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ARBORICULTURAL IMPACT ASSESSMENT

Land at 109 & 111 London Road, Cowplain

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ARBORICULTURAL IMPACT ASSESSMENT

Section	Subject Heading
1	INTRODUCTION & CLIENTS BRIEF
2	DOCUMENT DISCLOSURE STATEMENT
3	TREE SURVEY & ROOT PROTECTION AREA SCHEDULES & PLANS
4	CONSTRAINTS POSED BY EXISTING TREES – ASSESSMENT OF ABOVE & BELOW GROUND CONSTRAINTS
5	PROXIMITY OF STRUCTURES TO TREES
6	ARBORICULTURAL IMPACT ASSESSMENT
7	TREE PROTECTION PLAN
8	ARBORICULTURAL METHOD STATEMENT - HEADS OF TERMS
9	DEMOLITION AND CONSTRUCTION PHASES OF WORK - TREE MANAGEMENT – BARRIERS & GROUND PROTECTION
10	SITE MONITORING
11	LANDSCAPE DESIGN - SITE WORKS, LANDSCAPE OPERATIONS AND MANAGEMENT
12	CONCLUSIONS
Appendices	**Subject**
BH1	Tree Survey Schedule (*Figure 1 Flow Diagram from BS5837 + Tree Survey Notes*)
BH2	Tree Survey & Root Protection Area Schedule (*Root Protection Area Calculation Methodology*)
BH3	Tree Survey & Root Protection Area Plan [**BJH.01/02]**
BH4	Tree Retentions & Removals Plan [**BJH.03]** Tree Protection Plan–**BJH.04** *[+ BS5837 Extracts + Example Warning Notices*]
BH5	Tree Works Schedule
BH6	NJUG 10 Extract & Cellular Confinement System
BH7	Qualifications & Experience

1.0 INTRODUCTION & CLIENTS BRIEF

1.1 The proposed development site is currently derelict land with an extant approval to construct one bungalow on land to the rear of No.111 and this latest planning application involves the construction of four new dwellings to the rear of No.109 with associated access road and turning head.

1.2 There are trees on and immediately adjacent to this site that might be affected by the proposals which is why I have been employed to address the arboricultural issues and to compile all necessary reports and plans in support of the scheme.

1.3 In advising my clients I am duty bound to comply with 'Best Practice' industry guidelines and to follow the recommendations contained in BS5837:2012 – Tree In Relation To Design, Demolition and Construction Recommendations – adopting the sequential approach illustrated in the *Figure 1 Flow Diagram – The design and construction process and tree care.*

2.0 DOCUMENT DISCLOSURE STATEMENT

2.1 I have been supplied with a copy of the original Topographical Base Plan for this site at 1:200 scale.

2.2 I have also been supplied with a copy of the following Architects planning layout drawings:-

- **Planning Layout Drawing – 2013.078 – PL02- Jan2014- 1:200 scale**

2.3 I place total reliance on the accuracy of this drawing in advising my clients on tree issues and compiling this report.

3.0 TREE SURVEY & ROOT PROTECTION AREA (RPA) SCHEDULES & PLANS

3.1 The Tree Survey exercise was carried out on **5th March 2014** and a copy of the **Tree Survey Schedule** is included at **appendix BH1 [with explanatory notes].** The survey recorded **6** Individual trees and **3** Groups.

3.2 The data obtained from the Tree Survey exercise has been utilised to prepare the **Root Protection Area Schedule** and a copy of the RPA Schedule is included at **appendix BH2 [with explanatory notes].**

3.3 Plans have been prepared to accompany the schedules and a copy of the combined **Tree Survey and Root Protection Plan - BJH 01/02** is included at **appendix BH3.**

4.0 CONSTRAINTS POSED BY EXISTING TREES – ASSESSMENT OF ABOVE AND BELOW GROUND CONSTRAINTS

4.1 The RPA's have been plotted onto a copy of the Layout Proposals and the implications for the above and below ground impact on trees both on and adjacent to the development site has been recorded onto the **Tree Retentions and Removals Plan - BJH.03** with a finalised copy provided at **appendix BH4** [*N.B. wherever possible this will have been disclosed to the clients as part of the ongoing design process leading up to the submission of this report which is based on the Finalised Layout Proposals*].

5.0 PROXIMITY OF STRUCTURES TO TREES

BS5837 states that the default position should be that structures are located outside the RPA's of trees to be retained. However, where there is an overriding justification for construction within the RPA, technical solutions might be available that prevent damage to the tree(s) and requires that if operations within the RPA are proposed, the project arboriculturist should detail them and explain how they might be overcome or mitigated and this is dealt with in detail as part of the Arboricultural Impact Assessment at 6.0 below and shown on the **Tree Retentions & Removals Plan BJH.03** and **Tree Protection Plan BJH.04** both of which are included at **appendix BH4.**

6.0 ARBORICULTURAL IMPACT ASSESSMENT

6.1 The finalised planning layout drawing has been provided to me and an assessment made as to the viability of retaining trees as part of this layout in order that they meet the RPA requirements of BS5837 and the data is presented here in tabular format:-

Key: UF = Under footprint **YES** = tree can be retained and fully protected **YES (1)** = tree can be retained subject to mitigation measures being applied

NO-RSAM = tree will be removed for sound arboricultural management reasons **NO-RTFD** = tree cannot be retained and will be removed to facilitate development

Tree No	Species	Cat	Stem Diameter mm	BS5837:2012 Radial Prot. Area m	BS5837:2012 Polygon Area m^2	Distance from Site Features (see key above)	Can Tree Be Retained (see key above)
1	Pedunculate Oak *Quercus robur*	B1	780	9.4	275	15m+ to turning head 20m+ to building	**YES**
Grp 1	Hawthorn (*Crataegus*) Sycamore (*Acer*) Yew (*Taxus*)	C2	100 to 150	1.2 1.8	5 10	5m at closest point to turning head 10m+ at closest point to buildings	**YES**
2	Pedunculate Oak *Quercus robur*	C1	860	10.3 Reduced by 20% to 8.3m	335 219	5.4m to turning head 10.5m to new building	**YES (1)**
3	Pedunculate Oak *Quercus robur*	C1	800	9.6 Reduced by 15% to 8.2m	290 212	5.2m to turning head 9.7m to new building	**YES (1)**
Grp 2	Goat Willow (*Salix*) Privet (*Ligustrum*) Yew (*Taxus*)	C2	150 to 200	1.8 2.4	10 18	11m+ to new garage	**YES**
4	Pedunculate Oak *Quercus robur*	B1	470	5.6	100	12.5m to new garage	**YES**
5	Silver Birch *Betulus pendula*	A1	250 #	3.0	28	6.5m to new garage 8.5m to new building	**YES**
6	Pedunculate Oak *Quercus robur*	C1	400 #	4.8	72	6.8m to new garage 10.5m to new buildings	**YES**
Grp 3	Grey Willow (*Salix*) *x 2 of*	C2	350	4.2	55	3.8m to new garage 11.5m to new building	**YES (1)**

6.2 **NO – RSAM**

There are **no (0)** trees within this category on this project which are recommended for removal for health and safety reasons regardless of any redevelopment proposals.

6.3 **NO – RTFD**

There are **no (0)** trees within this category on this project which cannot be retained with the proposed new layout.

6.4 **YES**

There are **4** trees and **2** groups in this category on this project which can be retained and fully protected in accordance with BS5837 recommendations (see **Tree Protection Plan BJH.04** at **appendix BH4** and full listing in schedule at 6.1 above).

