

ARBORICULTURAL REPORT

Land east of Fontwell Avenue,
Fontwell BN18 0SB

Prepared by

Jonathan Podwell Cert Arb L4(ABC): TechArborA

September 2020



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Beechdown ref: B/0283/20

Fontwell - BS 5837 tree survey/report - September 2020

VAT Registration no. 887 1140 26

Registered Office as above Registered in England & Wales no. 5355859 Directors: Jonathan Rodwell NCH (arb), Catherine Bellington ACMA.

SUMMARY

- » **The quality of 61 trees within influence of a development proposal was assessed.**
- » **An arboricultural impact assessment of the development proposal was prepared.**
- » **The proposal is for construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping.**
- » **In addition to the removal of Category C trees from around the English oak (T3) implementation of the development proposal will require the removal of several Category B trees from within the site, two Category B trees from beyond the northern boundary and the broad belt of multi-stemmed laurel and area of lapsed formal planting.**
- » **Precautionary measures will be required to protect the retained trees throughout the development process.**

1.0 INTRODUCTION

- 1.1 I have received instruction from Jon Carver of Rural Associates, on behalf of Global Technologies Racing Ltd, to provide arboricultural consultancy services in relation to the proposed development of land to the east of Fontwell Avenue, Fontwell BN18 0SB.
- 1.2 The purpose of the instruction was to:

- » **Assess the quality of any trees that could be affected by the proposed development.**
- » **Prepare an arboricultural impact assessment evaluating the effects of the development proposal.**
- » **Prepare a method statement and tree protection plan.**

- 1.3 The survey was conducted and the report prepared with reference to the guidelines detailed in BS 5837:2012 "Trees in relation to design, demolition and construction – Recommendations" and according to good arboricultural practice.

- 1.4 Contents of the report are exclusively for the use of the client; liability does not extend to any third party without our written consent.

2.0 DOCUMENTS PROVIDED

- 2.1 Drawings prepared by Wealden:

WM/627/500	Block plan	1:500@A2
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3.0 SURVEY FORMAT

- 3.1 Trees included in the survey were those with the potential to be affected by the development proposal and with a stem diameter, at 1.5m high, greater than 75mm. The trees were inspected from the ground only and no specialist decay detection was undertaken. Trees were assessed from within the site or from public areas.
- 3.2 The tree identification numbers used are for the purpose of this report and may not reflect numbering used in previous surveys or Tree Preservation Orders.
- 3.3 Data was recorded on a handheld computer, the trees plotted via GPS and their positions marked on the 1:1000 @ A4 tree survey plan (**Appendix 4**).
- 3.4 A detailed tree survey sheet is shown as **Appendix 1** with an explanation of the terms and categories covered as **Appendix 2**.
- 3.5 The extent of the survey was limited to collecting sufficient data to inform upon the feasibility of the proposed development, it was not a detailed tree hazard or risk assessment and, unless specified, no guarantee, expressed or implied, can be given regarding the safety of the trees or their suitability for safe long term retention.

4.0 GRADING CATEGORIES

- 4.1 The quality of the surveyed trees was assessed and they were categorised to reflect the criteria recommended in Table 1 of BS 5837:2012 as detailed at **Appendix 3**.

- 4.2 The following is a breakdown of the number of trees in each BS category:

Category U	0 trees
Category A	0 trees
Category B	43 trees
Category C	18 trees

5.0 STATUTORY CONTROLS

- 5.1 Consultation with the Local Planning Authority confirmed the application site is not within a designated Conservation Area but that trees **T1** to **T6** in the centre of the site may be subject to tree preservation order no. **TPO/WA/2/14**. Boundary trees bordering Fontwell Avenue and part way along the northern boundary are subject to tree preservation orders no. **TPO/WA/2/14** and **TPO/EG/1/14**.
- 5.2 Under Part 1 of the Wildlife and Countryside Act (1981), with only a few exceptions, it is an offence to intentionally take, damage or destroy the nest of any wild bird while the nest is in use or being built. Bat species are protected under Section 39 of the 1994 Conservation (Natural Habitats etc.) Regulations (as amended), the 1981 Wildlife and Countryside Act (as amended) and the 2000 Countryside and Rights of Way Act. It is illegal to damage or destroy any bat roost, whether occupied or not, or disturb or harm a bat. Further specialist investigation may be required before undertaking any recommended works.

6.0 DEVELOPMENT PROPOSAL

- 6.1 The proposal is for construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping.

7.0 SITE DESCRIPTION

- 7.1 The land outlined for proposed development is an open field, covering around 2ha (**Fig.1 overleaf**), that rises slightly from the eastern boundary before sloping down to the west and dipping slightly more into the north-west corner. A bramble-covered fence-line extended along the eastern boundary; the southern boundary is currently unfenced and recorded trees and dense woody vegetation followed the west and north boundaries. Access to the

site from Arundel Road is via a concrete drive part way along the northern boundary. A broad multi-stemmed avenue of laurel (shown as **A** on the survey plan) formed an impenetrable belt inside the boundary with Fontwell Avenue and extended up to the northern boundary. Multiple stems had been cut down to ground level, at either end, with bramble-covered regrowth developing through the cut branches. An unusual, lapsed formal planting of decreasing concentric circles of mixed species laurel, beech, goat willow, birch and field maple around a central holm oak (**B**) was noted. Low-level brambles and a section of 5m laurel hedging extended along the Fontwell Avenue boundary between trees **T9** and **T10**.



Fig. 1 – Image courtesy of Google Maps (map data © 2020 Google)

The narrow belt of laurel, interspersed with smaller diameter Scots pine and field maple, then continued along outside the site boundary up to the north-west corner. A strip of laurel, small-diameter ash, field maple and Scots pine, beyond the fence along the northern boundary, separated the site from a small copse (**C**) of ivy-covered ash, sycamore, field maple and pine with and understorey of hawthorn, elder and laurel. Trees too small to be recorded or beyond influence of the development proposal included ash, elder, rowan and *Robinia*, amongst the recorded trees in the middle of the site, beech, bay, blackthorn and hawthorn along the top of the bank in the north-east corner and scrubby holly, blackthorn, sycamore and hawthorn on the ivy and bramble-covered bank between Arundel Road and the north-east boundary fence.

- 7.2 The land to the east of Fontwell Avenue is in a semi-rural location with the A27 and housing to the north and north-east but with the wider landscape including individual trees or small groups in domestic settings, as roadside trees, in copses and in hedgerows along field boundaries.
- 7.3 The site geology is recorded as Lambeth Group clay, silt and sand sedimentary bedrock while the superficial geology is described by the National Soils Resources Institute as a freely-draining, slightly acid loamy soil. No detailed analysis of the soil structure, composition or pH was undertaken and these details should not be relied on for design purposes.

8.0 TREE SURVEY

- 8.1 The surveyed trees were predominantly within the site; prominent off-site trees were recorded only where constraints exceeded those within the boundary or if within influence of the proposed development.

9.0 TREE APPRAISAL

- 9.1 Individual tree details and comments are listed in the appended BS 5837 survey schedule detailed at **Appendix 1**. Details of the trees that I consider require further explanation or comment are noted below.

- ❖ **English oak** (T3) – a treehouse and wooden steps were nailed to the tree; minor damage has occurred but this is unlikely to have any real long-term impact on tree health.
- ❖ **Corsican pine** (T5) – a prominent tree with good vitality but downgraded to a Category C tree because of structural defects. There were multiple large old pruning wounds on the main stem and the decaying remains of a co-dominant stem at fracture point at around 6m.
- ❖ **Monterey pine** (T57) - A highly visible, prominent off-site tree albeit with notable defects. Ivy cover precluded detailed inspection of stem base. There were multiple old low pruning wounds - including a large wound at the site of the historic loss of co-dominant stem at 4m. Extensive dieback of the central upper crown has led to a stag-headed appearance but there was a well-developed crown of healthy lower growth. Recorded as a Category B tree but further investigation on behalf of the tree-owner may find other defects that downgrade it to a Category C tree.
- ❖ **Lapsed formal planting** (B) – the decreasing concentric circles of mixed species laurel, beech, goat willow, birch and field maple around a central holm oak were between the recorded boundary trees along Fontwell Avenue and blended into the wide laurel border. Largely beyond renovation and formed of trees with low individual merit.

ARBORICULTURAL IMPACT ASSESSMENT

10.0 BELOW GROUND CONSTRAINTS – ROOT PROTECTION AREA (RPA)

- 10.1 Section 3.7 of BS 5837: 2012 states that – *“The Root Protection Area (RPA) is a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. ”*
- 10.2 The RPA calculations have been produced using the information gathered from the tree survey and section 4.6.1 of BS 5837:2012. This indicates the RPA in m² and the minimum required all round radial distances for rooting zone protection and allows a view to be taken as to whether the trees can be retained safely without undue damage to their root systems. The RPA calculations are detailed in the appended tree survey and the initial dimensions marked on the 1:1000 @ A4 RPA and shade plan (**Appendix 5**).
- 10.3 Tree root morphology can be affected by numerous factors; availability of water, aeration, soil type, temperature and structure, compacted or impervious surfaces and proximity to buildings and other structures all affect the way roots develop and although the RPAs are marked on the plan as uniform polygons the actual root systems will be far more irregular. Root mapping or hand excavation under arboricultural supervision could determine whether significant roots extend beyond the RPAs and require greater protection in relation to construction or whether it may be possible to develop within the RPA without a negative impact on the rooting environment.
- 10.4 The majority of the surveyed trees are growing in unsurfaced ground and I think it unlikely that their nominal RPAs vary hugely from those indicated at **Appendix 5**; however, proximity of the mature Monterey pine (T57) to Arundel Road means that root development is likely to be more extensive within the verge, to the east and west, and within the unsurfaced field to the south.

11.0 ABOVE GROUND CONSTRAINTS

- 11.1 Consideration should be given to the effects that the current tree size, future growth potential, shade levels and leaf and fruit

nuisance may have on the proposed development. Tree height and crown spread measurements are detailed in the appended tree survey; the crown spread of the trees and the shadow pattern through the main part of the day is indicated on the 1:1000 @ A4 RPA and shade plan (**Appendix 5**).

12.0 COMMENT

- 12.1 The largely open nature of the site means that development should be achievable without significant impact on the majority of the recorded trees.
- 12.2 **Industrial units** - The 1:1000 @ A4 development proposal plan (**Appendix 6**) shows that the position of the northern building (Unit A) is located beyond the RPA of recorded trees but extends slightly into the north-east section of cleared laurel and brambles. The position of Unit B impacts on around 8% of the RPA of the English oak (**T3**) and 3.5% of the Corsican pine (**T4**). Although fairly prominent, the Corsican pine (**T4**) has defects that means its long-term retention will probably not be viable in the setting of the proposed site layout. Despite the minor damage to the oak (**T3**) its long-term retention as a significant tree within the site is desirable. Impact on its RPA is fairly minimal and excavation for the individual block foundations, under arboricultural supervision to ensure no damage occurs, may be feasible; however, the southern extent of the crown spread will be in contact with the building. Re-positioning Unit B slightly to the south or reducing the extent of its floorspace will have less impact on the tree and allow it to mature without the need for unsympathetic pruning.
- 12.3 **Infrastructure, car-parking and attenuation pond** – car-parking spaces in the south-west corner (**Fig.2 overleaf**) extend into the area of cleared laurel and dense brambles and impact marginally on the RPA of the sycamore (**T11**). Car-parking and access in the north-west corner (**Fig.3 overleaf**) extends into the bramble-covered cut laurel and the standing laurel in front of the recorded boundary trees as well as the area of lapsed formal planting. The western end of the car-park impacts minimally on the nominal RPA of the sycamores (**T27, T29 & T31**), the field maple (**T28**), the off-site Monterey pine (**T34**) and the small English oak (**T44**). Low canopies of several boundary sycamores extend over parking spaces and access. With the exception of the Monterey pine the boundary trees noted above could be removed with little impact on the appearance of the site; existing off-site trees will maintain tree cover

and screening while the proposed planting scheme (**LLD1773-LAN-DWG-200**) will increase screening and enhance biodiversity.

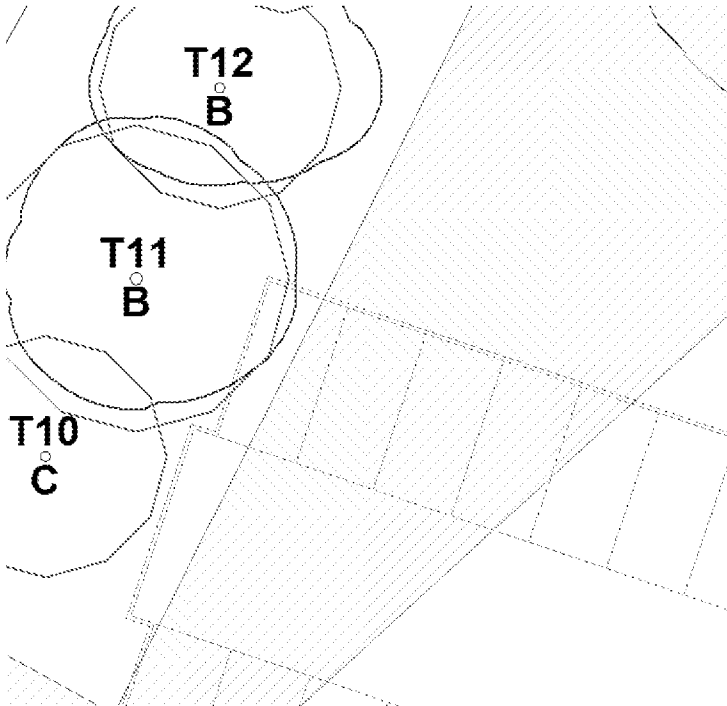


Fig. 2 – south-west parking



Fig. 3 – north-west parking

The attenuation pond is within the broad belt of multi-stemmed laurel but well beyond the RPA of the boundary trees.

- 12.4 **New access** – existing planning consent (**WA/22/15/OUT**) with reference to approved plan **1186-02 Rev D – access to Arundel Road** requires the existing access to be closed and a new access constructed as per site layout drawing (**Fig.4 below**). Construction of the new access will require the removal of the hawthorns (**T59 & T61**) and field maple (**T60**) from within the site and the holly (**T55**) and sycamore (**T56**) from the bank between the site and Arundel Road. Construction of the new access impacts on around 13% of the nominal RPA of the sycamore (**T54**) and 4% of the Monterey pine (**T57**). Further investigation will establish whether construction of the new access can be achieved without impact on the RPAs or whether no-dig construction techniques will need to be used as for the northernmost parking spaces that are fully within the RPA of the Monterey pine.