T1- Pedunculate Oak; T4 - Pedunculate Oak; T5 – Birch; T6 - Pedunculate Oak and Group 1 & Group 2

6.5 **YES (1)**

There are **2** trees and **1** group in this category on this project where work will marginally intrude into their RPA's as listed at 6.1 above and as shown on the **TRR Plan BJH 03**:-

T2 – Pedunculate Oak

T3 – Pedunculate Oak – both of these trees are showing signs of dieback and low vigour and vitality which has lead to them being assessed as having reduced requirements for their RPA. The original RPA to the buildings has been met in any event but the back end of the turning head very minimally intrudes into the RPA – provided that they employ 'No Dig' porous solution to this area then the impact on these trees will be insignificant. It is suggested that this could be constructed with CellWeb cellular confinement modules retained by either treated pegged board edging or pinned railway sleepers. An example of this type of construction technique is included at **appendix BH6.**

Group 3 – Grey Willows – these trees have been heavily lopped and topped in the past and will need to be pruned back again in order for them to be retained – the construction layout plans show these trees to be removed but I believe that there is an option to retain them for screening and separation purposes if desired. Alternatively they can be removed and a new hedge planted along this boundary line.

7.0 TREE PROTECTION PLAN

7.1 The Tree Protection Plan (TPP) has been superimposed on the layout plan based on the topographical survey.

7.2 The plan clearly indicates the location of protective barriers to form a Construction Exclusion Zone around the retained trees.

7.3 The TPP has been annotated with descriptive text and a key and additional information prepared as a separate text document where necessary that must accompany the Plan at all stages e.g. when handed to the Site Manager.

7.4 Where there is a need for Ground Protection this has been clearly indicated and a specification provided for same.

7.5 The following is a list of factors that BS recommends need to be considered to avoid disturbance to the barriers during the construction process – some of these matters will have been dealt with in this report but in the event that there are issues that have not been satisfactorily resolved at this juncture it is suggested that the Planning Authority seek detailed responses as part of Method Statement submissions to satisfy Planning Conditions:-

a) site construction access; b) the intensity and nature of the construction activity; c) contractors car parking; d) phasing of construction works; e) the space needed for foundation excavations and construction works; f) the availability of special construction techniques; g) the location and space needed for all temporary and permanent apparatus and service runs, including foul and surface water drains, land drains, soakaways, gas, oil, water, electricity, telephone, television or other communication cables; h) all changes in ground levels, including the location of retaining walls, steps and making adequate allowance for foundations of walls; i) working space for cranes, plant, scaffolding and access during works; j) space for site huts, temporary toilet facilities (including their drainage) and other temporary structures; k) the type and extent of landscape works which will be needed within the protected areas, and the effects these will have on the root system; l) space for storing (whether temporary or long term) materials, spoil and fuel and the mixing of cement and concrete and m) the effects of slope on the movement of potentially harmful liquid spillages towards or into protected areas.

8.0 ARBORICULTURAL METHOD STATEMENT – Heads of Terms

8.1 At the Planning Application stage BS5837 requires that the arboriculturist is to identify any areas where the ability to achieve a successful outcome for retained trees on a development site can be defined in principle. Then under 'Heads of Terms' list those areas where more detailed input from other specialists is required and/or where more technical information is required to be submitted to satisfy Planning Conditions. In this particular instance it is unlikely that this will be a requirement but for completeness the following observations are provided:-

8.2 ***Above Ground Formed – Pile and Beam Footings*** – not required on this project and all foundations can be of standard open trench form.

8.3 ***Ground Protection Measures*** – the location where these may be required on this project has been shown on the Tree Protection Plan BJH04 and the specification for this will be as follows:-

a) For Pedestrian Movements Only – a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane.

8.4 ***Utility Service Connections*** – no specific information has been provided to me for consideration at this juncture and this matter may therefore need to be dealt with in a separate Method Statement to satisfy a planning condition – although I am assured that all such connections and new service runs will be outside of tree RPA's.

8.5 ***Highway safety and visibility splays and Access Arrangements –*** this site utilises an existing and approved access point.

8.6 ***Site Huts/Toilets/Materials Storage & Site Compound/Cement Mixing Area*** – this information has not been made available to me at this time but there is space for all of these facilities to be incorporated within this development site provided that it is built out in a phased manner so that there will not be any adverse impact on retained trees RPA's. It is suggested that this can best be shown on a Site Set-Up drawing to be provided to satisfy a planning condition.

8.7 ***Substations, refuse stores, lighting, signage, solar collectors, satellite dishes and CCTV sightlines -*** full details are not available at this stage and **IF** they are applicable to this project and required then this would need to be addressed within a separate Method Statement.

9.0 DEMOLITION AND CONSTRUCTION PHASES OF WORK

TREE MANAGEMENT - BARRIERS AND GROUND PROTECTION

9.1 Based on the finalised layout for the development a schedule of tree works will be required listing all trees that require work as follows :-

- Trees for removal to enable development to take place and also any stump grinding works required. – None required on this project.
- Remedial tree works, including those required to establish acceptable levels of risk and management in the context of the proposed land use – See Tree Works Schedule accompanying this report.
- Access facilitation pruning - None required on this project.

9.2 A Tree Works Schedule forms part of this report and is included at **appendix BH5** and this work is to be undertaken prior to the erection of any Protective Fencing as free access will be required to all areas of the site – although restrictions will need to be applied when accessing areas within tree RPA's with machinery and suitable ground protection measures must be applied in accordance with Section 8.3 of this report.

9.3 All trees that are being retained on site are to be protected by barriers and/or ground protection before any materials or machinery are brought onto site **and most importantly before any demolition, stripping of soil or commencement of construction works. Where demolition works are required on a given project all buildings will be pulled in on their own footprints and machinery must always operate outside of retained tree RPA's with fencing extended or facilitation pruning works carried out to ensure that demolition vehicles cannot damage the crowns of trees.**

9.4 Barriers are to be 'Fit For Purpose' to exclude demolition/construction activity and must be maintained to ensure that they remain rigid and complete and in the original setting out positions. These checks will need to be incorporated into a schedule of site monitoring visits to be agreed with the clients subject to phased development operations and subsequently copies of these site visit reports will need to be copied in to the Council.

9.5 The default position will always be to erect fencing to the standard illustrated at Figure 2 (see drawing and specification at **appendix BH4**).

9.6 Where site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification will be agreed and deployed.

9.7 Where the fencing is to be erected over retained hard surfacing (whether temporary or permanent) it may not prove feasible or is undesirable to drive pins or struts down through the surfacing and through protected tree roots with the resultant high risk of damage. In these circumstances it will be appropriate to erect scaffolding as illustrated at Figure 3 (see drawing and specification at **appendix BH4**).

9.8 Where construction working space or temporary construction access is justified within the RPA, this will be facilitated by a set-back in the alignment of the protective fencing and the appropriate levels of Ground Protection laid.

9.9 In any event the appropriate levels of protection for either Protective Fencing or Ground Protection will be illustrated and specified on the Tree Protection Plan and in its accompanying text.

9.10 A copy of the **Tree Protection Plan – BJH.04** is to be pinned up in the offices/mess hut on site for all site staff to see. The area within the fenced off exclusion zone is to be regarded as **sacrosanct** and the fencing shall not be taken down or relocated at any time without the prior written approval of the monitoring arboriculturist or local authority tree officer, unless this has already been agreed as part of the planning application consent process and is detailed in writing and shown on a plan.

The following prohibitions shall apply within the area enclosed by the Tree Protection Fencing :-

- **No** mechanical digging or scraping once the initial ground cover vegetation has been cleared and the site fenced off.
- **No** storage of plant, equipment or materials
- **No** vehicular or plant access
- **No** fire lighting
- **No** handling, discharge or spillage of any chemical substance, including cement washings
- **No** action likely to cause localised water-logging
- **No** change in ground levels

9.11 In addition any materials whose accidental spillage would cause damage to a tree are to be stored, handled or mixed well away from the outer edges of a retained trees RPA or if this is unavoidable then appropriate polythene sheeting must be laid to prevent soil contamination.

9.12 It will be very important for any vehicle drivers to have undergone a pre-contract induction session where the trees to be retained are to be highlighted and the need for care and attention when working nearby with wide loads; tall loads; plant with swinging booms, jibs and counterweights (including drilling rigs) or slewing hydraulic arms to avoid contact with trunks or crowns.

10.0 SITE MONITORING

- BS5837 recommends that wherever trees on or adjacent to a site have been identified within the tree protection plan for protection measures, there should be an auditable system of arboricultural site monitoring.
- This should extend to direct arboricultural monitoring whenever construction and development activity is to take place within or adjacent to any RPA.
- Existing planning regulations include the provision for local authorities to enforce planning requirements so it is important that local authorities recognise the need to include a Condition to require the supply and approval of an auditable system of arboricultural site monitoring.
- The project arboriculturist appointed by the developer can help monitor site activity, but enforcement is the responsibility of the local authority.
- ***On this project ongoing monitoring after the initial site set up is unlikely to be required because the trees will all be behind protective fencing and thus protected from development activity.***
- It is recommended that a pre-start meeting is held– prior to the Construction Phase of works - which should be held out on site with the Contracts Manager to inspect the protective fencing and ground protection measures to verify that they are fit for purpose and in the correct location according to the Tree Protection Plan before any works take place on site.
- There will undoubtedly be a requirement for a detailed schedule of site monitoring works to cover the need for site visits and monitoring but this cannot be accurately defined at this juncture as the phasing of operations is not available to me for comment and it is therefore suggested that this matter is best dealt with as a requirement of a planning condition when the full phased program of works has been determined for this project.

11.0 LANDSCAPE DESIGN - SITE WORKS, LANDSCAPE OPERATIONS AND MANAGEMENT

11.1 As an arboriculturist my level of expertise does not extend to Landscape design which is a specialist area requiring expert input from a Landscape Architect with a detailed scheme to accompany the planning application. However, there is no actual tree loss as part of this project so no mitigation planting will be required but some enhancement planting of trees and shrubs may be planned and if so this would need to be agreed with the Council to satisfy a planning condition.

12.0 CONCLUSIONS

- This report covers the overall principle of development and recommends mitigation measures where necessary for the layout being proposed.
- There is no tree loss proposed and all retained trees can be adequately protected in accordance with BS5837 recommendations.
- Provided that the methodology prescribed in this report is strictly adhered to and all subsequent Method Statements are provided to satisfy planning conditions I am of the opinion that the retained trees will readily cope with the levels of disturbance anticipated and survive the development works without adverse impact.

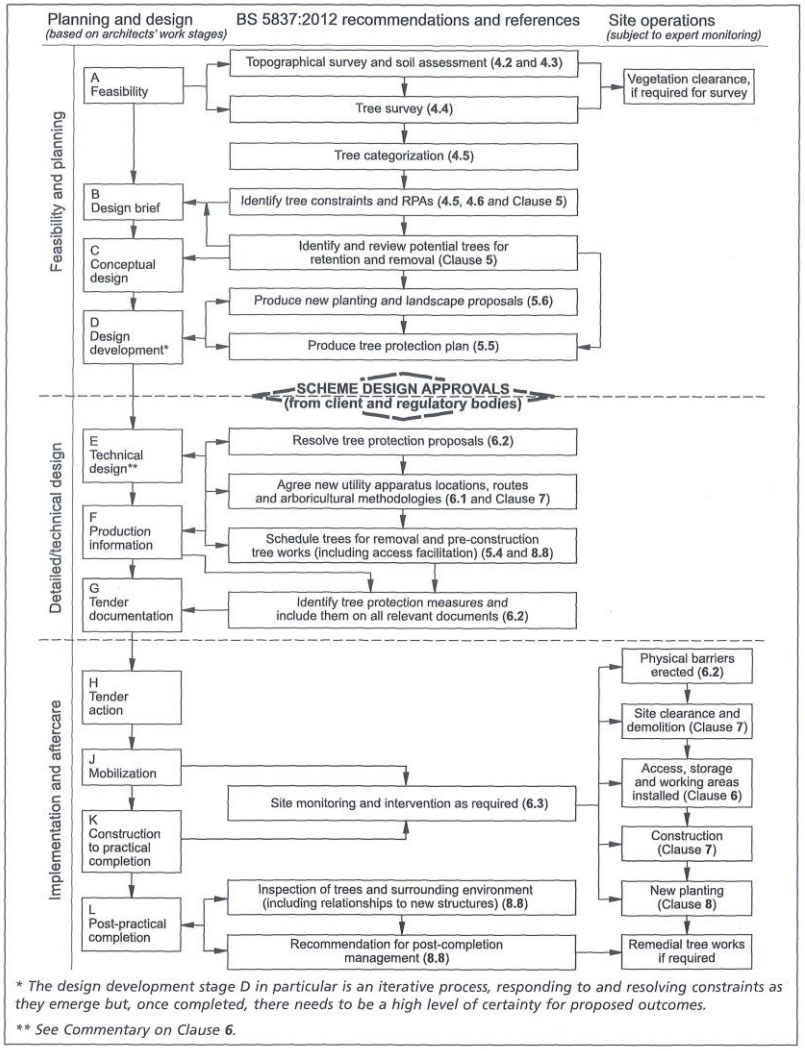
Bernie Harverson
arboricultural consultant

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**

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TREE SURVEY SCHEDULE

Client :

Site Location : **109/111 London Road, Cowplain**

Surveyor : Bernie Harverson *M.Arb.*

Date Surveyed : 5th March 2014

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	Pedunculate Oak *Quercus robur*	14	780	N4 E6 S8 W6	4	5s	M	Epicormics-contorted trunk-some dieback-small and large diameter deadwood and stubs	Remove all deadwood	>40	B1
Grp 1	Hawthorn (*Crataegus*) Sycamore (*Acer*) Yew (*Taxus*)	3 to 5	100 to 150	N2 E2 S2 W2	0	0 nesw	Y	Some fallen and root-plate lifted-part of an old hedge line where these young trees have seeded themselves into the line	No work considered essential at time of survey	20-30	C2
2	Pedunculate Oak *Quercus robur*	20	860	N8 E8 S2 W8	3	3w	M	Ivy smothering base and trunk-epicormics-crown shape dictated by group pressure-low crown density-significant dieback in upper reaches-two trees that effectively make up one crown area	Remove all deadwood, broken branches ,hangers , split branches and dieback	>40	C1
3	Pedunculate Oak *Quercus robur*	18	800	N2 E8 S8 W8	3	3w	M	Ivy smothering base and trunk-epicormics-crown shape dictated by group pressure-two trees that effectively make up one crown area	Remove all deadwood, broken branches ,hangers , split branches and any dieback	>40	C1
Grp 2	Goat Willow (*Salix*) Privet (*Ligustrum*) Yew (*Taxus*)	3 to 5	150 to 200	N3 E3 S3 W3	0	0 nesw	Y	Part of an old hedge line where these young trees have seeded themselves into the line	No work considered essential at time of survey	20-30	C2
4	Pedunculate Oak *Quercus robur*	10	470	N6 E4 S4 W6	3	2n	SM	Ivy smothering base-small diameter deadwood	No work considered essential at time of survey	>40	B1
5	Silver Birch *Betulus pendula*	12	250 #	N4 E3 S3 W3	2	2s	SM	Unable to access-off site tree- good shape and form	No work considered essential at time of survey	>40	A1

6	Pedunculate Oak *Quercus robur*	10	400 #	N1 E6 S4 W2	3	3e	Y	Off site tree-leans east-contorted trunk-previously heavily topped-poor quality tree	No work considered essential at time of survey	>40	C1
Grp 3	Grey Willow (*Salix*) *x 2 of*	6	350	N4 E4 S2 W2	2	2 nesw	EM	Ivy smothering base, trunks and through crowns and totally dominating-crown shape dictated by group pressure-previously heavily topped-poor quality trees-crowns are a mass of re-growth from an old pruning point-heavily lopped back on south and west sides over boundary line	Sever ivy	>40	C2

Bernie Harverson
arboricultural consultant

BH 2

Tree Root Protection Area Schedule

+ BS5837 RPA Calculation Methodology

4.6 Root Protection Area (RPA)

4.6.1 For single stem trees, the RPA should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter measured at a height of 1.5m from ground level.