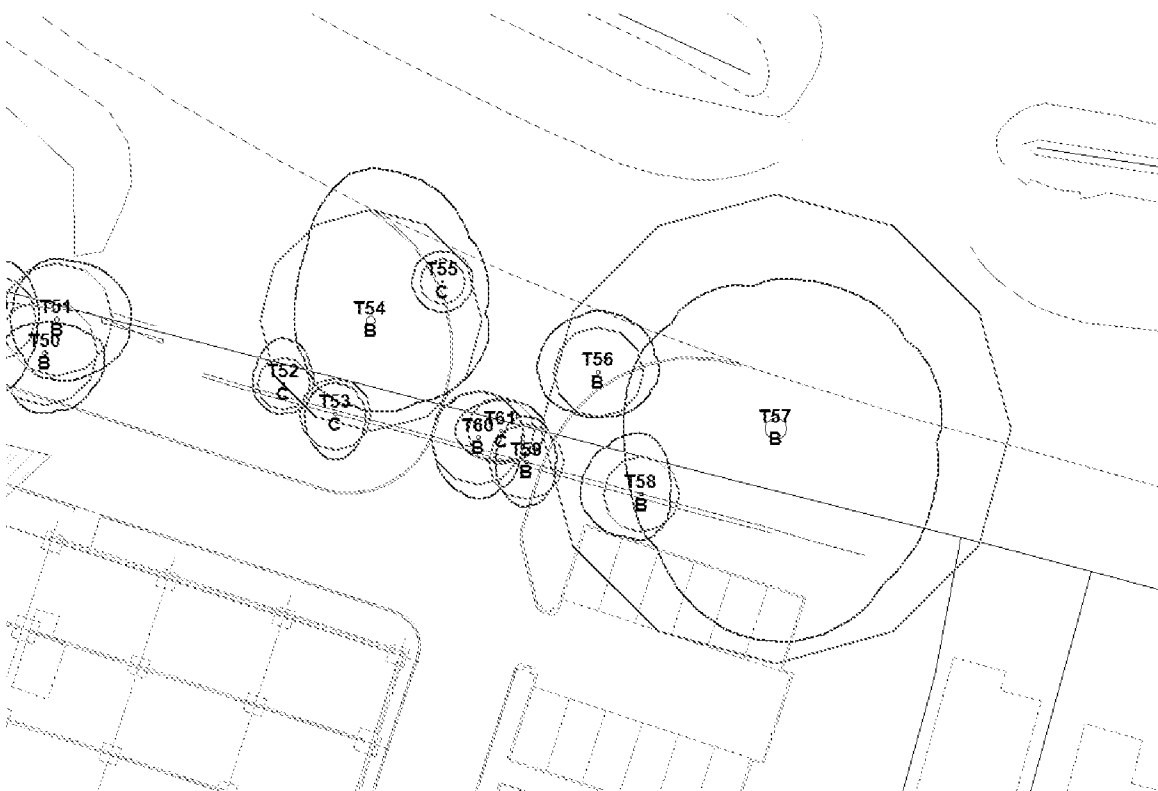


Fig. 4 – new access

13.0 CONCLUSION

13.1 With appropriate precautionary measures I consider the proposed development of land to the east of Fontwell Avenue is feasible, in relation to the surveyed trees, for the following reasons:

- » **In addition to the removal of Category C trees from around the English oak (T3) implementation of the development proposal requires the removal of several Category B trees from within the site, two Category B trees from beyond the northern boundary and the broad belt of multi-stemmed laurel and area of lapsed formal planting; however, the presence of tree-cover offsite or beyond influence of the development means the overall arboricultural characteristics of the area remain largely unchanged and tree losses will be mitigated by replacement planting throughout the site.**
- » **I do not consider current or future growth of the retained trees to have a significant impact on the development proposal or to lead to future pressure for removal or unsympathetic pruning.**
- » **The use of protective barriers and precautionary measures will prevent damage and potentially negative effects on the current and long-term health of the retained trees.**

14.0 DETAILS

14.1 Date of tree survey - 03.09.2020

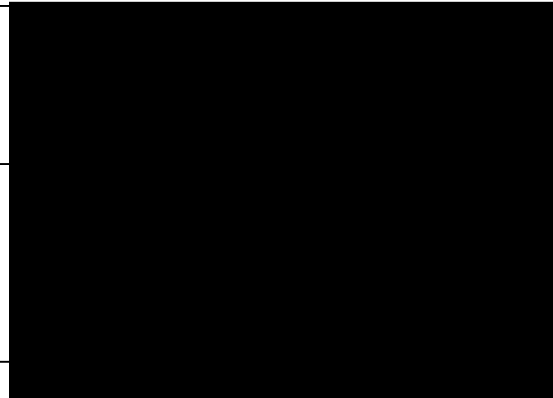
14.2 Present at tree survey - Jonathan Rodwell Cert Arb L4(ABC); TechArborA

14.3 Date of report - 07.09.2020

14.4 Contact details:

CONTACT	NAME	DETAILS
Local Planning Authority	Arun District Council	

Planning Consultants	Rural Associates
Arboricultural Consultants	Beechdown Arboriculture Ltd



References

Roberts, J. Jackson, N. Smith, M. (2006). *Tree Roots in the Built Environment*. The Stationery Office
BSI British Standards (2012) *BS 5837:2012 Trees in relation to demolition and construction – Recommendations, Fourth (Present) Edition*. BSI
Barrell Tree Consultancy (2018) *Manual for managing trees on development sites v2.1 – site guidance notes 2: Fencing protected trees, 4: Pollution control, 9: Installing and upgrading surfacing in root protection areas, 11: Installing services in root protection areas*

Jonathan Rodwell Cert Arb L4(ABC); TechArborA
 Beechdown Arboriculture Ltd

7th September 2020

ARBORICULTURAL METHOD STATEMENT

The arboricultural method statement includes the following plans:

Appendix 7	1:1000@A4	Tree protection plan showing position of: • protective barriers. • trees to be retained with a continuous outline. • trees to be removed with a broken outline.
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15.0 PROTECTIVE BARRIERS AND CONSTRUCTION EXCLUSION ZONE.

- 15.1 Prior to the commencement of construction work and before any machinery or materials are brought onto the site, protective barriers, marked as a light purple dotted line on the tree protection plan (**Appendix 7**), must be erected, around the Root Protection Area (RPA) to create a construction exclusion zone beyond the working area.
- 15.2 The construction exclusion zone, shown as light green horizontal hatching on the tree protection plan, will be afforded protection at all times during the development process; strictly no access, construction activities, mixing materials or storage will be allowed.
- 15.3 The barriers will have weather proof signs attached stating that it is protecting a **construction exclusion zone** and that **no works are permitted** beyond the barrier; the protective barrier should remain in place for the duration of the development process.
- 15.4 The protective barriers should be positioned in accordance with the tree protection plan (**Appendix 7**) and should be constructed as per figure 2 of BS 5837:2012 (shown at **Appendix 8**) and consist of a vertical and horizontal scaffold framework, well braced to resist impacts. The vertical tubes should be spaced at a maximum interval of 3m and driven securely into the ground. Onto this, weld mesh panels should be fixed with wire or scaffold clamps. Care should be taken when locating the vertical and bracing poles to avoid roots; if the presence of roots precludes the use of driven poles, above ground stabilising using struts mounted on a block tray, constructed as per figure 3 b) of BS 5837:2012 may be used.

- 15.5 Site guidance notes 2: *Fencing protected trees* provided by Barrell Tree Consultancy and shown at **Appendix 11** details methods for tree protection on construction sites.

16.0 CONSTRUCTION OF NEW ACCESS ROAD AND PARKING SPACES WITHIN RPA

- 16.1 Construction of the short section of new access road and car-parking spaces within the RPA of T57 may require a no-dig construction specification.
- 16.2 A no-dig specification with a porous and permeable base layer and surface finish should be used. **Appendix 12** provides a detailed installation guide for the Geoweb® tree root protection no-dig Three-Dimensional Cellular Confinement System as summarised below:
- ✦ Existing surface vegetation to be removed by hand or treated with herbicide as agreed with Local Planning Authority (LPA).
 - ✦ Create a level subgrade by filling any hollows with permeable material, i.e. clean stone or sharp sand rather than removing or grading humps that may contain roots.
 - ✦ To help prevent pollution contamination of the RPA a non-woven geotextile should be laid on the level subgrade.
 - ✦ The new access across common land will be formed from single Geoweb panels (6.6m x 2.6m) placed on the geotextile and joined end to end.
 - ✦ The Geoweb panels will be filled with porous, no-fines 4-20mm clean angular stone and using the already filled panels as the working platform.
 - ✦ Pinned sleepers, gabions or non-invasive haunch kerbing may provide suitable edging.
 - ✦ The finished surface must be permeable to moisture penetration and agreed with the LPA.
- 16.3 Site guidance notes 9: *Installing/upgrading surfacing in root protection areas* provided by Barrell Tree Consultancy and shown at **Appendix 11** provides additional generic information.

17.0 FOUNDATION CONSTRUCTION

- 17.1 Foundation depth should be determined by the architect or a structural engineer and with reference to NHBC Chapter 4.2 – Building near trees.

17.2 Excavation and construction of foundations takes place beyond the nominal RPAs of most of the retained trees; however, arboricultural supervision of hand excavation for foundations in close proximity to the southern quadrant of the RPA of the English oak (**T3**) may be required. If roots are encountered during excavation -

- ✦ Careful use of hand tools will avoid bark damage of retained roots at the edge of the foundation if present;
- ✦ exposed roots or fibrous root masses that are to be retained should be immediately covered – with hessian or similar - to prevent drying;
- ✦ individual roots less than 25mm diameter that need to be removed should be cleanly severed, with secateurs or a pruning saw, far enough back from the edge of the foundation (>100mm) that the effects of uncured cement do not impact tree health;
- ✦ the project arboriculturalist will determine whether it is possible to sever roots greater than 25mm diameter or whether the pad should be repositioned;
- ✦ use of impermeable membranes to line the excavations before the concrete is poured will help prevent damage by the alkaline properties of cement.

18.0 INFRASTRUCTURE REQUIREMENTS

18.1 Undisclosed siting of service runs, above ground services, CCTV cameras, electrical sub-stations, refuse stores, lighting and other infrastructure requirements can lead to unnecessary tree pruning or root loss during or post development. Should any infrastructure requirements become necessary post planning their design should be discussed with the project arboriculturalist and, if necessary, the permission of the local planning authority obtained. Further guidance is given at Site guidance notes 11: *Installing services in root protection areas* provided by Barrell Tree Consultancy and shown at **Appendix 11**.

19.0 ADDITIONAL PRECAUTIONS

- 19.1 No storage or mixing of materials to take place within the construction exclusion zone or in the ground protected RPA.
- 19.2 No storage or mixing of materials will take place in any location where they may leak into the construction exclusion zone or RPA.

- 19.3 Materials which may contaminate the soil will not be discharged within 10m of the tree stems or mixed in any location where gradients allow contaminants to run towards RPAs.
- 19.4 Site guidance note 4: *Pollution control* provided by Barrell Tree Consultancy and shown at **Appendix 11** details several methods for reducing the risk that the mixing, pouring and cleaning of harmful substances may represent to retained trees.

20.0 SUPERVISION AND MONITORING

- 20.1 It will be the responsibility of the main contractor to ensure that any conditions attached to the planning consent are adhered to at all times and that a monitoring regime with regard to tree protection on site is adopted.
- 20.2 An arboriculturalist should be appointed to monitor tree protection measures and address any arboricultural issues that may arise.
- 20.3 The project arboriculturalist should mark the positions of the protective barriers and inspect them once erected and prior to site work commencing.
- 20.4 In addition to the scheduled supervision regular site visits to inspect the protective barriers may be required. Frequency of the visits is dependent on the progress of the development but should take place every two to four weeks of continuous site activity.
- 20.5 A copy of a site visit and arboricultural supervision record is shown at **Appendix 9**.
- 20.6 A copy of an arboricultural monitoring record is shown at **Appendix 10**.
- 20.7 The main contractor will be responsible for ensuring subcontractors comply with the arboricultural method statement and do not undertake any operation that is likely to impact adversely upon any tree on site.
- 20.8 The main contractor will ensure that the build sequence is appropriate to ensure that no damage occurs to the trees during the development process.

21.0 SEQUENCE OF EVENTS

21.1 Sequence of tree protection measures in relation to phases of development.

Site meeting	Project arboriculturalist to discuss tree protection measures with architect/developer and local authority arboricultural officer.
Protective barriers	Installation of protective barriers prior to construction.
Monitoring	Arboricultural monitoring every two to four weeks of continuous site activity.
Protective barriers	Removal of protective barriers on completion of development proposal.

21.2 Should circumstances arise where unscheduled work may impact upon trees or tree protection the work should cease until the project arboriculturalist has been consulted and the local planning authority arboricultural officer informed.

BS5837:2012 Tree Survey

Beechdown Arboriculture Ltd

Client: Rural Associates
 Project: Global Technologies Racing - Fontwell
 Survey Date: 03/09/2020
 Surveyor: Jonathan Rodwell

Club Cottage, Top Road
 Slindon
 Arundel
 West Sussex
 BN18 0RP

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T1												
Mountain Ash <i>Sorbus aucuparia</i>	5.5	1	130	N E S W	1 3 2 2	0.1 0.1 0.1 0.1	M 	A: 7.6 R: 1.55	Good	C: Good S: Good B: Good		C1.2 20 to 40 yrs
T2												
Ash <i>Fraxinus excelsior</i>	5	1	110	N E S W	1 3 3 3	2 1.5 2 2	Y 	A: 5.5 R: 1.32	Fair	C: Fair S: Fair B: Fair		C1.2 20 to 40 yrs
T3												
English oak <i>Quercus robur</i>	16	1	590	N E S W	8 7 6 6.5	1 2 3 1	M 	A: 157.5 R: 7.08	Good	C: Good S: Fair B: Fair	Treehouse and wooden steps nailed to tree; minor damage but unlikely to have long-term impact on tree health.	B1.2 >40 yrs
T4												
Ash <i>Fraxinus excelsior</i>	7	1	220	N E S W	3 5 3 3	1.5 1 1.5 1.5	SM 	A: 21.9 R: 2.64	Fair	C: Fair S: Good B: Fair		C1.2 20 to 40 yrs

Age Classifications:	N	Newly planted	EM	Early Mature	Condition:	C	Crown	Stems:	Ø	Diameter
	Y	Young	M	Mature		S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature		B	Basal area	ERC:		Estimated Remaining Contributio

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC	
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment			
T5														
Corsican Pine <i>Pinus nigra var.maritima</i>		22	1	685	N	6	7	M	A: 212.3 R: 8.22	Good	C: Fair S: Poor B: Fair	Prominent tree with good vitality but structural defects; multiple large old pruning wounds on main stem and decaying remains of co-dominant stem at fracture point at around 6m.	C.1.2 10 to 20 yrs	
					E	4	10							
					S	5	9							
					W	6	6							
T6														
Robinia <i>Robinia pseudoacacia</i>		5.5	1	180	N	2	1.5	SM	A: 14.7 R: 2.16	Fair	C: Fair S: Fair B: Fair		C.1.2 20 to 40 yrs	
					E	1	2							
					S	2	2							
					W	2	1.5							
T7												Estimated Measurements		
Ash <i>Fraxinus excelsior</i>		11	1	170	N	2	3	SM	A: 13.1 R: 2.04	Decline	C: Poor S: Fair B: Fair		C.1.2 10 to 20 yrs	
					E	3	1							
					S	3	1							
					W	3	2							
T8												Estimated Measurements		
Small-Leafed Lime <i>Tilia cordata</i>		13	1	330	N	2	1	SM	A: 49.3 R: 3.96	Fair	C: Good S: Ivy B: Fair		B.1.2 >40 yrs	
					E	5	1							
					S	4.5	1							
					W	4	1							
T9												Estimated Measurements		
Monterey Cypress <i>Cupressus macrocarpa</i>		16	1	550	N	6	0.1	M	A: 136.9 R: 6.6	Good	C: Good S: Fair B: Fair		B.1.2 20 to 40 yrs	
					E	6	0.1							
					S	6	0.1							
					W	6	0.1							
T10														
Sycamore <i>Acer pseudoplatanus</i>		11	1	300	N	4	0.1	M	A: 40.7 R: 3.59	Decline	C: Poor S: Fair B: Poor		C.1.2 10 to 20 yrs	
					E	5	0.1							
					S	5	0.1							
					W	3.5	1							
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:		Ø	Diameter
		Y	Young	M	Mature				S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:		Estimated Remaining Contributio	