For trees with more than one stem, one of two calculation methods should be used as illustrated and explained below.

a) For trees with 2 to 5 stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \ldots \text{ up to } + (\text{stem diameter } 5)^2}$$

In words - measure the diameter of each of the stems – square each one and add it to the next - finally assess the square root of the combined total to derive one measurement which you look up in Table D.1 to find the radial RPA and area measurement equivalent to the area of a circle with that radius - in case you have to apply a polygon protection zone [see at 4.6.2 below].

The calculated RPA for each tree is to be capped at 707 m^2

b) For trees with more than five stems the combined stem diameter should be calculated as follows:

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

In words – measure all of the stem diameters – add them all together and divide by the total number of stems (= mean stem diameter) – then square this figure – then multiply that figure by the total number of stems and then finally assess the square root of that figure to derive one measurement which you look up in Table D.1 to find the radial RPA and area measurement equivalent to the area of a circle with that radius - in case you have to apply a polygon protection zone [see at 4.6.2 below].

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

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

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

Root Protection Area – Table D1

The RPA's given in Table D.1 should be used for single stem trees and the equivalent resultant combined stem diameter for multi-stemmed trees

Stem Diam. mm	Circle Rad. m	Area m^2	Stem Diam. mm	Circle Rad. m	Area m^2	Stem Diam. mm	Circle Rad. m	Area m^2	Stem Diam. mm	Circle Rad. m	Area m^2	Stem Diam. mm	Circle Rad. m	Area m^2
75	0.9	3	**310**	3.7	43	**545**	6.5	134	**780**	9.4	275	**1015**	12.2	466
80	1.0	3	**315**	3.8	45	**550**	6.6	137	**785**	9.4	279	**1020**	12.2	471
85	1.0	3	**320**	3.8	46	**555**	6.7	139	**790**	9.5	282	**1025**	12.3	475
90	1.1	4	**325**	3.9	48	**560**	6.7	142	**795**	9.5	286	**1030**	12.4	480
95	1.1	4	**330**	4.0	49	**565**	6.8	144	**800**	9.6	290	**1035**	12.4	485
100	1.2	5	**335**	4.0	51	**570**	6.8	147	**805**	9.7	293	**1040**	12.5	490
105	1.3	5	**340**	4.1	52	**575**	6.9	150	**810**	9.7	297	**1045**	12.5	494
110	1.3	5	**345**	4.1	54	**580**	7.0	152	**815**	9.8	301	**1050**	12.6	499
115	1.4	6	**350**	4.2	55	**585**	7.0	155	**820**	9.8	304	**1055**	12.7	504
120	1.4	7	**355**	4.3	57	**590**	7.1	157	**825**	9.9	308	**1060**	12.7	508
125	1.5	7	**360**	4.3	59	**595**	7.1	160	**830**	10.0	312	**1065**	12.8	513
130	1.6	8	**365**	4.4	60	**600**	7.2	163	**835**	10.0	315	**1070**	12.8	518
135	1.6	8	**370**	4.4	62	**605**	7.3	166	**840**	10.1	319	**1075**	12.9	523
140	1.7	9	**375**	4.5	64	**610**	7.3	168	**845**	10.1	323	**1080**	13.0	528
145	1.7	10	**380**	4.6	65	**615**	7.4	171	**850**	10.2	327	**1085**	13.0	533
150	1.8	10	**385**	4.6	67	**620**	7.4	174	**855**	10.3	331	**1090**	13.1	538
155	1.9	11	**390**	4.7	69	**625**	7.5	177	**860**	10.3	335	**1095**	13.1	542
160	1.9	12	**395**	4.7	71	**630**	7.6	180	**865**	10.4	339	**1100**	13.2	547
165	2.0	12	**400**	4.8	72	**635**	7.6	182	**870**	10.4	342	**1105**	13.3	552
170	2.0	13	**405**	4.9	74	**640**	7.7	185	**875**	10.5	346	**1110**	13.3	557
175	2.1	14	**410**	4.9	76	**645**	7.7	188	**880**	10.6	350	**1115**	13.4	562
180	2.2	15	**415**	5.0	78	**650**	7.8	191	**885**	10.6	354	**1120**	13.4	568
185	2.2	16	**420**	5.0	80	**655**	7.9	194	**890**	10.7	358	**1125**	13.5	573
190	2.3	16	**425**	5.1	82	**660**	7.9	197	**895**	10.7	362	**1130**	13.6	578
195	2.3	17	**430**	5.2	84	**665**	8.0	200	**900**	10.8	366	**1135**	13.6	583
200	2.4	18	**435**	5.2	86	**670**	8.0	203	**905**	10.9	371	**1140**	13.7	588
205	2.5	19	**440**	5.3	88	**675**	8.1	206	**910**	10.9	375	**1145**	13.7	593
210	2.5	20	**445**	5.3	90	**680**	8.2	209	**915**	11.0	379	**1150**	13..8	598
215	2.6	21	**450**	5.4	92	**685**	8.2	212	**920**	11.0	383	**1155**	13.9	604
220	2.6	22	**455**	5.5	94	**690**	8.3	215	**925**	11.1	387	**1160**	13.9	609
225	2.7	23	**460**	5.5	96	**695**	8.3	219	**930**	11.2	391	**1165**	14.0	614
230	2.8	24	**465**	5.6	98	**700**	8.4	222	**935**	11.2	396	**1170**	14.0	619
235	2.8	25	**470**	5.6	100	**705**	8.5	225	**940**	11.3	400	**1175**	14.1	625
240	2.9	26	**475**	5.7	102	**710**	8.5	228	**945**	11.3	404	**1180**	14.2	630
245	2.9	27	**480**	5.8	104	**715**	8.6	231	**950**	11.4	408	**1185**	14.2	635
250	3.0	28	**485**	5.8	106	**720**	8.6	235	**955**	11.5	413	**1190**	14.3	641
255	3.1	29	**490**	5.9	109	**725**	8.7	238	**960**	11.5	417	**1195**	14.3	646
260	3.1	31	**495**	5.9	111	**730**	8.8	241	**965**	11.6	421	**1200**	14.4	652
265	3.2	32	**500**	6.0	113	**735**	8.8	244	**970**	11.6	426	**1205**	14.5	657
270	3.2	33	**505**	6.1	115	**740**	8.9	248	**975**	11.7	430	**1210**	14.5	662
275	3.3	34	**510**	6.1	118	**745**	9.0	251	**980**	11.8	435	**1215**	14.6	668
280	3.4	35	**515**	6.2	120	**750**	9.0	255	**985**	11.8	439	**1220**	14.6	673
285	3.4	37	**520**	6.2	122	**755**	9.1	258	**990**	11.9	443	**1225**	14.7	679
290	3.5	38	**525**	6.3	125	**760**	9.1	261	**995**	11.9	448	**1230**	14.8	685
295	3.5	39	**530**	6.4	127	**765**	9.2	265	**1000**	12.0	452	**1235**	14.8	690
300	3.6	41	**535**	6.4	130	**770**	9.2	268	**1005**	12.1	457	**1240**	14.9	696
305	3.7	42	**540**	6.5	132	**775**	9.3	272	**1010**	12.1	462	**1245**	14.9	701
												1250	15.0	707

Bernie Harverson arboricultural consultant

ROOT PROTECTION ZONE/AREA SCHEDULE

Client :

Site Location : 109/111 London Road, Cowplain

Tree No.	Tree Species	Cat	Diam mm	BS5837:2012 Table1 Radial Protection Zone m	BS5837:2012 Table D1 Polygon Area m^2	Is An Offset Required To Cater For Existing Rooting Pattern Restrictions
1	Pedunculate Oak *Quercus robur*	B1	780	9.4	275	NO – free rooting to all directions
Grp 1	Hawthorn (*Crataegus*) Sycamore (*Acer*) Yew (*Taxus*)	C2	100 to 150	1.2 1.8	5 10	NO – free rooting to all directions
2	Pedunculate Oak *Quercus robur*	C1	860	10.3 Reduced by 20% to 8.3m	335 219	**YES** – competition from T3 tree will restrict the rooting pattern + low vigour and vitality mean that there is scope to reduce the RPA given that the area quoted is for a full crowned tree in good health
3	Pedunculate Oak *Quercus robur*	C1	800	9.6 Reduced by 15% to 8.2m	290 212	**YES** – competition from T2 tree will restrict the rooting pattern + low vigour and vitality (slightly better than T2) mean that there is scope to reduce the RPA given that the area quoted is for a full crowned tree in good health
Grp 2	Goat Willow (*Salix*) Privet (*Ligustrum*) Yew (*Taxus*)	C2	150 to 200	1.8 2.4	10 18	NO – free rooting to all directions
4	Pedunculate Oak *Quercus robur*	B1	470	5.6	100	NO – free rooting to all directions
5	Silver Birch *Betulus pendula*	A1	250 #	3.0	28	NO – free rooting to all directions
6	Pedunculate Oak *Quercus robur*	C1	400 #	4.8	72	NO – free rooting to all directions
Grp 3	Grey Willow (*Salix*) *x 2 of*	C2	350	4.2	55	NO – free rooting to all directions

Bernie Harverson
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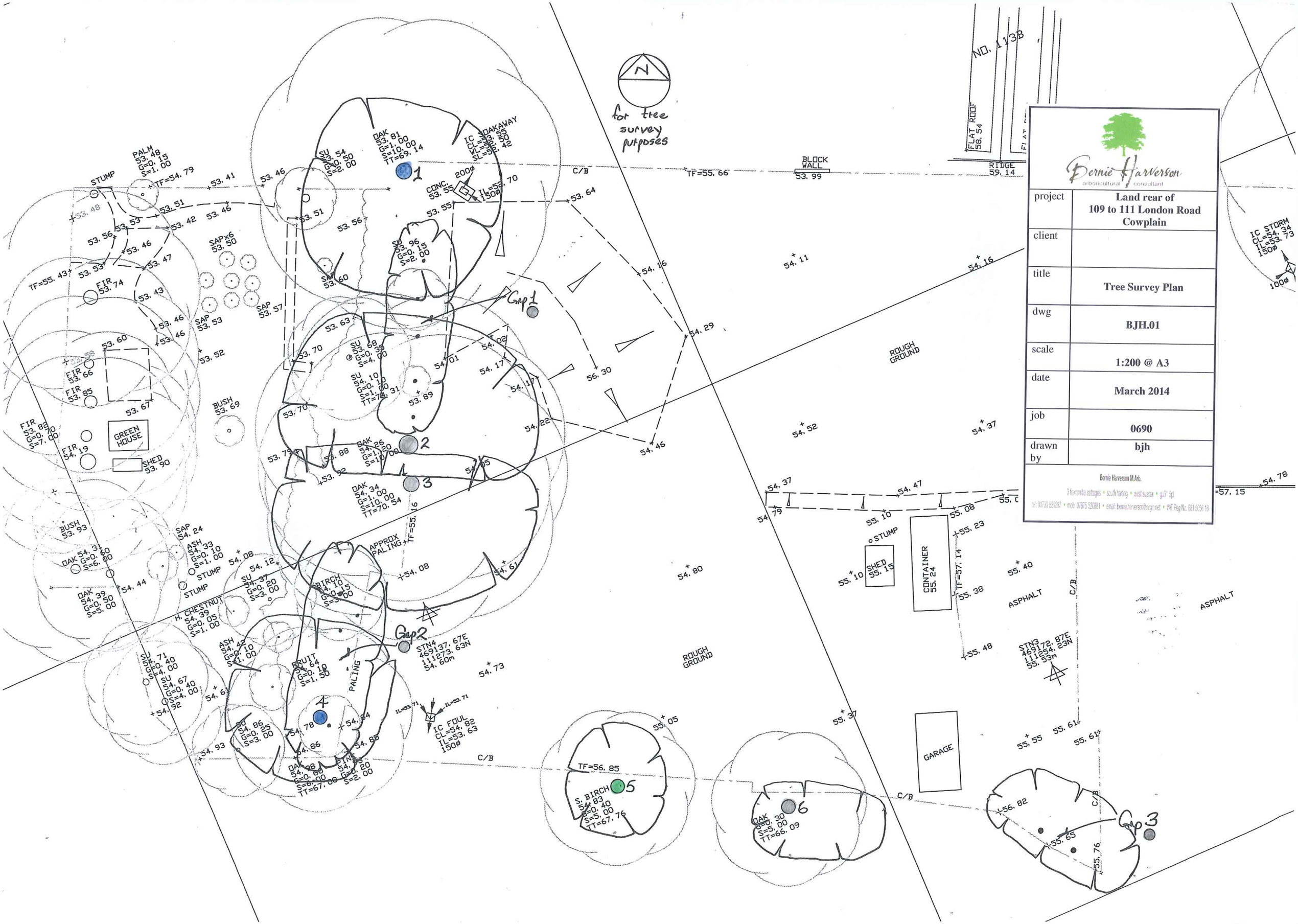
BH 3

Tree Survey BJH 01
& Root Constraints Plan BJH 02



Bernie Harverson
arboricultural consultant

project	Land rear of 109 to 111 London Road Cowplain
client	
title	Tree Survey Plan
dwg	BJH.01
scale	1:200 @ A3
date	March 2014
job	0690
drawn by	bjh