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T11													
Ash	16	1	380	N	5	5	M	A: 65.3	Fair	C: Fair			B.1.2
Fraxinus excelsior				E	5	3		R: 4.55		S: Good			20 to 40 yrs
				S	4	5				B: Good			
				W	4	6							
T12													
Ash	15	1	300	N	4	7	M	A: 40.7	Fair	C: Fair			B.1.2
Fraxinus excelsior				E	5	5		R: 3.59		S: Fair			20 to 40 yrs
				S	3	7				B: Fair			
				W	4	6							
T13													
Sycamore	13	1	280	N	3	4	M	A: 35.5	Good	C: Good			B.1.2
Acer pseudoplatanus				E	4	3		R: 3.36		S: Good			20 to 40 yrs
				S	3	4				B: Fair			
				W	3	5							
T14													
Sycamore	12	1	340	N	3	5	M	A: 52.3	Good	C: Good			B.1.2
Acer pseudoplatanus				E	4	2		R: 4.08		S: Good			20 to 40 yrs
				S	4	2				B: Good			
				W	4	6							
T15													
Sycamore	11	1	290	N	4	2	M	A: 38.1	Decline	C: Poor			C.1.2
Acer pseudoplatanus				E	3	2		R: 3.48		S: Poor			<10 yrs
				S	4	2				B: Poor			
				W	4	2.5							
T16												Estimated Measurements	
Monterey Pine	18	2	636	(Eq) N	7	1	M	A: 183.2	Good	C: Fair			B.1.2
Pinus radiata				E	4	1		R: 7.63		S: Good			>40 yrs
				S	6	1				B: Fair			
				W	8	1							
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:	Ø	Diameter
		Y	Young	M	Mature				S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:	Estimated Remaining Contributio	

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T17													
Sycamore	14	1	240	N	5	3	M	A: 26.1	Good	C: Fair			B.1.2
Acer pseudoplatanus				E	5	4		R: 2.88		S: Good			20 to 40 yrs
				S	3	8				B: Good			
				W	4	7							
T18													
Sycamore	16	1	360	N	3	5	M	A: 58.6	Good	C: Good			B.1.2
Acer pseudoplatanus				E	6	2.5		R: 4.31		S: Good			20 to 40 yrs
				S	4	3				B: Good			
				W	5	6							
T19													
Sycamore	14	1	270	N	2	8	M	A: 33	Good	C: Good			B.1.2
Acer pseudoplatanus				E	5	1		R: 3.24		S: Fair			20 to 40 yrs
				S	4	4				B: Fair			
				W	2	7							
T20													
Sycamore	14	1	220	N	3	6	SM	A: 21.9	Good	C: Fair			B.1.2
Acer pseudoplatanus				E	5	2		R: 2.64		S: Fair			20 to 40 yrs
				S	4	6				B: Good			
				W	2	5							
T21													
Sycamore	15	1	370	N	5	5	M	A: 61.9	Good	C: Good			B.1.2
Acer pseudoplatanus				E	6	1		R: 4.43		S: Good			20 to 40 yrs
				S	5	2				B: Good			
				W	5	6							
T22													
Sycamore	14	1	250	N	2	5	M	A: 28.3	Fair	C: Fair			C.1.2
Acer pseudoplatanus				E	3	4		R: 3		S: Fair	Suppressed growth habit.		<10 yrs
				S	2	4				B: Fair			
				W	3	5							
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter													
Y Young M Mature S Stem (Eq) Equivalent stem diameter using BS5837:2012 definition													
SM Semi-mature OM Over Mature B Basal area ERC: Estimated Remaining Contributio													

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T23													
Sycamore <i>Acer pseudoplatanus</i>	15	1	310		N E S W	3 3 4 4	4 5 5 4	M A: 43.5 R: 3.72	Good	C: Good S: Fair B: Good			B.1.2 20 to 40 yrs
T24												Estimated Measurements	
Field Maple <i>Acer campestre</i>	14	3	530 (Eq)		N E S W	4 4 4 4	4 5 3 2	M A: 126.9 R: 6.35	Good	C: Good S: Fair B: Fair			B.1.2 >40 yrs
T25													
Sycamore <i>Acer pseudoplatanus</i>	15	1	260		N E S W	2 3 3 3	4 5 7 7	SM A: 30.6 R: 3.12	Good	C: Fair S: Fair B: Fair			B.1.2 20 to 40 yrs
T26													
Sycamore <i>Acer pseudoplatanus</i>	15	1	190		N E S W	1 3 2 2	9 8 8 8	SM A: 16.3 R: 2.27	Fair	C: Fair S: Fair B: Fair	Suppressed		C.1.2 10 to 20 yrs
T27													
Sycamore <i>Acer pseudoplatanus</i>	15	1	260		N E S W	2 3 3 3	12 6 7 6	SM A: 30.6 R: 3.12	Good	C: Fair S: Good B: Fair			B.1.2 20 to 40 yrs
T28													
Field Maple <i>Acer campestre</i>	14	2	348 (Eq)		N E S W	2 4 5 4	3 4 2 4	M A: 54.9 R: 4.18	Good	C: Good S: Fair B: Fair			B.1.2 >40 yrs
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:	Ø	Diameter
		Y	Young	M	Mature				S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:	Estimated Remaining Contributio	

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T29													
Sycamore <i>Acer pseudoplatanus</i>		16	1	280	N E S W	3 6 5 2	2 1 5 3	M A: 35.5 R: 3.36	Good	C: Good S: Good B: Good			B.1.2 20 to 40 yrs
T30													
Field Maple <i>Acer campestre</i>		14	1	230	N E S W	2 2 3 2	2 4 4 3	SM A: 23.9 R: 2.75	Good	C: Fair S: Fair B: Good			B.1.2 >40 yrs
T31													
Sycamore <i>Acer pseudoplatanus</i>		16	1	260	N E S W	2 5 4 3	2 1.5 4 9	M A: 30.6 R: 3.12	Good	C: Good S: Good B: Good			B.1.2 20 to 40 yrs
T32												Estimated Measurements	
Monterey Pine <i>Pinus radiata</i>		22	1	600	N E S W	5 6 5 5	3 6 2 1	M A: 162.9 R: 7.2	Good	C: Good S: Fair B: Fair			B.1.2 >40 yrs
T33													
Wild Cherry <i>Prunus avium</i>		16	1	230	N E S W	2 4 2 2	4 2 9 8	M A: 23.9 R: 2.75	Decline	C: Poor S: Fair B: Fair			C.1.2 <10 yrs
T34												Estimated Measurements	
Monterey Pine <i>Pinus radiata</i>		22	1	650	N E S W	8 8 6 8	1 1 1 1	M A: 191.2 R: 7.8	Good	C: Good S: Fair B: Fair			B.1.2 >40 yrs
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:	Ø	Diameter
		Y	Young	M	Mature				S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:	Estimated Remaining Contributio	

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T35												Estimated Measurements	
Monterey Pine	18	2	500 (Eq)	N	8	1	M	A: 113.1	Fair	C: Fair			B.1.2
<i>Pinus radiata</i>				E	4	1		R: 6		S: Fair	Suppressed		>40 yrs
				S	2	1				B: Fair			
				W	8	1							
T36													
Sycamore	12	1	145	N	2	2	SM	A: 9.5	Good	C: Good			C.1.2
<i>Acer pseudoplatanus</i>				E	3	2		R: 1.73		S: Good			20 to 40 yrs
				S	3	1.5				B: Good			
				W	2	3.5							
T37													
Sycamore	15	1	200	N	2	10	M	A: 18.1	Decline	C: Poor			C.1.2
<i>Acer pseudoplatanus</i>				E	2	5		R: 2.4		S: Fair			<10 yrs
				S	4	4				B: Fair			
				W	2	7							
T38													
Sycamore	16	1	290	N	4	10	M	A: 38.1	Good	C: Good			B.1.2
<i>Acer pseudoplatanus</i>				E	3	8		R: 3.48		S: Good			20 to 40 yrs
				S	4	6				B: Fair			
				W	2	10							
T39													
Sycamore	16	1	250	N	4	6	M	A: 28.3	Good	C: Good			B.1.2
<i>Acer pseudoplatanus</i>				E	2	5		R: 3		S: Good			20 to 40 yrs
				S	4	3				B: Good			
				W	2	7							
T40													
Sycamore	16	1	290	N	4	5	M	A: 38.1	Good	C: Good			B.1.2
<i>Acer pseudoplatanus</i>				E	3	2		R: 3.48		S: Good			20 to 40 yrs
				S	6	2				B: Good			
				W	2	8							
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter													
Y Young M Mature S Stem (Eq) Equivalent stem diameter using BS5837:2012 definition													
SM Semi-mature OM Over Mature B Basal area ERC: Estimated Remaining Contributio													

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC	
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment			
T41														
Sycamore <i>Acer pseudoplatanus</i>		14	1	240	N E S W	3 2 5 3	4.5 8 1.5 4	M A: 26.1 R: 2.88	Good	C: Good S: Good B: Good			B.1.2 20 to 40 yrs	
T42														
Sycamore <i>Acer pseudoplatanus</i>		15	1	300	N E S W	3 2 5 3	4 5 2 4	M A: 40.7 R: 3.59	Good	C: Good S: Good B: Fair			B.1.2 20 to 40 yrs	
T43														
Sycamore <i>Acer pseudoplatanus</i>		15	1	300	N E S W	2 3 6 2	4 5 1 4	M A: 40.7 R: 3.59	Good	C: Good S: Good B: Fair			B.1.2 20 to 40 yrs	
T44														
English oak <i>Quercus robur</i>		4.5	1	150	N E S W	1 2 4 1.5	1.5 0.5 0.5 0.5	Y A: 10.2 R: 1.8	Fair	C: Poor S: Fair B: Fair			C.1.2 10 to 20 yrs	
T45														
Sycamore <i>Acer pseudoplatanus</i>		16	1	280	N E S W	3 3 5 2	7 4 3 7	M A: 35.5 R: 3.36	Fair	C: Fair S: Ivy B: Fair			B.1.2 20 to 40 yrs	
T46														
Sycamore <i>Acer pseudoplatanus</i>		14	1	220	N E S W	2 3 5 3	6 5 2.5 4	M A: 21.9 R: 2.64	Fair	C: Fair S: Ivy B: Fair			B.1.2 20 to 40 yrs	
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:		Ø	Diameter
		Y	Young	M	Mature				S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:		Estimated Remaining Contributio	

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T47													
Sycamore <i>Acer pseudoplatanus</i>	13	1	190	N E S W	3 3 5 3	5 4 2 4	SM	A: 16.3 R: 2.27	Good	C: Good S: Good B: Good			B.1.2 20 to 40 yrs
T48													
Sycamore <i>Acer pseudoplatanus</i>	14	1	290	N E S W	4 3 5 2	5 4 1.5 4	M	A: 38.1 R: 3.48	Good	C: Good S: Ivy B: Fair			B.1.2 20 to 40 yrs
T49													
Sycamore <i>Acer pseudoplatanus</i>	13	1	230	N E S W	4 3 5 3	5 3 1 3	SM	A: 23.9 R: 2.75	Good	C: Good S: Fair B: Fair			B.1.2 20 to 40 yrs
T50													
Sycamore <i>Acer pseudoplatanus</i>	14	1	280	N E S W	2 4 4 3	2 1 1 2	M	A: 35.5 R: 3.36	Good	C: Good S: Ivy B: Fair			B.1.2 20 to 40 yrs
T51												Estimated Measurements	
Ash <i>Fraxinus excelsior</i>	16	1	300	N E S W	4 5 4 3	5 2 5 5	SM	A: 40.7 R: 3.59	Good	C: Fair S: Ivy B: Fair			B.1.2 20 to 40 yrs
T52												Estimated Measurements	
Holly <i>Ilex aquifolium</i>	6	1	140	N E S W	3 2 2 2	1 2 1 2	SM	A: 8.9 R: 1.68	Good	C: Good S: Good B: Fair			C.1.2 >40 yrs
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:	Ø	Diameter
		Y	Young	M	Mature				S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:		Estimated Remaining Contributio

Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T53													
Field Maple <i>Acer campestre</i>	6	2	191 (Eq)	N	2	1	SM	A: 16.5 R: 2.29	Good	C: Good S: Fair B: Fair			C.1.2 20 to 40 yrs
T54												Estimated Measurements	
Sycamore <i>Acer pseudoplatanus</i>	14	1	590	N	10	1.5	M	A: 157.5 R: 7.08	Good	C: Good S: Fair B: Poor			B.1.2 20 to 40 yrs
T55												Estimated Measurements	
Holly <i>Ilex aquifolium</i>	4	1	120	N	2	1	Y	A: 6.5 R: 1.43	Good	C: Good S: Fair B: Fair			C.1.2 20 to 40 yrs
T56												Estimated Measurements	
Sycamore <i>Acer pseudoplatanus</i>	11	1	240	N	4	2	M	A: 26.1 R: 2.88	Good	C: Good S: Good B: Fair			B.1.2 20 to 40 yrs
T57												Estimated Measurements	
Monterey Pine <i>Pinus radiata</i>	22	1	1445	N	10	5	M	A: 707 R: 15	Fair	C: Poor S: Ivy B: Fair		A highly visible, prominent tree albeit with notable defects. Ivy cover precluded detailed inspection of stem base; multiple old low pruning wounds - including historic loss of co-dominant stem at 4m; extensive dieback of central upper crown but well-developed crown of healthy lower growth. Rookery.	B.1.2.3 20 to 40 yrs
T58												Estimated Measurements	
English oak <i>Quercus robur</i>	10	1	200	N	4	2	Y	A: 18.1 R: 2.4	Good	C: Good S: Good B: Good			B.1.2 >40 yrs
Age Classifications:		N Y SM	Newly planted Young Semi-mature	EM M OM	Early Mature Mature Over Mature	Condition:		C S B	Crown Stem Basal area	Stems:		Ø Diameter (Eq) Equivalent stem diameter using BS5837:2012 definition	ERC: Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T59											Estimated Measurements	
Hawthorn	4.5	1	200	N	3	1	M	A: 18.1	Good	C: Good		B.1.2
Crataegus monogyna				E	2	1		R: 2.4		S: Good		>40 yrs
				S	3	1				B: Good		
				W	2	1						
T60											Estimated Measurements	
Field Maple	11	2	250 (Eq)	N	3	1	M	A: 28.3	Good	C: Good		B.1.2
Acer campestre				E	3	0.5		R: 3		S: Good		20 to 40 yrs
				S	4	0.5				B: Fair		
				W	3	0.5						
T61											Estimated Measurements	
Hawthorn	6	1	180	N	2	3	SM	A: 14.7	Fair	C: Fair		C.1.2
Crataegus monogyna				E	3	2		R: 2.16		S: Ivy		10 to 20 yrs
				S	2	2				B: Fair		
				W	3	3						

Appendix 2 – tree survey definition of terms

<u>Category</u>	<u>Definition</u>
Tree ID/tag	Identification number and/or tree tag number.
Species	Common and/or scientific name.
Height	To the nearest 0.5m below 10m; to the nearest 1m above 10m.
Ø/No. of stems	Stem diameter measured at 1.5m or equivalent with reference to Annex C of BS5837:2012.
First branch	Height above ground level and direction of first significant branch.
Crown spread	Measured at the cardinal points in metres.
Canopy height/clearance	Crown clearance in metres above ground level at the cardinal points.
RPA	Root protection area (m ²) and length of radial protection (m).
Age class	Young Less than approximately 10 years old.
	Semi-mature Less than 1/5 of typical life expectancy.
	Mature Between 1/5 and 5/5 of typical life expectancy.
	Over-mature Tree having reached its maximum life span and declining in health and size.
	Veteran A tree that is of interest biologically, aesthetically or culturally because of its age, size or condition.
Structural/physiological condition	General condition of tree crown, stem and basal area structure and form - assessed as:
	Good Good form, structure and vitality; no apparent signs of decay, structural weakness, decline in health, pests or diseases.
	Fair Moderate form and structure.

Beechdown ref: B/0283/20

Fontwell – BS 5837 tree survey/report – September 2020

Appendix 2 – tree survey definition of terms

	Poor	Poor form or structure; significant decay, structural weakness or decline in vitality.
BS 5837 category (Cat)	BS grading category described in detail at appendix 3.	
ERC	Estimated remaining contribution.	