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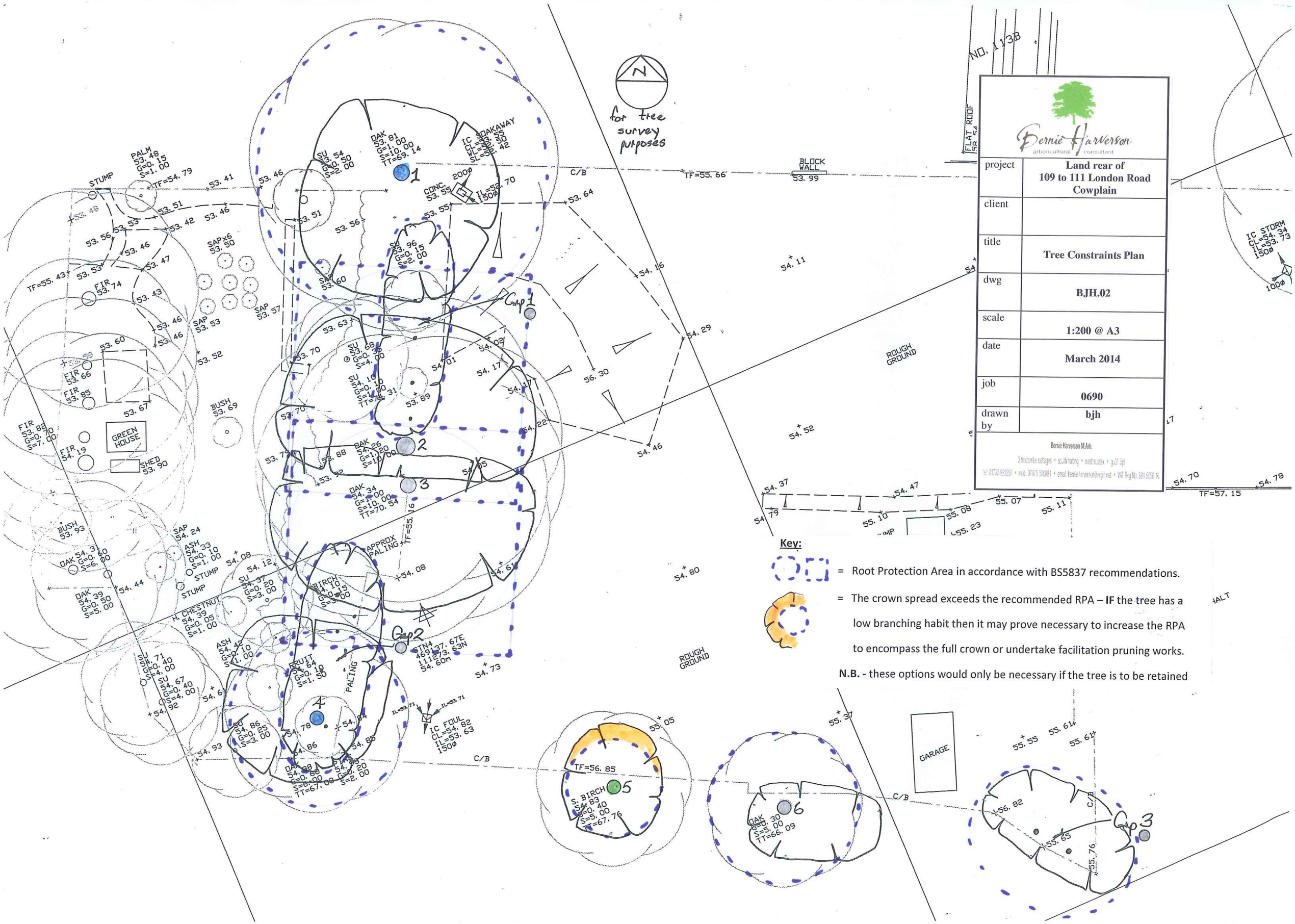

Key:

= Root Protection Area in accordance with BS5837 recommendations.

= The crown spread exceeds the recommended RPA – **IF** the tree has a low branching habit then it may prove necessary to increase the RPA to encompass the full crown or undertake facilitation pruning works.

N.B. - these options would only be necessary if the tree is to be retained

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arboricultural consultant

BH 4

Tree Retentions & Removals Plan BJH 03
and Tree Protection Plan BJH 04

A3

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Revisions

Rev	Date	Drawn	Check'd	Details

Bernie Harverson arboricultural consultant

project	Land rear of 109 to 111 London Road Cowplain
client	
title	Tree Retentions & Removals Plan
dwg	BJH.03
scale	1:200 @ A3
date	March 2014
job	0690
drawn by	bjh

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1. Site Layout
scale 1:200

Key:

= Trees which are to be retained and fully protected

= Trees which cannot be accomodated and will need to be removed to facilitate the proposed layout

= The extent of pruning recommended if this group is to be retained

- Existing trees
- New grassed lawns to rear garden
- Buff permeable block paving
- Charcoal block paving
- New shurb planting
- Concrete paving slabs
- Front door location
- Rear access location
- Garage access location
- New 1.8m high close boarded timber fence

Project	Title
109 London Road Cowplain	Site Plan

Scale	Date	Drawn	Checked	Job No.	Drawing. No.	Revision
1: 200	Jan 2014			2013.078	PL.02	

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Revisions

Rev	Date	Drawn	Check'd	Details

Bernie Harverson arboricultural consultant

project	Land rear of 109 to 111 London Road Cowplain
client	
title	Tree Protection Plan
dwg	BJH.04
scale	1:200 @ A3
date	March 2014
job	0690
drawn by	bjh

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A3

Gap 1

Gap 2

Gap 3

Approved turning head

Approved bungalow FFL 54.60

Plot 4 parking space

Plot 4 garage space

3 bed 2 storey house

3 bed 2 storey house

Plot 3 parking space

Plot 2 parking space

Plot 3 garage space

Plot 2 garage space

3 bed 2 storey house

3 bed 2 storey house

Plot 1 parking space

Plot 1 garage space

PLOT 4

PLOT 3

PLOT 2

PLOT 1

2

3

4

5

6

1. Site Layout
scale 1:200

0 5m 10m 15m

Key:

= The setting out positions for the Protective Fencing in accordance with BS5837:2012 recommendations – Section 6.2 and Figures 2

= There will be a need to apply Ground Protection measures in this area in accordance with BS5837:2012 recommendations – Section 6.2.3.3 a)

= Porous Turning Head of 'No Dig' construction form – suggested 'Cellweb' filled with washed aggregate with a treated and pegged board edging or pinned railway sleepers