Trees unsuitable for retention

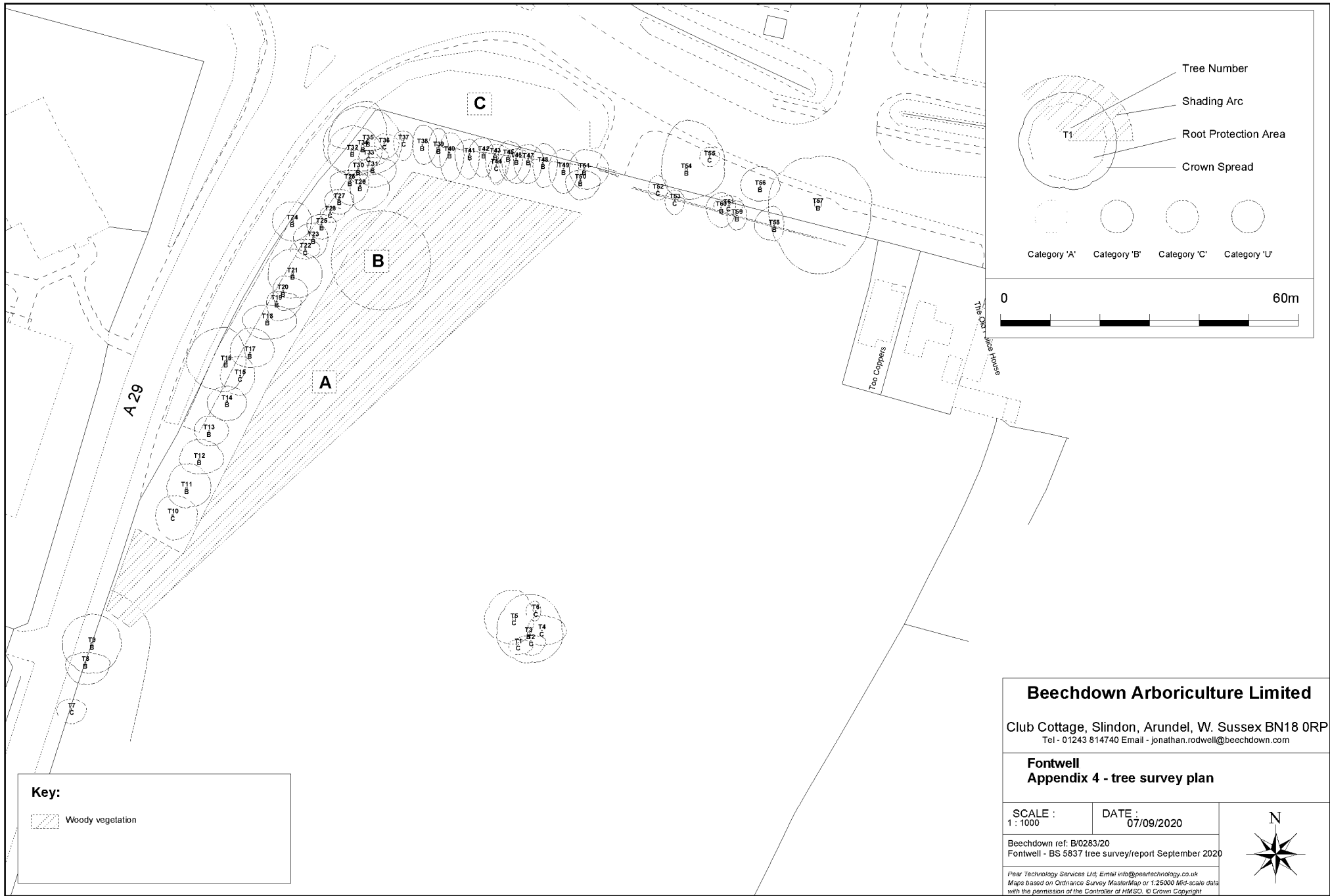
<u>Category</u>	<u>Definition</u>
Category U	Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years – shown in dark red on plans.

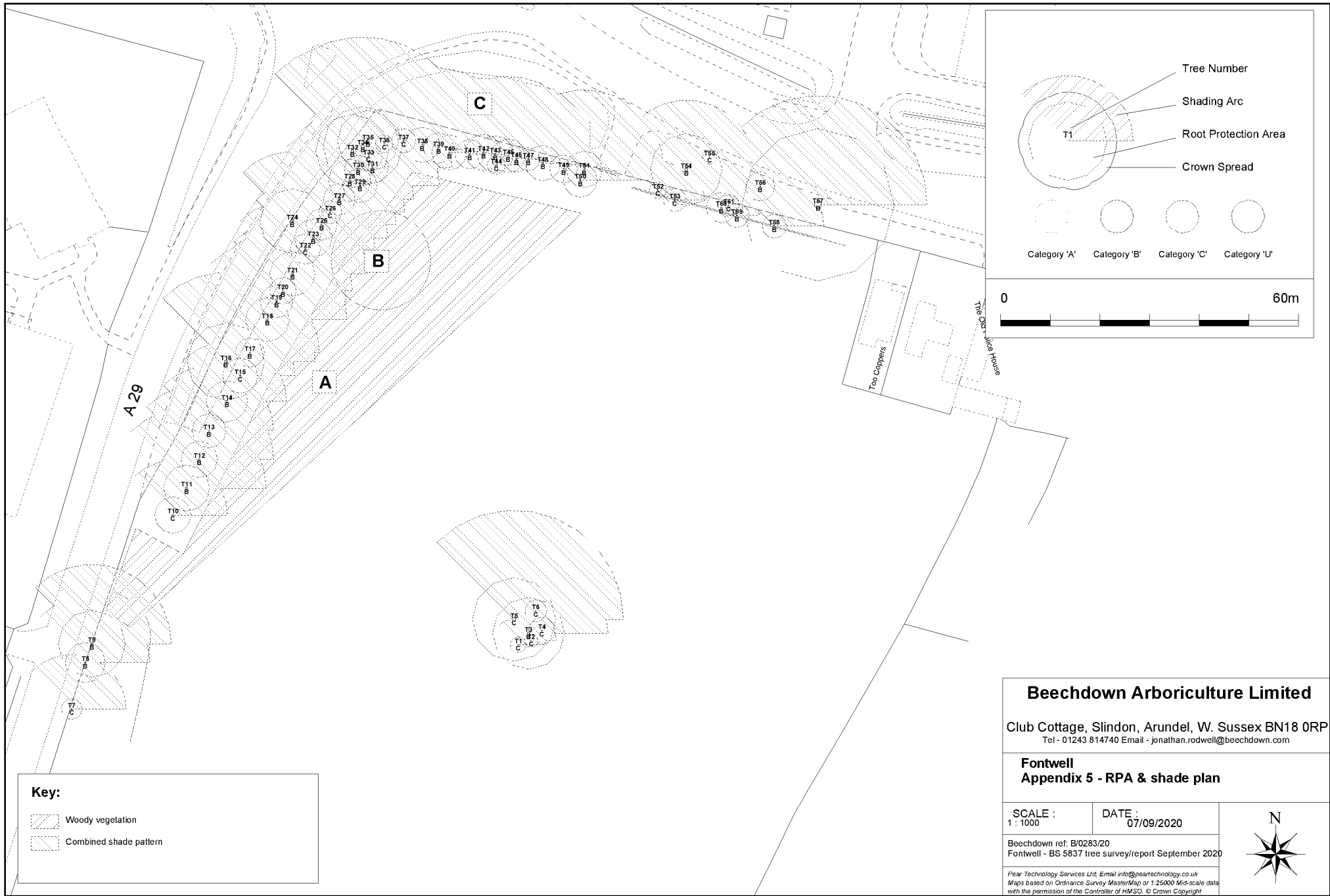
Trees to be considered for retention

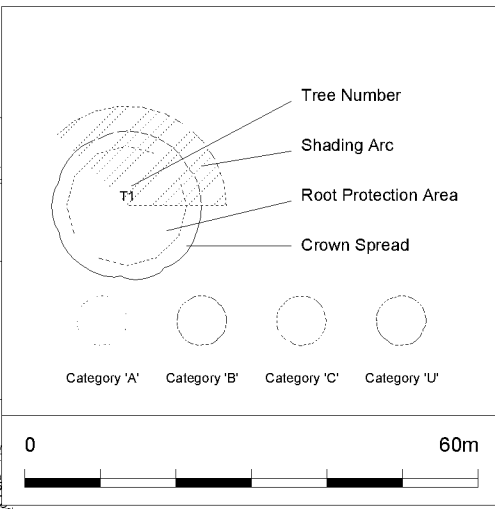
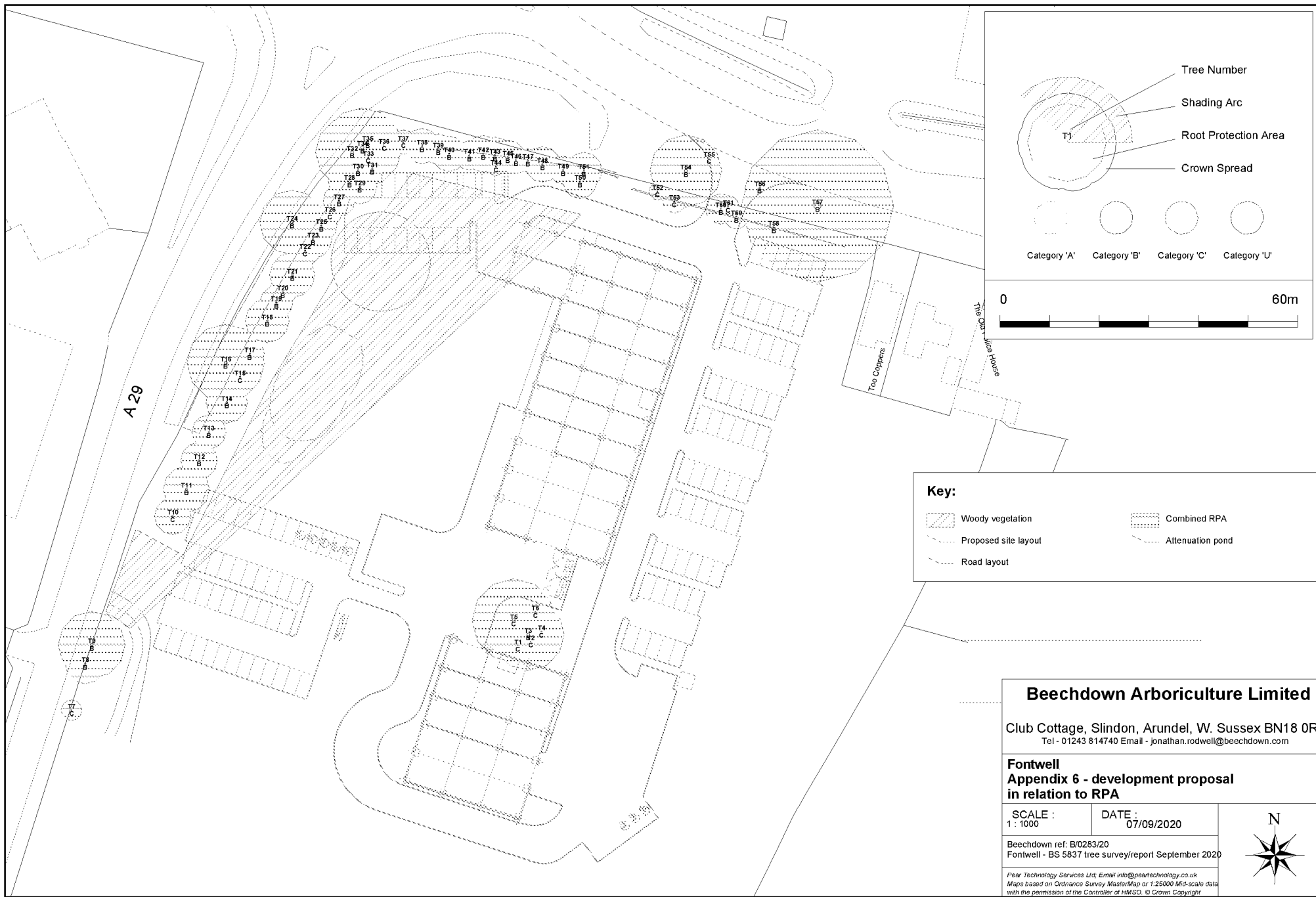
<u>Category</u>	<u>Definition</u>
Category A	Trees of high quality with an estimated remaining life expectancy of at least 40 years – shown in light green on plans. <u>1 - Mainly arboricultural qualities</u> – trees that are good examples of their species, especially if rare or unusual; or those that are essential components of groups, formal or semi-formal arboricultural features. <u>2 - Mainly landscape qualities</u> – trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features. <u>3 - Mainly cultural values, including conservation</u> – trees, groups or woodlands of significant conservation, historical, commemorative or other value.
Category B	Trees of moderate quality with an estimated life expectancy of at least 20 years – shown in mid blue on plans. <u>1 - Mainly arboricultural qualities</u> – trees that might be included in category A but are downgraded because of impaired condition (e.g. presence of significant but remediable defects) to the extent that they are unlikely to be suitable for retention beyond 40 years; or trees lacking the particular quality necessary for category A designation. <u>2 - Mainly landscape qualities</u> – trees present in numbers, usually growing as groups or woodlands, that attract a higher collective rating than they might as individuals; or groups of trees situated so as to make little visual contribution to the wider locality.

Appendix 3 – BS 5837 grading categories

	<u>3 - Mainly cultural values, including conservation</u> – trees with material conservation or other cultural values.
Category C	Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter under 150mm - shown in grey on plans. <u>1 - Mainly arboricultural qualities</u> – unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories. <u>2 - Mainly landscape qualities</u> – 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 landscape benefits. <u>3 - Mainly cultural values, including conservation</u> – trees with no material conservation or other cultural values.







Key:

- Woody vegetation
- Proposed site layout
- Road layout
- Combined RPA
- Attenuation pond

Beechdown Arboriculture Limited

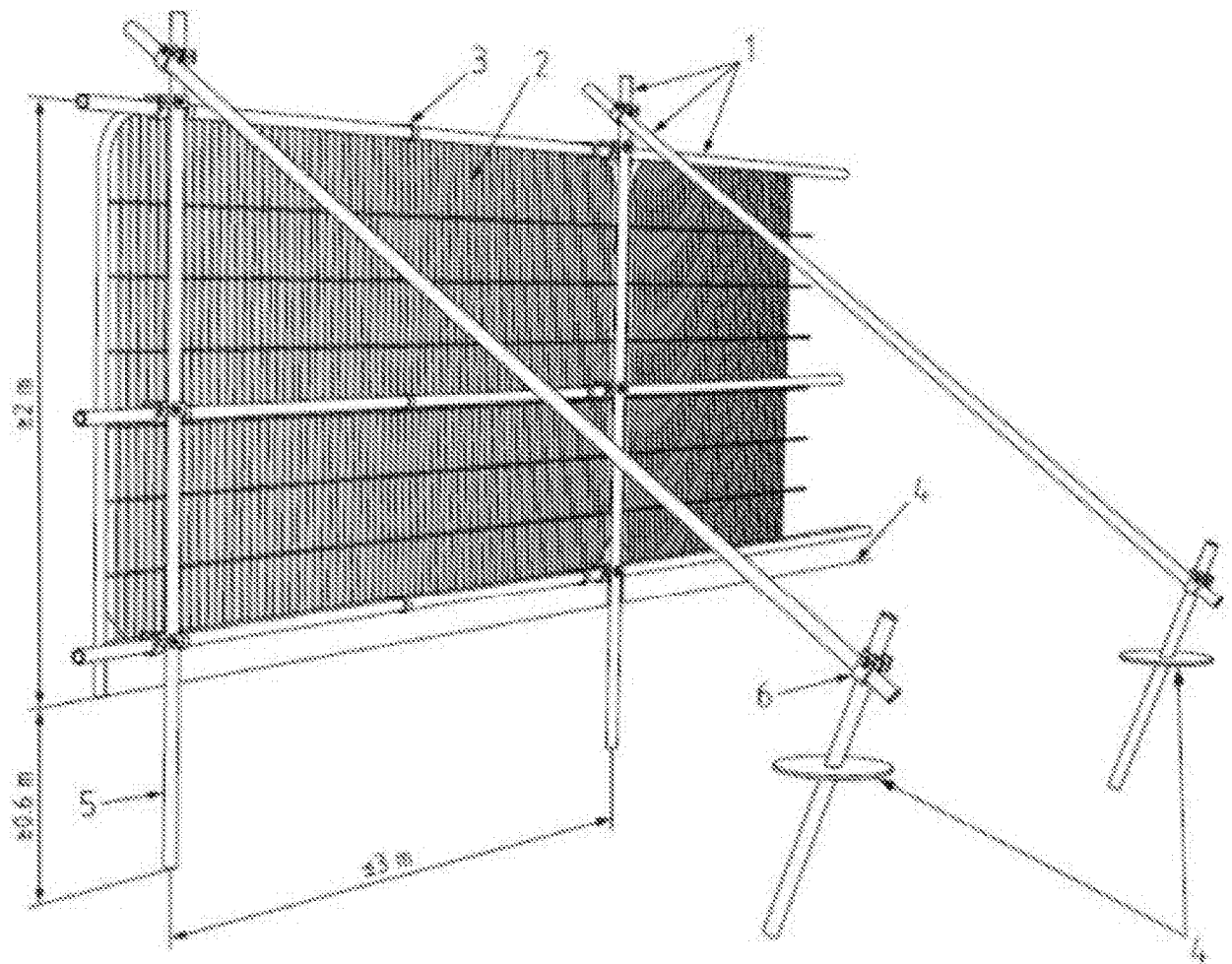
Club Cottage, Slindon, Arundel, W. Sussex BN18 0RP
Tel - 01243 814740 Email - jonathan.rodwell@beechdown.com

Fontwell
Appendix 6 - development proposal
in relation to RPA

SCALE : 1 : 1000	DATE : 07/09/2020	
Beechdown ref: B/0283/20 Fontwell - BS 5837 tree survey/report September 2020		
Pear Technology Services Ltd, Email info@peartechnology.co.uk Maps based on Ordnance Survey MasterMap or 1:25000 Mid-scale data with the permission of the Controller of HMSO. © Crown Copyright		



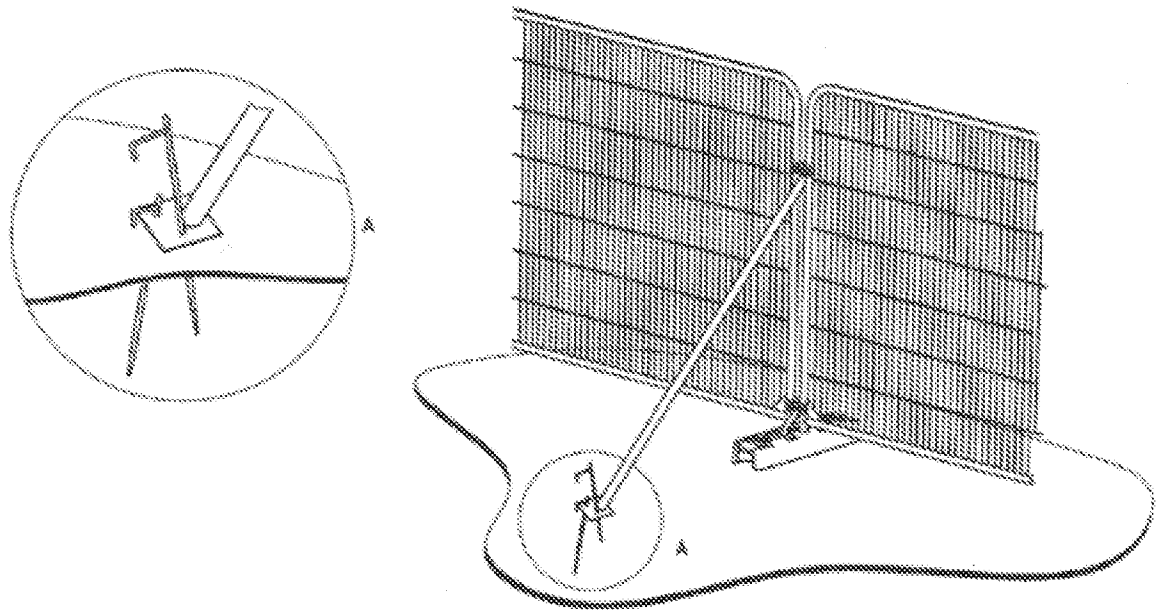
Appendix 8 – Protective Barrier



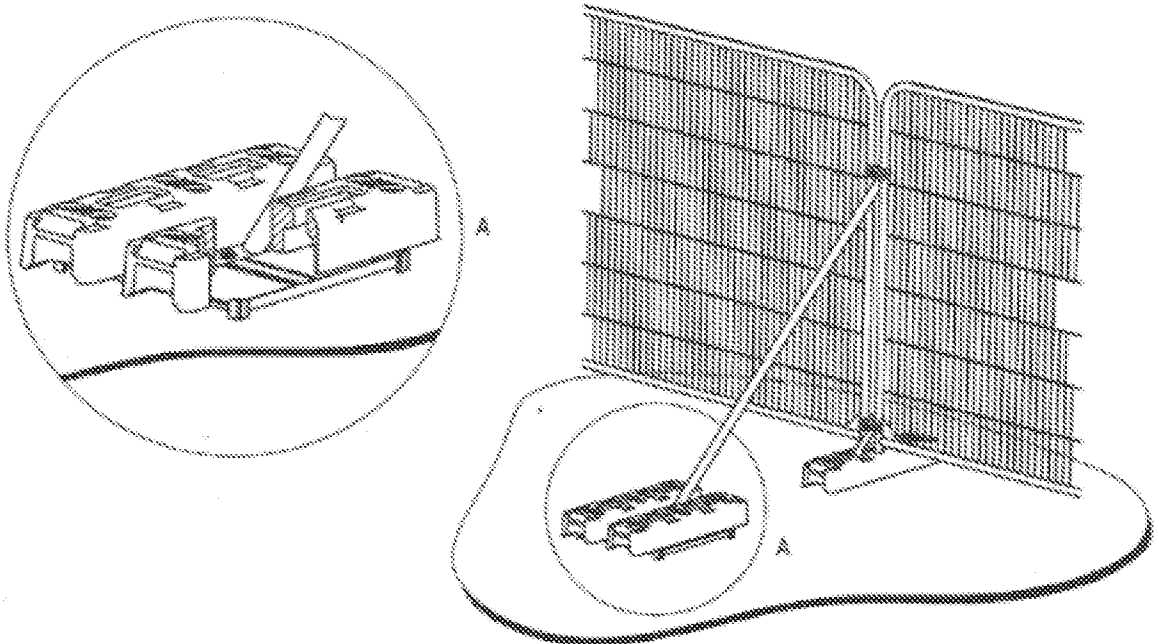
Key

- 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

Default specification for protective barrier as per Figure 2 of BS 5837:2012 *Trees in relation to demolition and construction – Recommendations, Fourth (Present) Edition*. BSI



a) Stabilizer strut with base plate secured with ground pins



b) Stabilizer strut mounted on block tray

Examples of above-ground stabilising systems as per Figure 3 of BS 5837:2012 *Trees in relation to demolition and construction – Recommendations, Fourth (Present) Edition*. BSI

Appendix 9 - Record of Site Visits and Arboricultural Supervision

Client			Location	
	Global Technologies Racing Ltd			Land to the east of Fontwell Avenue, Fontwell BN18 0SB
Local planning authority	Arun District Council			
Planning application	BN/57/19/RES			
Development	Construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping			

Stage of development	Action required
Pre-construction	Mark position of protective barrier forming construction exclusion zone.

Notes	
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Arboriculturalist	
Signed	
Date	

NOTE - COPY OF COMPLETED FORM TO BE SCANNED AND SENT TO LPA ARBORICULTURAL OFFICER

Beechdown ref: B/0283/20
Fontwell -- BS 5837 tree survey/report -- September 2020

Appendix 9 - Record of Site Visits and Arboricultural Supervision

Client			Location		
Global Technologies Racing Ltd		Land to the east of Fontwell Avenue, Fontwell BN18 0SB			
Local planning authority	Arun District Council				
Planning application	BN/57/19/RES				
Development	Construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping				

Stage of development	Action required
Pre-construction	Site visit to check position of protective barrier prior to construction activity.

Notes	
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Arboriculturalist	
Signed	
Date	

NOTE - COPY OF COMPLETED FORM TO BE SCANNED AND SENT TO LPA ARBORICULTURAL OFFICER

Beechdown ref: B/0283/20
Fontwell -- BS 5837 tree survey/report -- September 2020

Appendix 9 – Record of Site Visits and Arboricultural Supervision

Client			Location		
Global Technologies Racing Ltd			Land to the east of Fontwell Avenue, Fontwell BN18 0SB		
Local planning authority	Arun District Council				
Planning application	BN/57/19/RES				
Development	Construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping				

Stage of development	Action required
Construction	Supervision of hand excavation for foundations adjacent to RPA of T3.

Notes	
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Arboriculturalist	
Signed	
Date	

NOTE - COPY OF COMPLETED FORM TO BE SCANNED AND SENT TO LPA ARBORICULTURAL OFFICER

Beechdown ref: B/0283/20
Fontwell – BS 5837 tree survey/report – September 2020

Appendix 10- Arboricultural Monitoring Form

Client	Global Technologies Racing Ltd	Location	Land to the east of Fontwell Avenue, Fontwell BN18 0SB
Local planning authority	Arun District Council		
Planning application	BN/57/19/RES		
Development	Construction of 2274sqm of light industrial floorspace and associated infrastructure and landscaping		

Area inspected	Comments	Action required
Protective barriers		
Construction exclusion zone		
Site storage/material mixing		
Other		
Additional Comments		

Arboriculturalist	
Signed	
Date	

NOTE - COPY OF COMPLETED FORM TO BE SCANNED AND SENT TO LPA ARBORICULTURAL OFFICER

Beechdown ref: B/0283/20
Fontwell – BS 5837 tree survey/report – September 2020



Site Guidance Note 2: Fencing protected trees

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SGN 2: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).

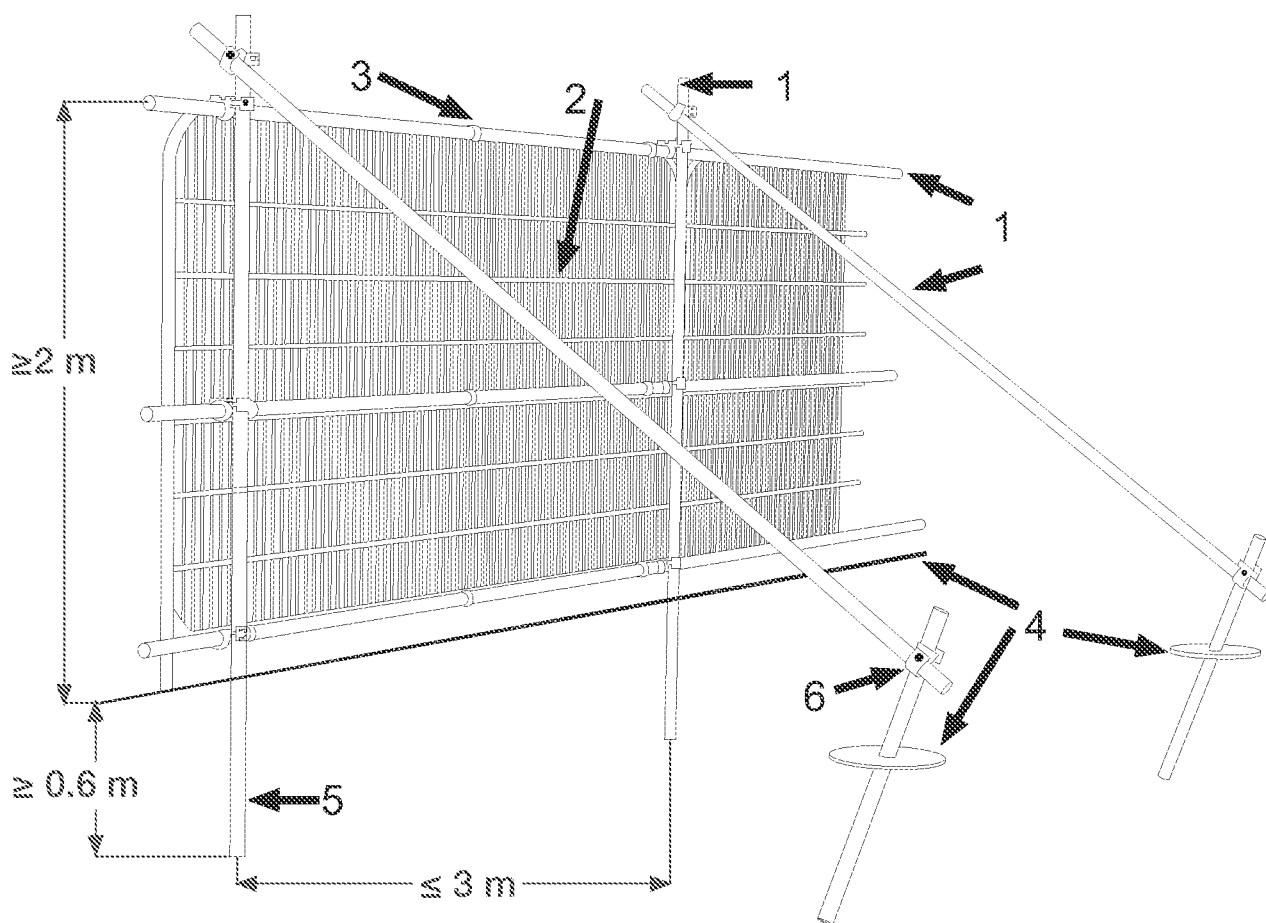
Important reminders

5. Fencing will be fit for purpose, i.e. prevent unauthorised incursions and activities within RPAs.
6. Fencing will be installed at the locations shown on the tree protection plan.
7. Fencing locations will not be altered without prior approval of the supervising arboriculturist.
8. Fencing will not be removed at the end of the construction activity without prior approval of the supervising arboriculturist.

SGN 2: Explanatory notes and examples

Purpose

SGN 2 describes where the temporary protective fencing will be installed, what form it can take and how long it should remain in place to effectively protect the RPAs of trees to be retained, based on the recommendations in BS 5837 (6.2 & 7.3).



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

SGN 2-01 Protective fencing recommendations taken from figure 2 of BS 5837.

SGN 2: Explanatory notes and examples

General principles and clarifications

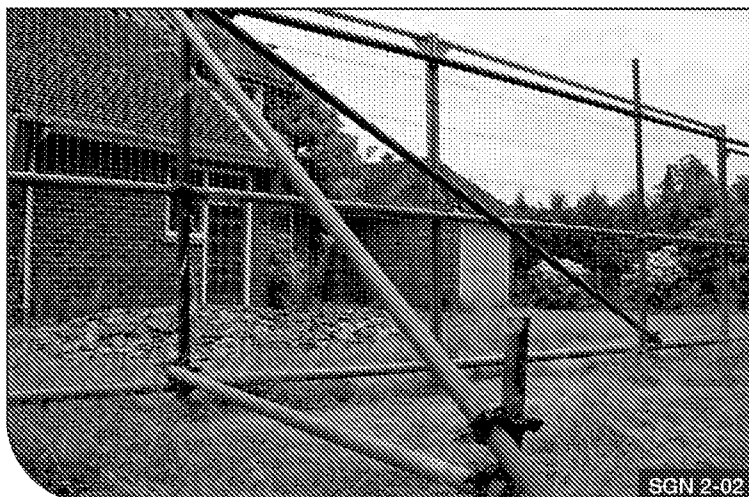
The fencing will be installed at the locations shown on the tree protection plan and agreed by the local planning authority before any construction activity starts on site. It will remain in place until there is no risk of harm from the development activity.