Existing trees

New grassed lawns to rear garden

Buff permeable block paving

Charcoal block paving

New shurb planting

Concrete paving slabs

Front door location

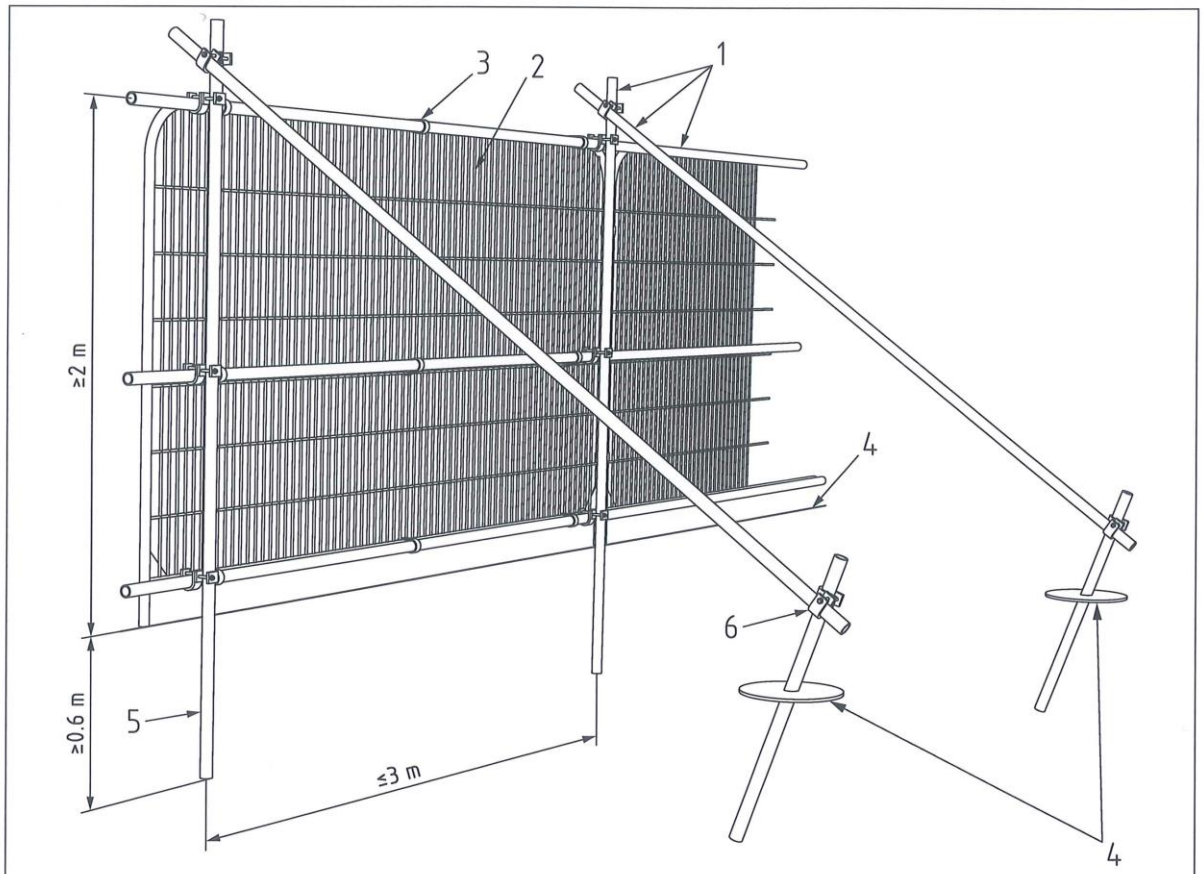
Rear access location

Garage access location

New 1.8m high close boarded timber fence

Project	Title					
109 London Road Cowplain	Site Plan					
Scale	Date	Drawn	Checked	Job No.	Drawing. No.	Revision
1: 200	Jan 2014			2013.078	PL.02	

Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles

2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels

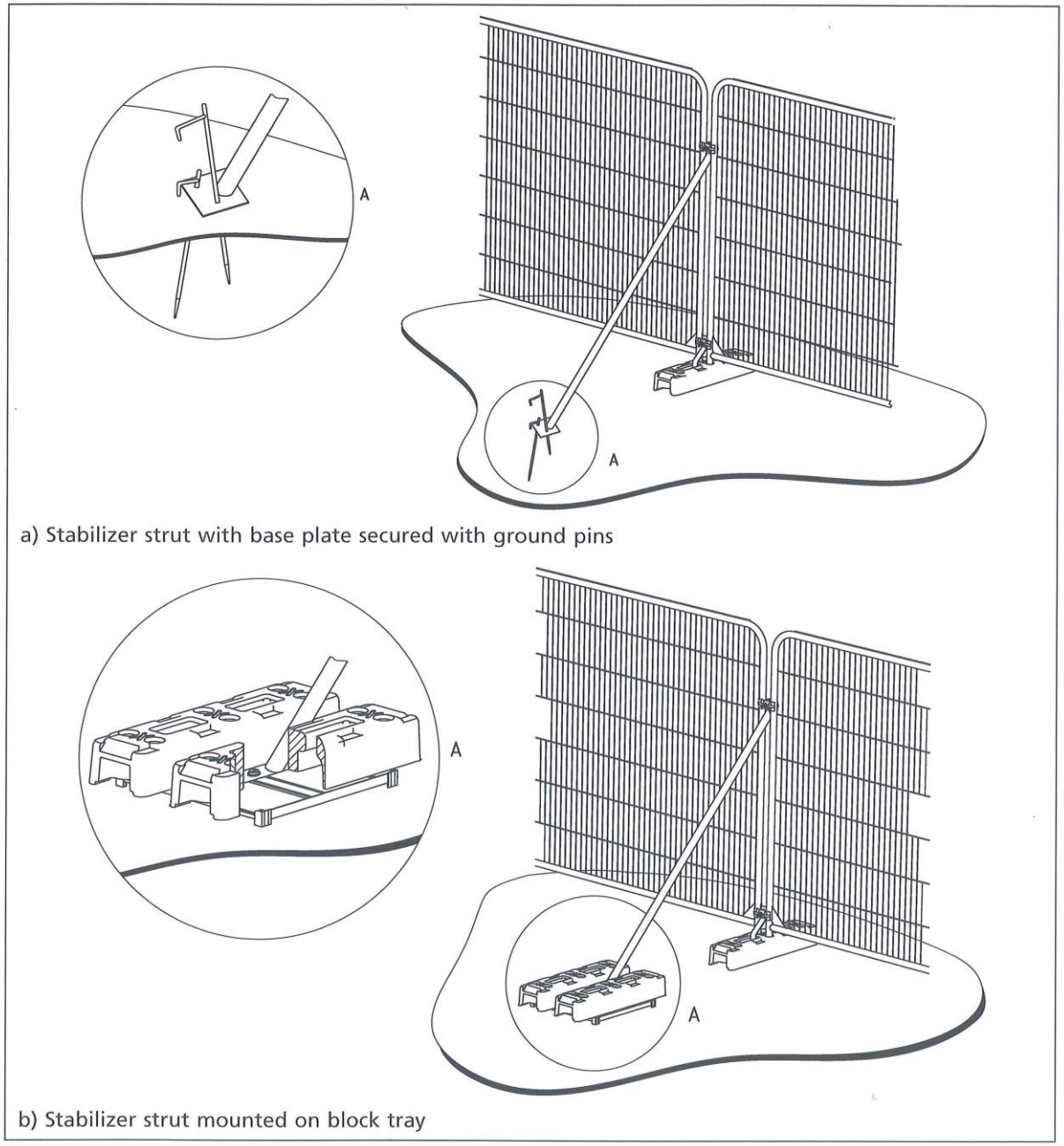
3 Panels secured to uprights and cross-members with wire ties