No fencing will be moved from its agreed location, removed, or temporarily dismantled, without consulting the supervising arboriculturist. Furthermore, the condition of the fencing will be regularly monitored by the supervising arboriculturist to ensure it remains fit for purpose, i.e. sufficient to prevent unauthorised access or activities within the RPAs of retained trees.

The minimum specification for the fencing will be as shown in figure 2 of BS

5837, or an equivalent design that effectively restricts access to the RPAs it protects. The precise form of the fencing can vary, provided it is fit for purpose. More specifically, behind the fencing, there will be no unauthorised vehicular access; no repeated pedestrian access; no fires; no storage of excavated debris, building materials, chemicals, or fuels; no mixing of cement; no service installation or excavation; no raising or lowering of soil levels; and no excessive cultivation for landscape planting.

Any variations to these restrictions will be agreed by the supervising arboriculturist.



Heras fencing wired to scaffold braced posts is a robust and effective interpretation of the BS specification.

SGN 2: Explanatory notes and examples

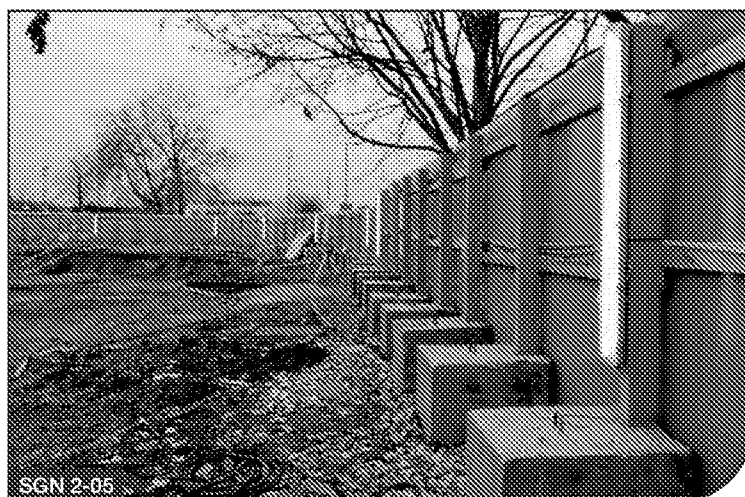
Board specification on secure wooden posts is a suitable alternative to the standard braced scaffold design.



Boards following the line of existing hard standing, enclosing the vulnerable RPA within the fencing.



An alternative to dug supports is concrete blocks set outside the RPA.



SGN 2: Explanatory notes and examples



Improvised use of drainage pipe wrapped around the trunk can provide an added layer of protection beneath a layer of plywood.



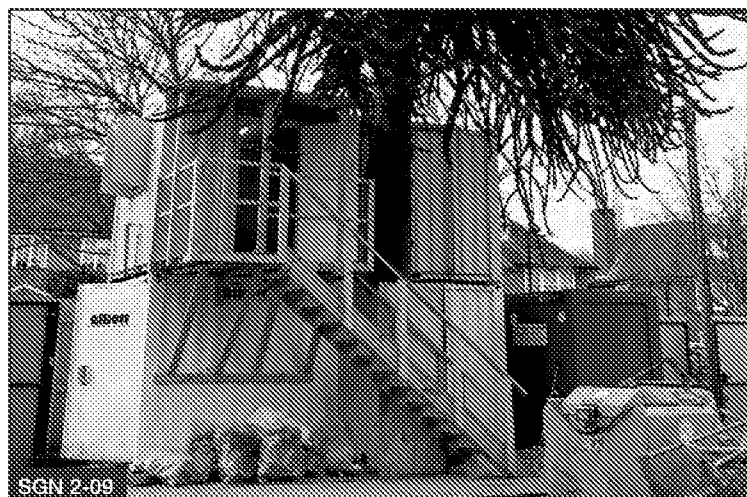
Boards attached to a supporting framework surrounding the trunk reduces the risk of accidental impact.



A wood frame around the trunk can be used to support a plywood surround.

SGN 2: Explanatory notes and examples

An innovative use of plywood and accommodation cabins to protect the trunk and roots of this retained tree.



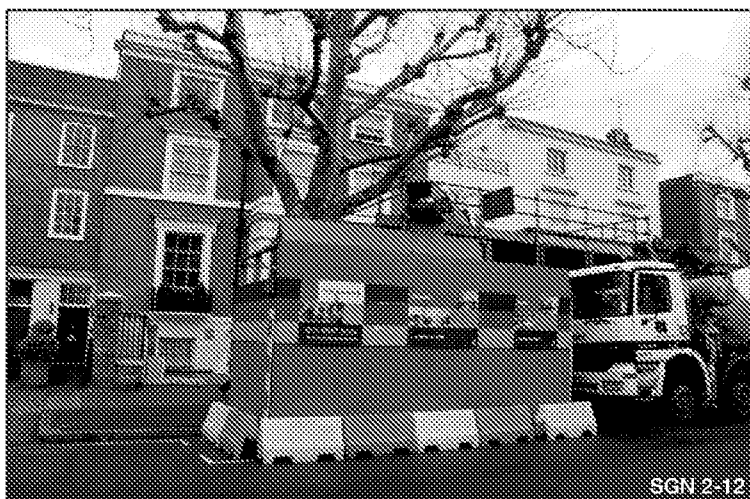
Scaffold and boards can be installed around trees that have to be retained within working areas.



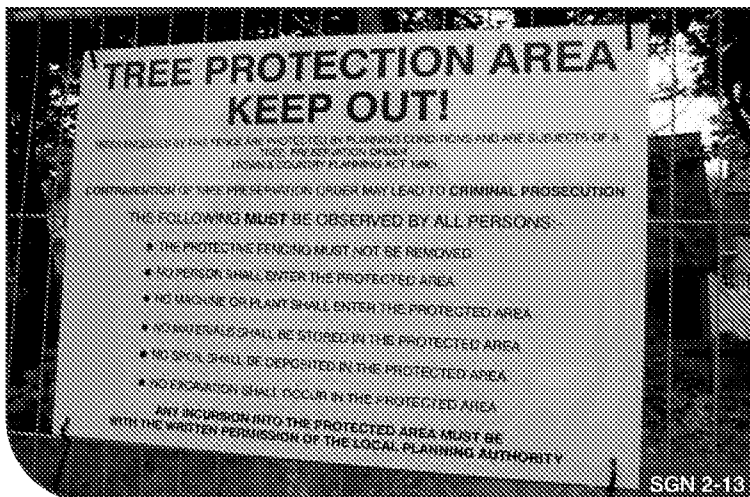
SGN 2: Explanatory notes and examples



Boxing in trunks provides effective protection, even in the tightest of situations, along with the retention of existing hard surfacing to protect the RPA.



If street trees could be harmed during development, they should also be protected even though they may be off site.



BS 5837 recommends warning signs are attached to fencing as a reminder of the restrictions within the RPA.

SGN 2: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. **BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:**
Clauses 6.2 (Barriers and ground protection) and 7.3 (Tree protection during development) recommend:
 - 6.2.1.1 *All retained trees should be protected by fencing and ground protection before any demolition, development or soil stripping starts.*
 - 6.2.1.3 *The protected area is sacrosanct. Fencing and ground protection should not be removed or altered unless agreed by the supervising arboriculturist.*
 - 6.2.1.5 *The supervising arboriculturist should confirm that the tree protection has been installed as agreed before any significant site work starts.*
 - 6.2.2.1 *The tree protection should be fit for purpose, i.e. preventing inappropriate work in the RPAs of retained trees, and be maintained to remain rigid and complete.*
 - 7.3.2 *Where structures are to be removed from RPAs, fencing and ground protection should be installed up to the edge of the structure to protect the underlying soil.*



Site Guidance Note 4: Pollution control

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SGN 4: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Manage pollution control under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Where a significant risk of root protection area (RPA) contamination is identified, put pollution control measures in place to manage that risk.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).

Important reminders

5. Make provision for emergency spillage clean-up.
6. Mix cement and wash vehicles as far away from RPAs as possible.
7. Use bunding and impermeable membranes to prevent liquid contaminants reaching RPAs.
8. Use impermeable membranes to prevent leachates from poured concrete contaminating RPAs.
9. Keep pollution control measures in place until there is no significant risk of RPA contamination.

SGN 4: Explanatory notes and examples

Purpose

SGN 4 describes why pollution control is necessary, what form it will take, and how long it will remain in place to effectively protect retained trees, based on the recommendations in BS 5837 (5.5, 6.2.4, 7.4, 7.5, & A.2).



General principles and clarifications

Pollution control is intended to prevent pollutants contaminating RPAs and it will be necessary wherever risk assessment identifies a significant risk of harm arising from this cause. Spilt solid or liquid chemicals that reach RPAs can kill existing roots and may prevent new roots growing, so provision will be made to minimise the risk of soil contamination within the normal risk management protocols for the site. If identified as necessary in the risk assessment process, pollution control measures will include physical means of containing spillages and procedures for clearing them up if they occur. All cement mixing and vehicle washing points will be

located outside RPAs, with provision to contain any spillages. Where the contours of the site create a risk of polluted water or toxic liquids running into RPAs, a precautionary measure of bunding or a frame, sealed with heavy-duty plastic sheeting sufficient to prevent contamination, will be used to contain accidental spillages. Where wet concrete is poured within RPAs, an impermeable liner will be used to prevent contamination of the soil from any leachate. Pollution control measures will remain in place until there is no significant risk of RPA contamination.

SGN 4: Explanatory notes and examples



The storage of fuels or any toxic chemicals is not permitted in RPAs.



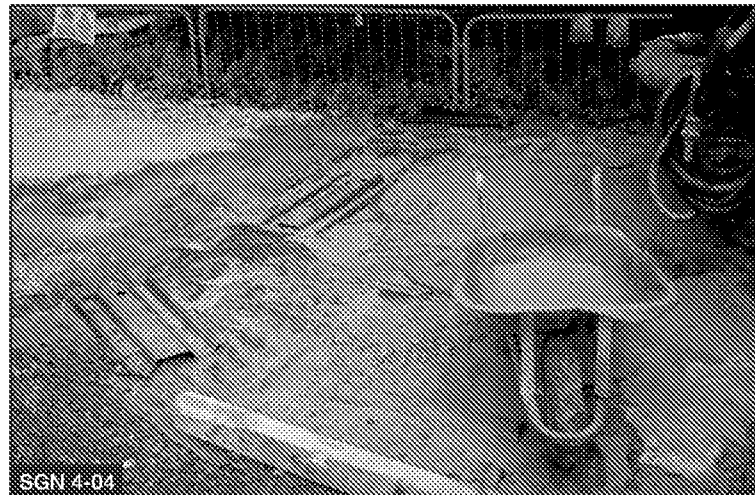
Where fuel or other chemicals are stored on site, risk assessment will be carried out to identify if emergency spillage kits are needed to restrict the environmental impact of accidents.



Soil bunding or a supporting framework covered in heavy-duty plastic sheeting will be installed where there is a risk of spillages contaminating RPAs. This specifically applies to cement mixing areas and vehicle washing facilities.

SGN 4: Explanatory notes and examples

Cement washings are toxic to plants and must be contained in a way that prevents contamination of adjacent RPAs.



The leachate from poured wet concrete is toxic to plants and must be prevented from contaminating RPAs by using an impermeable membrane to stop any leakage into the soil.



When pouring wet concrete in RPAs, methods must be used to prevent spillage and contamination beyond the installation.



SGN 4: Explanatory notes and examples



Impermeable liners must be used to prevent contamination of the RPA from the leachate that originates from poured concrete.

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. **BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:** Clauses 5.5 (Tree protection plan), 6.2.4 (Additional precautions outside the exclusion zone), 7.4 (Permanent hard surfacing within the RPA), 7.5 (Special engineering for foundations within the RPA), and A.2 (Avoiding damage to trees), recommend:
 - 5.5.6 To avoid contamination from pollutants, account should be taken of the effects of slope on the movement of potentially harmful liquid spillages towards RPAs.
 - 6.2.4.3 Materials that could harm trees should be stored and handled well away from RPAs.
 - 7.4.4.5 Concrete should not be poured within RPAs unless an impermeable liner has been installed to prevent contamination by the highly alkaline leachate.
 - 7.5.5 Pile type should be selected to minimise the potentially toxic effects of uncured concrete, e.g. sleeved bored pile or screw pile.
 - A.2.1 Care should be taken to avoid accumulating adverse impacts on retained trees from materials such as uncured concrete, diesel oil, and vehicle washings.



Site Guidance Note 9: Installing/upgrading surfacing in root protection areas

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SGN 9: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).
5. Design access to avoid soil compaction (See SGN 3 Ground protection).
6. Follow the guidance in SGN 4 Pollution control, if concrete is poured within or near RPAs.
7. Minimise excavation into original undisturbed soil (See SGN 7 Excavation in root protection areas).
8. Follow the guidance in SGN 8 Removing surfacing and structures in root protection areas, if existing surfacing is to be removed before installing new surfacing.
9. Follow the guidance in SGN 10 Installing structures in root protection areas, if the surfacing is to be installed on supports, i.e. piles, pads, or posts.

SGN 9: Summary guidance for site operatives

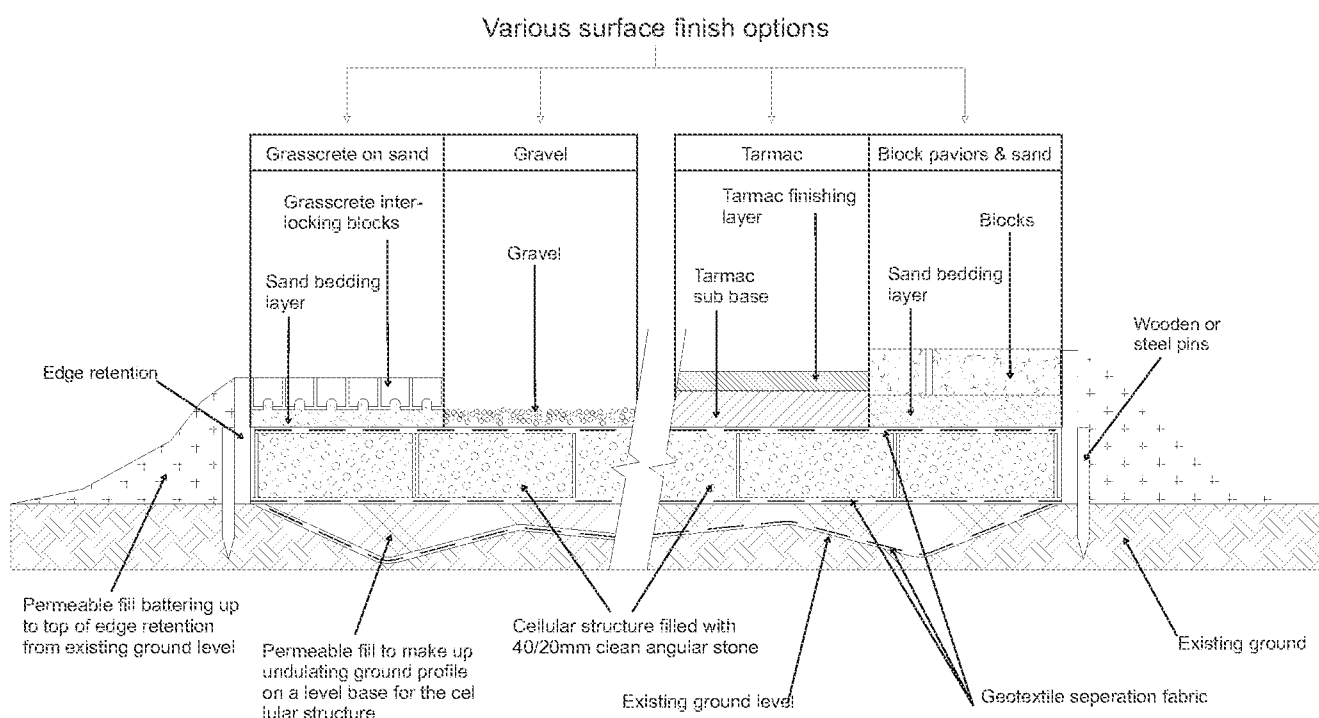
Important Reminders

10. For ground without existing surfacing, remove any loose material at the soil surface by hand and do not excavate into existing soil levels unless approved by the supervising arboriculturist.
11. For ground with a vegetation layer, excavations may be appropriate to remove the turf layer and surface vegetation, but this must be agreed by the supervising arboriculturist.
12. All new surfacing must be set back from trunks and buttress roots by at least 50 cm, unless otherwise agreed by the supervising arboriculturist.
13. Fill low points on undulating surfaces to an even level with any high points using an agreed granular material such as sand or stone.
14. Do not mechanically compact new fill or existing soil.
15. If a three-dimensional cellular confinement system is used, install it according to the manufacturer's technical specification. Note: The cellular fill will be washed angular stone with no fines, as specified by the manufacturer.

SGN 9: Explanatory notes and examples

Purpose

SGN 9 describes the practical requirements for installing new surfacing and upgrading existing surfacing in RPAs, based on the recommendations in BS 5837 (7.4).



Illustrative specification for no-dig cellular confinement surfacing with examples of finishing options.

Note: The final design must be site specific and detailed by an appropriate specialist

BS 5837 recommends that three-dimensional cellular confinement systems are an appropriate sub-base for installing surfacing in RPAs. Most products are made from heavy-duty plastic that is pulled apart to open into cells. These are then filled with washed stone, after the product is spread over the ground and pinned in place. This forms a base layer that acts as a floating raft, spreading the load across the whole construction width. The base layer can be topped with a variety of finishes as illustrated in the cross-section.

Product suppliers: Protectaweb 3D cellular confinement product -
<https://wrekinproducts.com>

SGN 9: Explanatory notes and examples

General principles and clarifications

Conventional surfacing installation based on excavating and compacting a supporting sub-base is unacceptable in RPAs because it can damage roots and the rooting environment. This harm is caused by killing roots, compacting soil structure, and impeding water/gaseous exchange through the soil. Adverse impact on trees will be reduced by minimising the extent of these changes in RPAs.

New surfacing solutions

Important elements of an effective design include protecting roots and the rooting environment during installation, a load spreading capability to prevent localised compaction, and providing adequate permeability for water and gasses to support living roots. The main approaches are:

- three-dimensional cellular confinement systems filled with washed stone laid directly onto the soil surface;
- concrete slabs cast directly onto the soil surface; and,
- surfacing supported above the soil surface on top of piles, pads, or posts.

The specific design of the chosen approach is an engineering issue that will take account of the bearing capacity of the soil, the intended loading, and the frequency of loading. The detail of

product and specification are technical matters to be provided by an appropriate specialist.

Dealing with undulating surfaces and establishing a tolerable level of excavation

The precise location and depth of roots within the soil is unpredictable and will often only be known when careful digging starts on site. Ideally, all new surfacing in RPAs will be no-dig, i.e. requiring no excavation, but this can sometimes be difficult on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base will not be compacted as would happen in conventional surface installation. Some limited excavation can be necessary to achieve this and need not be damaging if carried out carefully and large roots are not cut. Tree roots and grass roots rarely occupy the same soil volume at the top of the soil profile, so the removal of an established turf layer up to 5cm from the surface is unlikely to be damaging to trees. However, this may not be possible where there is no grass because tree roots may grow right up to the soil surface. In some situations, it may be possible to dig to a greater depth,

SGN 9: Explanatory notes and examples

depending on local conditions, but this will be assessed by the supervising arboriculturist if excavation deeper than 5cm is anticipated.

On undulating surfaces, finished gradients and levels will be planned with sufficient flexibility to allow on-site adjustment if excavation of any high points reveals large unexpected roots near the surface. If the roots are less than 2.5cm in diameter, they can be cut and the base for the surfacing formed with the preferred minimal excavation of up to 5cm. However, if roots over 2.5cm in diameter are exposed, cutting them may be too damaging and further excavation may not be possible. If that is the case, the surrounding levels will be adjusted to take account of these high points by filling with suitable material. If this is not practical, the situation will be discussed with the supervising arboriculturist before a final decision is made.

Edge retention

Conventional kerb edge retention set in concrete-filled excavated trenches can cause damage to roots and will be avoided. Edge retention in RPAs will be designed to avoid any significant excavation into existing soil levels, with several approaches that are fit for this purpose. For block pavements, the use of pre-formed edging secured by metal pins is effective and can be reinforced by concrete supports if there is no

excavation into the soil. Railway sleepers pinned in place or wooden boards offer alternative options, depending on the expected loading of the surfacing. If the edge retention needs to be battered down to lower surrounding ground levels, a permeable soil fill will be used, as agreed with the supervising arboriculturist.

Footpaths and surfacing without a load-spreading base layer

In some situations, limited-width floating concrete rafts constructed directly onto the soil surface may be acceptable for both pedestrian and vehicular access, but the design will not include any strip-dug supports. If concrete is poured directly, precautions must be taken to ensure that no toxic fluids can contaminate the adjacent soil, e.g. confining the concrete in an impermeable liner. Alternatively, elevated paths supported on low impact frames or post supports allow a decking surface to cross sensitive areas. Where paths are installed very close to trunks, provision will be made for distortion from future root growth through using flexible components for the supporting frame and surfacing.

Specific considerations for upgrading existing surfacing

When upgrading existing surfacing, the preferred option will be to leave it in place and install the new surfacing on top of it. If the retained surfacing is impermeable, it may improve conditions for tree roots if it

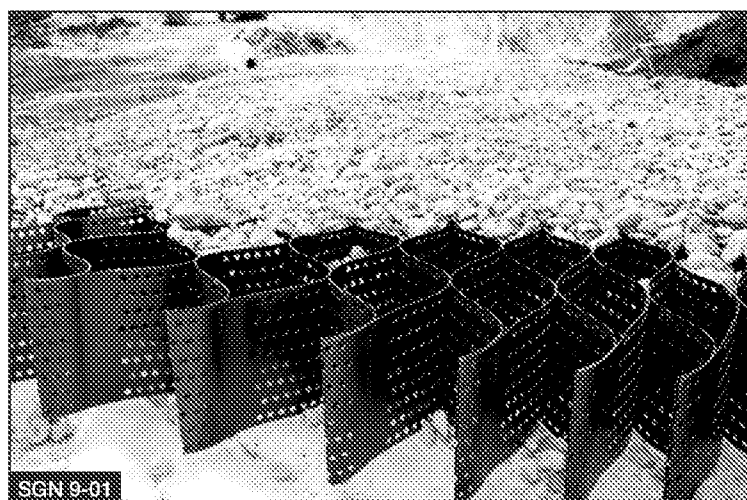
SGN 9: Explanatory notes and examples

is punctured before the new surfacing is laid, but this is detail to be agreed with the supervising arboriculturist. If the existing surfacing is to be removed, it will be excavated down to the soil level beneath following the guidance set out in SGN 8 (Removing surfacing and structures in root protection areas). The new surfacing will then be installed on this surface, as described above.

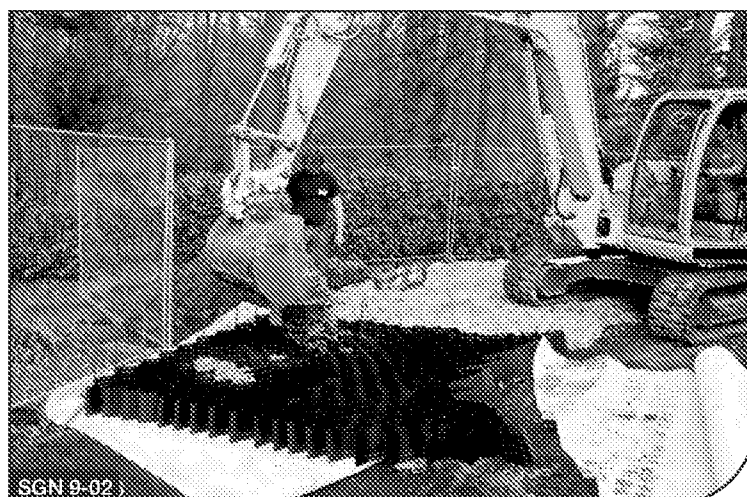
New surfacing near trunks

All new surfacing should be set back from trunks and buttress roots by at least 50cm to allow space for future growth and minimise the risk of distortion.

The flat-packed three-dimensional cells are pulled apart, spread across the area to be surfaced, and pinned in place ready for the washed angular stone fill (with no fines).



The stone-filled cells spread the load of traffic to prevent localised compaction. The permeable geotextile membrane on the ground allows the movement of water and gasses, but prevents the migration of stone into the soil profile.



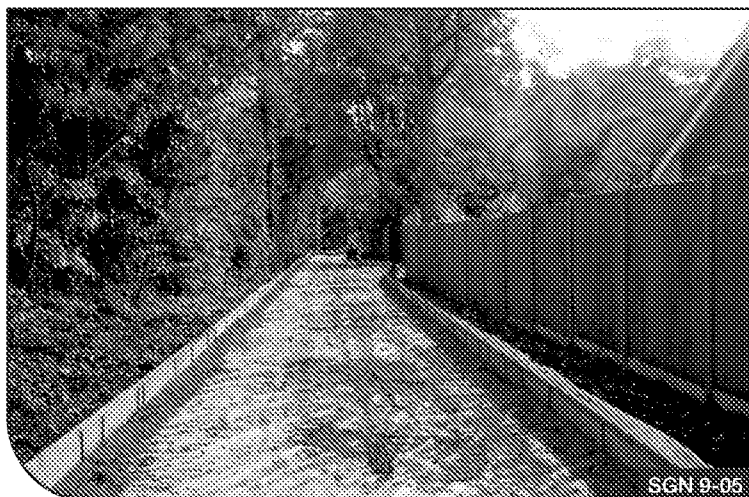
SGN 9: Explanatory notes and examples



Although BS 5837 recommends a minimum distance of 50cm between new surfacing and buttress roots, there may be scope for flexibility in this separation for mature trees with little potential for future growth, if agreed by the supervising arboriculturist.



A conventional concrete haunching can be used to retain new surfacing if it is not dug into a trench - here it is placed on top of the three-dimensional cellular confinement layer.



This preparation for a new residential access drive shows the base formation above the original ground level, with the permeable geotextile layer covering the ground. The wooden boards are pinned in place, creating an informal and rustic surface edging.

SGN 9: Explanatory notes and examples

The three-dimensional cells have been installed and filled with washed stone, ready for the finished surface to be laid above. The ground beyond the drive edges has been profiled with backfilled topsoil.



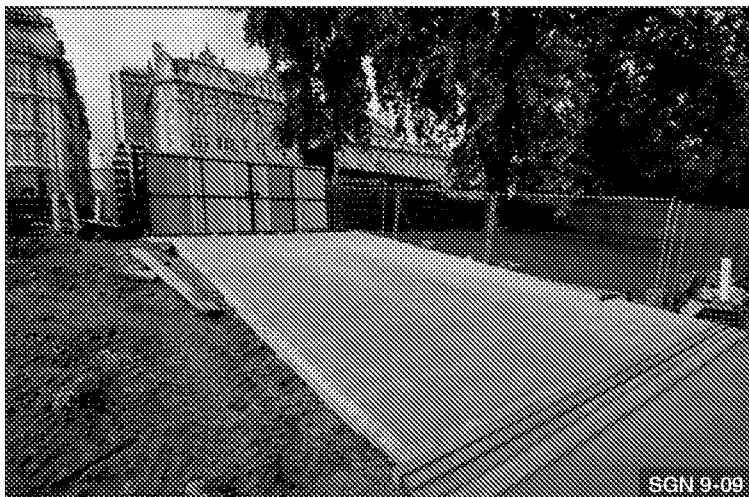
An alternative to the flexible three dimensional cells is rigid interlocking plastic cells, again filled with washed stone and retained by pinned wooden edges.



Another option for wooden edges at corner points that allows for vehicles to accidentally track over the edge of the formal surfacing.



SGN 9: Explanatory notes and examples



This temporary access for heavy construction traffic on the outer edge of a RPA is a concrete slab cast above ground level and will be removed when the project is completed. This approach is particularly suitable for slopes where a three-dimensional approach may be more prone to distortion when carrying heavy loads.



In some situations, it may be appropriate to cast a free-floating concrete surface directly onto the soil surface provided provision is made to prevent soil contamination while the concrete is being poured.



The RPA of this oak extended about 12m from its trunk and was previously covered in tarmac as parking. This original surfacing was removed and replaced with a new patio set above the ground level, with provision for water and air input into the covered RPA.

SGN 9: Explanatory notes and examples

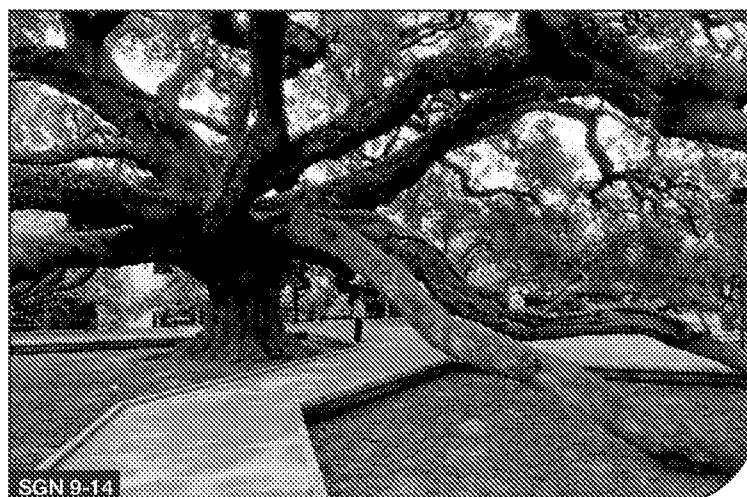
Where new surfacing is to be installed over existing, sometimes it may assist the movement of gasses and water if the existing surfacing is punctured. In this situation, exploratory digging showed important roots directly beneath the existing tarmac, which would have been damaged if the tarmac was removed.



An option for installing surfacing close to mature trees is to use a light metal frame with rubberised surfacing to allow the path to distort without failing as the roots grow.



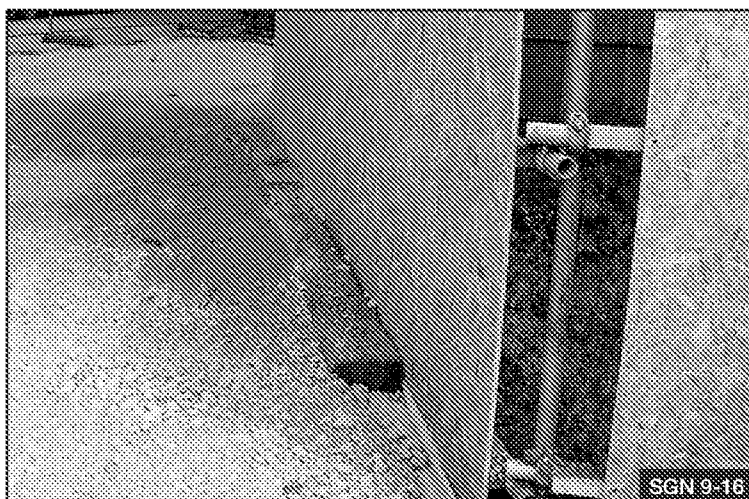
Board walks supported on posts or a light frame are another way of providing pedestrian access across sensitive RPAs (photo courtesy of Philip van Wassenaer).