4 Ground level

5 Uprights driven into the ground until secure (minimum depth 0.6 m)

6 Standard scaffold clamps

Figure 3 **Examples of above-ground stabilizing systems**



a) Stabilizer strut with base plate secured with ground pins

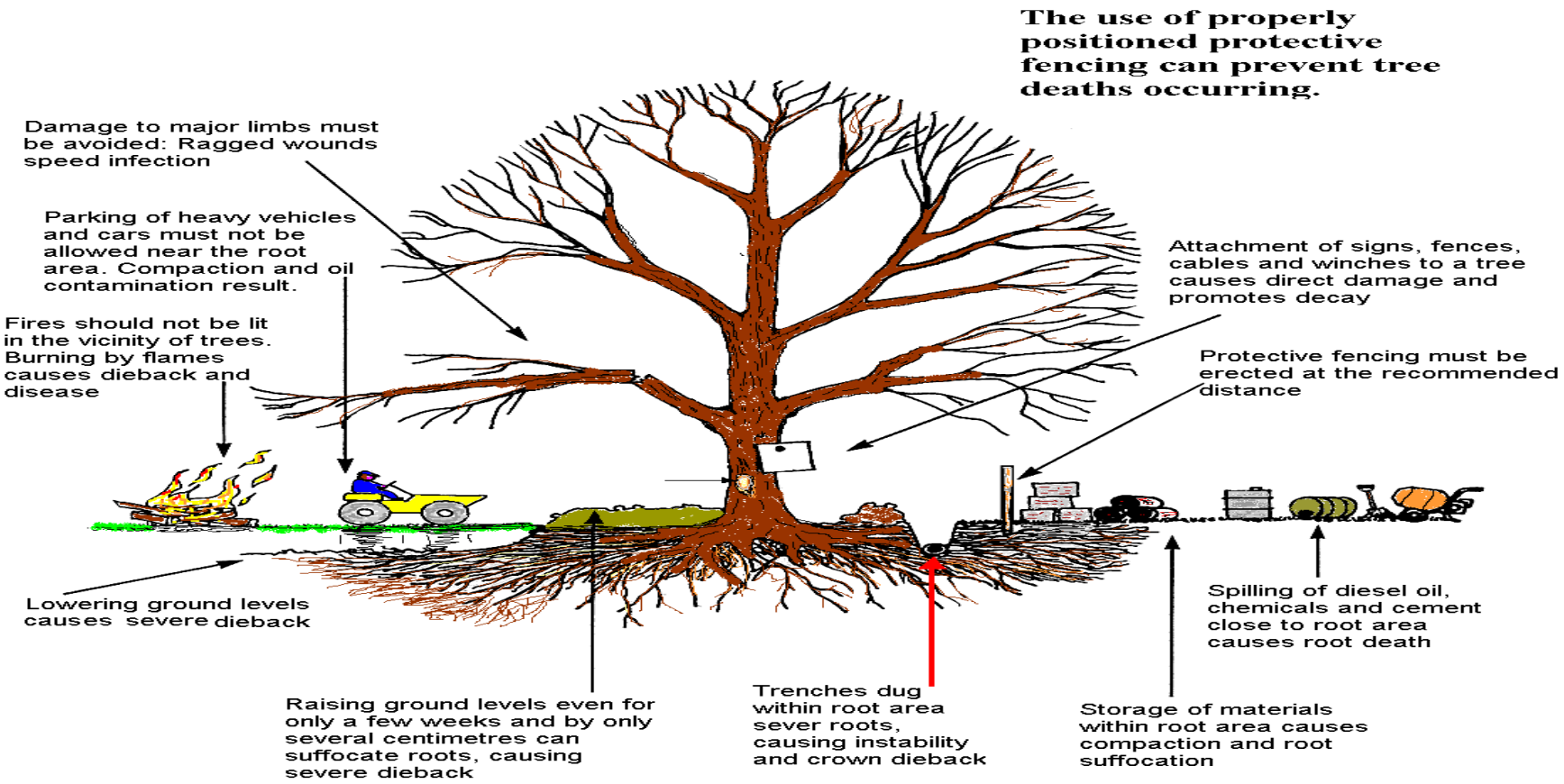
b) Stabilizer strut mounted on block tray

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

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arboricultural consultant

BH 5

Tree Works Schedule

0690.bjh.Mar14

TREE WORK SPECIFICATION

Site Location : 109/111 London Road, Cowplain

- ***Where branches are to be removed cuts close to the trunk are to be made as shown in Figure 2 of BS3998:2010 and all shortened branches are to be cut adjacent to a living growth point.***
- ***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	Pedunculate Oak *Quercus robur*	• Remove all deadwood to make safe
Grp 1	Hawthorn (*Crataegus*) Sycamore (*Acer*) Yew (*Taxus*)	• Remove or coppice all rootplate lifted or fallen trees within the hedge line
2	Pedunculate Oak *Quercus robur*	• Remove all deadwood and dieback and also any broken/split or hanging branches that are found within the crown • Following on from the above it may prove necessary to lightly reduce and reshape the remainder of the crown to improve its overall shape and form and give a sound base from which to encourage new growth and expansion.
3	Pedunculate Oak *Quercus robur*	• Remove all deadwood and dieback and also any broken/split or hanging branches that are found within the crown • Following on from the above it may prove necessary to lightly reduce and reshape the remainder of the crown to improve its overall shape and form and give a sound base from which to encourage new growth and expansion.
Grp 2	Goat Willow (*Salix*) Privet (*Ligustrum*) Yew (*Taxus*)	• No works are required at this time
4	Pedunculate Oak *Quercus robur*	• Sever ivy at ground level to prevent it from becoming a future problem in this small tree
5	Silver Birch *Betulus pendula*	• No works are required at this time
6	Pedunculate Oak *Quercus robur*	• No works are required at this time
Grp 3	Grey Willow (*Salix*) *x 2 of*	• Either coppice low down or remove and replace with a new hedge

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BH 6

NJUG 10 Extract & Cellular Confinement Details

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 tress 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 top 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 belong 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 cab 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 cause by root activity. Special precautions for differential movement should be incorporated where services join rigid structures founded at a different depth to the service.

Bernie Harverson
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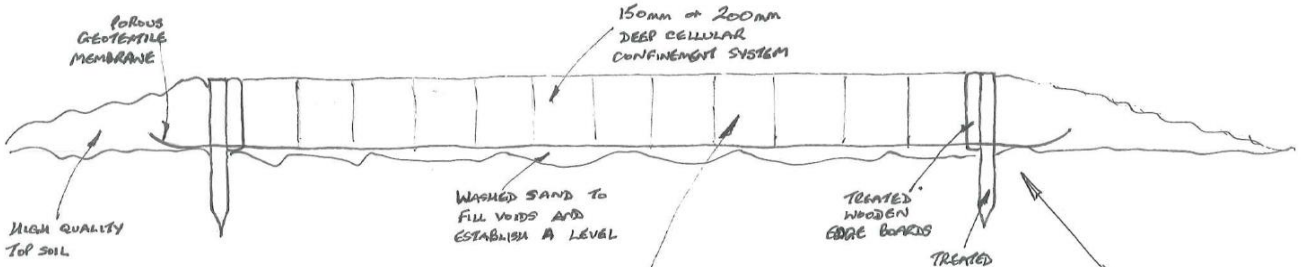
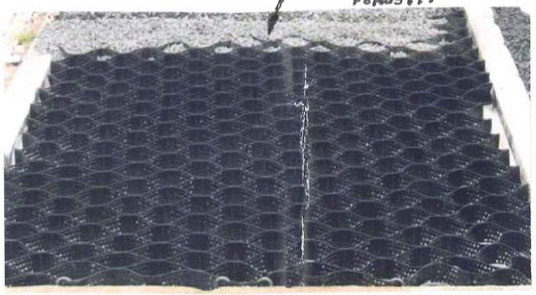
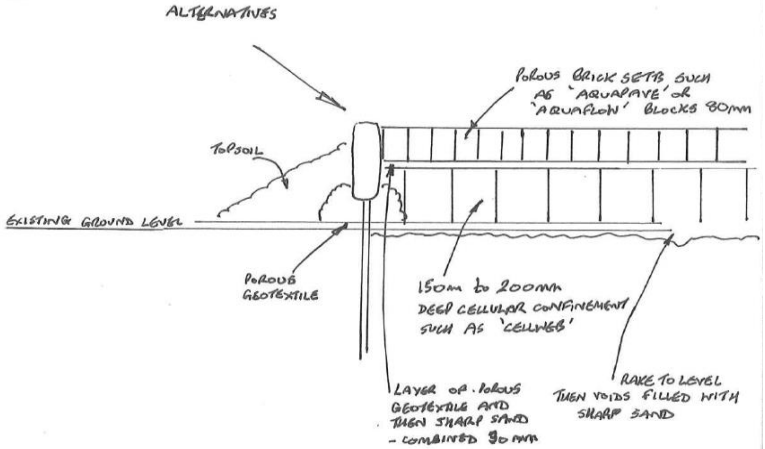
Ambleside Cellweb TRP site prior to installation.

Cellweb TRP access road during filling with clean stone.

EXAMPLE OF A 'NO DIG' POROUS CELLULAR CONFINEMENT SYSTEM







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BH 7

Qualifications & Experience

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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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