SGN 9: Explanatory notes and examples



New surfacing such as decking can be supported above the ground on posts leaving the soil surface beneath undisturbed.



Although this is only a temporary surface, railway sleepers pinned into the ground can be used to retain the edges of new surfacing.



Where space is restricted it is possible to use metal edging.

SGN 9: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. **BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:**

Clause 7.4 (Permanent hard surfacing within the RPA) recommends:

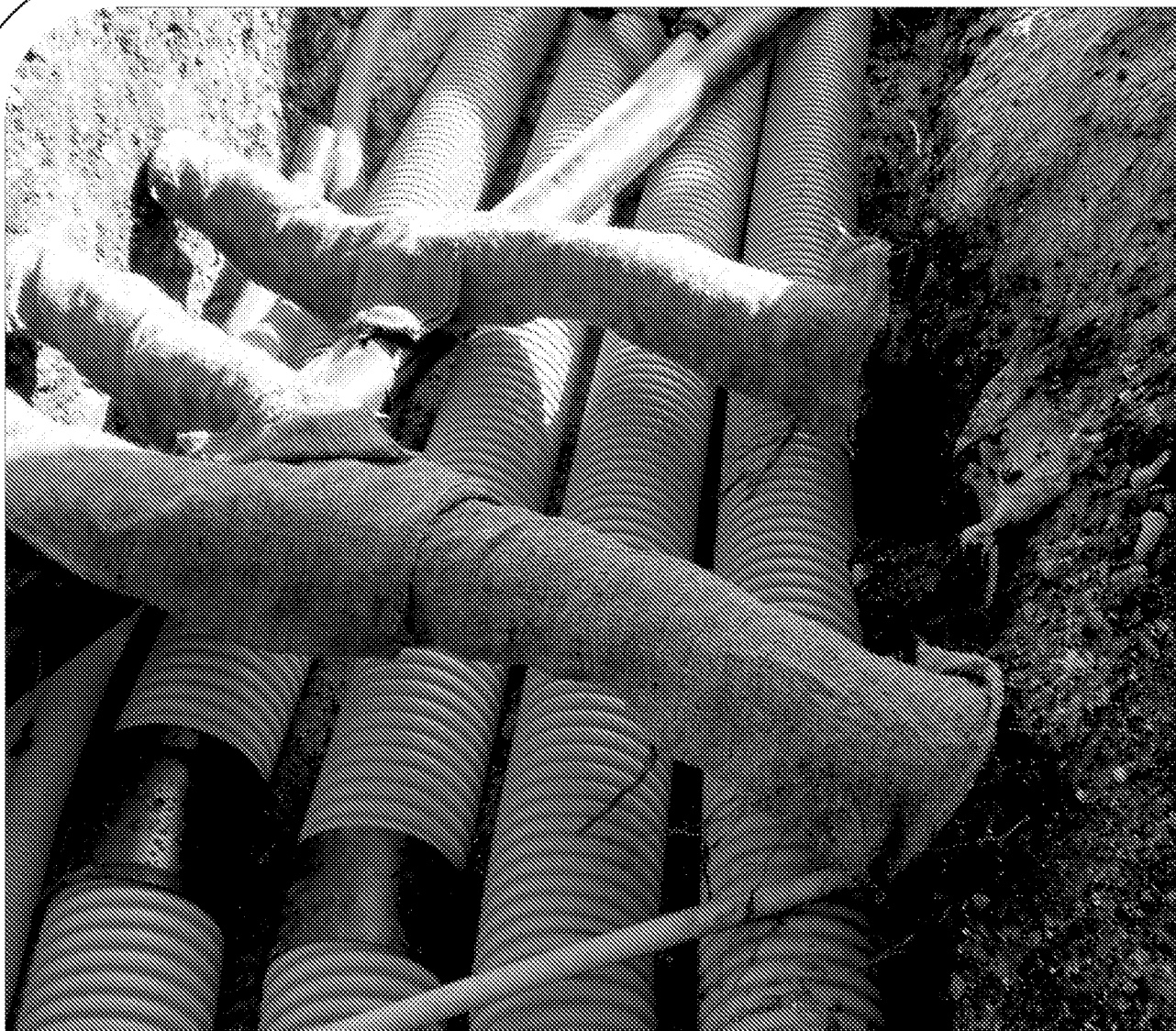
- 7.4.2.1 *New surface design should not require excavation other than the removal of the turf layer and surface vegetation. The design should be able to bear any anticipated loading, especially if it must carry construction traffic.*
- 7.4.2.2 *The design should evenly distribute the loading to avoid localised compaction.*
- 7.4.2.7 *The design should be resistant to or tolerant of deformation by tree roots, and should be set back from the stem and any root buttresses by a minimum of 50cm to allow for growth and movement. Levels can be made up using appropriate inert granular material.*

NOTE Piles, pads, elevated beams, and three-dimensional cellular confinement systems, can be used to support surfaces. If excavation is required, the location of roots greater than 2.5cm in diameter should be determined by exploratory investigations and retained if possible.

- 7.4.3 *The conventional installation of kerbs, edgings, and haunchings, can damage tree roots and should be avoided either by using alternative methods of edge support or by not using supports at all.*

NOTE Examples of suitable edge supports include above-ground peg and board edging, sleepers, gabions, and other non-invasive ground-contact structures.

- 7.4.4.3 *Ground levels should not be reduced to establish the new hard surface at the former ground level. Loose debris and turf should be removed carefully and the new surface should sit on top of the original soil.*
- 7.4.4.4 *Fill to raise levels should be a granular material which remains gas- and water-permeable throughout its design life.*
- 7.4.4.5 *Wet concrete should not be poured in the RPA unless an impermeable liner has been installed to prevent soil contamination from the toxic leachate.*



Site Guidance Note 11: Installing services in root protection areas

This document is only a summary of its subject matter. You should not rely on this general guidance in isolation, and you should always seek detailed advice from an appropriate expert in relation to specific circumstances before any action is taken or refrained from. The content of these pages is protected by copyright © Barrell Treecare Ltd 2018. You may download and republish (in its full format) and print copies of the guidance – but you must not adapt any guidance.

SGN 11: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).
5. Design access to avoid soil compaction (See SGN 3 Ground protection).
6. Minimise excavation into original undisturbed soil (See SGN 7 Excavation in root protection areas).

Important reminders

7. Trenchless installation will be preferred. The fall-back approaches of hand-dug broken trench and then hand-dug continuous trench, will be acceptable if agreed by the supervising arboriculturist.
8. For trenchless installation, the starting and finishing pits will be outside RPAs.

SGN 11: Explanatory notes and examples

Purpose

SGN 11 describes the practical requirements for installing new services within RPAs, based on the recommendations in BS 5837 (7) and the guidance in NJUG (4.1).



General principles and clarifications

Excavation to upgrade existing services or install new services in RPAs may damage retained trees. Where possible, all services will be outside RPAs and installation in RPAs will only be chosen as a last resort. If installation within RPAs is being considered, as advised in 4.1.3 of the NJUG guidance, the decision will be made in consultation with the supervising arboriculturist before any work is carried out. If service installation is agreed within RPAs, the NJUG protocol as set out in 4.1.3 of its guidance will be used to decide the most appropriate method. In summary, this sets out that “Acceptable techniques in

order of preference are; a) trenchless, ... b) Broken trench – hand-dug ... c) Continuous trench – hand-dug”. If trenchless methods are to be used, the starting and finishing pits dug at each end of the service run will be outside RPAs. Where a hand-digging option is agreed, any roots discovered during the excavations will be dealt with as described in SGN 7 (Excavation in root protection areas). Backfilled material around excavated services will not be heavily compacted, observing the specific advice provided in 4.1.5 of the NJUG guidance.

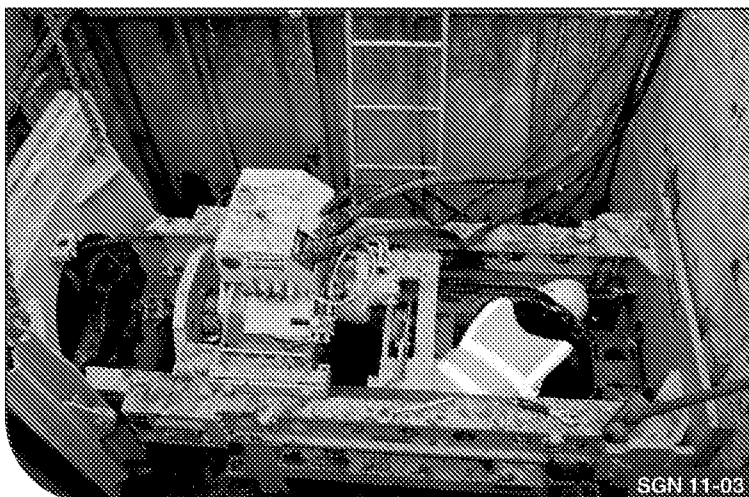
SGN 11: Explanatory notes and examples



Conventional installation of services digging a trench with a machine is **not permitted** in RPAS.



Trenching with machines to install services close to trees can make them unsafe and cause their premature death.



Thrust boring is the preferred option for installing service routes through the RPAs of retained trees.

SGN 11: Explanatory notes and examples

The start and finish pits for thrust boring are substantial and must be outside of RPAs.



Alternatives to thrust boring are to hand-dig broken or continuous trenches, so that roots can be retained (with the service ducting threaded beneath). Note the ground protection boards with soil piled on top on the left.



Ducting services that have to be threaded through existing roots is good practice because it reduces the need to excavate in the future. Note the hessian protection over roots while they are temporarily exposed to prevent sunscorch and drying.



SGN 11: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. **BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:**

Clause 7 (Demolition and construction in proximity to existing trees) recommends:

- 7.1.3 The installation of underground utility apparatus using trenchless technology will be acceptable where entry and retrieval pits can be formed outside the RPA. Even if the utility installation does not require planning permission, the work should still be undertaken in accordance with the guidance in NJUG Volume 4, Issue 2.
- 7.7.1 Care should be taken when routeing underground apparatus because the mechanical trenching can sever roots and change the local soil hydrology, both of which can adversely affect tree health. Wherever possible, underground services should be routed outside RPAs. If services are installed within RPAs, it is preferable to use common ducts, with inspection chambers sited outside the RPA.
- 7.7.2 Underground services within the RPAs should be shown on a plan prepared in conjunction with the project arboriculturist. Trenchless insertion methods should be the preferred option, with entry and retrieval pits outside RPAs, but if roots can be retained and protected, excavation using hand-held tools might be acceptable for shallow service runs.

2. **National Joint Utilities Group (“NJUG”) Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees – Issue 2** (www.njug.org.uk/wp-content/uploads/2016/09/V4-Trees-Issue-2-16-11-2007.pdf): Section 4.1 (How to avoid damage to trees – Below ground) advises:

“4.1.3 Realignment: Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage. Acceptable techniques in order of preference are;

- a) Trenchless: Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones. In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

SGN 11: Explanatory notes and examples

b) Broken Trench – Hand-dug: This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) 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 and outside of the Prohibited Zone.

c) Continuous Trench – Hand-dug: The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.”

Geoweb Tree Root Protection Installation Guide

Installation Recommendation

1. Preparation of the subgrade ready for Geoweb tree root protection no dig solution. Whilst inside the tree rooting area, all actions must ensure no detrimental effect on the ground condition. The tree rooting area is the surface which is being protected

- Removal of surface vegetation using prior agreed methods with local authority. No methods of removal which will cause compaction to the subgrade can be used. This includes the use of plant, vehicles and machinery. Examples of appropriate methods include hand tools or herbicide
- When creating a level subgrade, do not grade off humps or level off through compaction, as these may contain tree roots. Rather infill hollows with a permeable material such as clean stone or sharp sand to create a level surface.
- All external debris, such as rocks and waste, should be removed
- When an existing hard surface is scheduled for removal, care should be taken not to disturb tree roots that may be present beneath. Hand held tools or appropriate machinery should be used to remove the existing surface, working backwards over the area so not trafficking the exposed area

2. TRP4000 Non-woven Geotextile

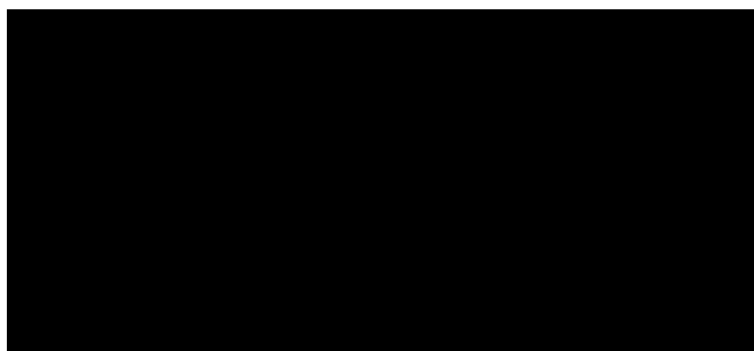
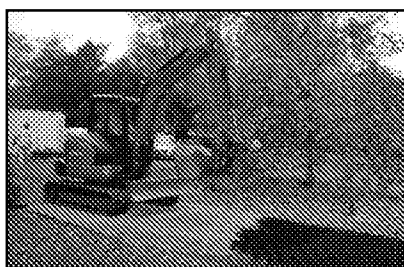
- Lay out the TRP4000 over the prepared area, overlapping joins by a minimum of 300mm, dependent on soil conditions
- When overlapping the TRP4000, ensure the overlap is in the same direction as the Geoweb will be extended. This will ensure the geotextile does not pull up when extending the Geoweb
- If a site specific solution has been provided by Greenfix which includes a sub-base, this will require installation through non compaction methods

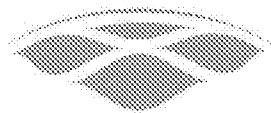
3. Installation of the Geoweb panels

- Lay out the collapsed Geoweb on the TRP4000 and secure at one end in the middle of the width.
- Extend the panel to 6.6m length, and secure its length at the other end
- Extend the width of the Geoweb to 2.6m wide, and secure each corner
- Ensure the panel is secured at 6.6m x 2.6m, as this will achieve the 259mm by 224mm cell diameter required.

4. Connection of the panels to create one single mattress

- All panels must be adjoined to one another both side by side and end to end
- Simply connect the Geoweb with the supplied ATRA® keys, through the aligned slots





GEOWEB®

Geoweb Tree Root Protection Installation Guide

1. Infill of the Geoweb for tree root application

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

2. Compaction of the infilled material

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

3. Edging options

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

4. Surface options available

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

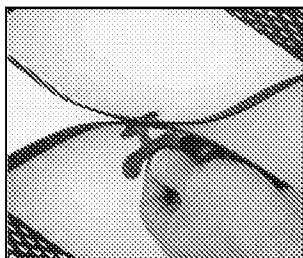
Additional Greenfix services available

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

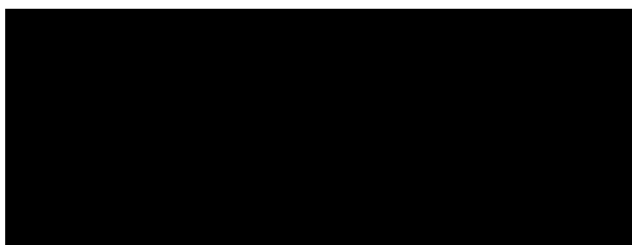
Site specific calculations and technical recommendations are also available via Greenfix.

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

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended however to substitute for any testing you may need to conduct to determine for yourself the suitability of the product for your particular use. Since we can not anticipate all variations in actual end use conditions, Greenfix Ltd make no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right



For enquiries and recommendations please contact



Greenfix
Soil Stabilisation and
Erosion Control Specialists