ARBORICULTURAL REPORT

Land at Wings Nursery, Lidsey Road, Woodgate

Prepared by

Jonathan Rodwell Cert Arb L4(ABC), TechArbor A

June 2020

ARUN DISTRICT COUNCIL AL/46/20/PL

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[redacted]

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4 - Tree survey plan. 5 – RPA and shade plan. 6 – Development proposal plan. 7 - Tree protection plan. 8 – Protective barriers. 9- Site visit and arboricultural supervision record. 10 - Arboricultural monitoring record. 11- Barrell Tree Consultancy (2018) Manual for managing trees on development sites v2.1 – site guidance notes 2: Fencing protected trees, 4: Pollution control, 8: Removing surfacing & structures in root protection areas, 9: Installing and upgrading surfacing in root protection areas, 11: Installing services in root protection areas.
12 - Geoweb tree root protection installation guide.

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SUMMARY

- **The quality of 36 trees within influence of a development proposal was assessed.**
- **An arboricultural impact assessment of the development proposal was prepared.**
- **The proposal is the construction of 81 new dwellings with associated access, drainage, open space and landscaping requirements.**

1.0 INTRODUCTION

1.1 I have received instruction from Thakeham Client Limited, on behalf of Southern Housing Group Limited, to provide arboricultural consultancy services in relation to a development proposal at Wings Nursery, Lidsey Road, Woodgate, Chichester PO20 3SU.

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 Thakeham Client Limited, on behalf of Southern Housing Group Limited; liability does not extend to any third party without our written consent.

2.0 DOCUMENTS PROVIDED

2.1 Plans provided by MHA.

19-121 0003	**Proposed block plan**	**1:500@A1**

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3.0 SURVEY FORMAT

3.1 Trees included in the survey were individuals or groups 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 1:1250 @ A4 tree survey plan (**Appendix 4**).

3.4 A detailed tree survey sheet is shown at **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	**1 tree**
Category A	**4 trees**
Category B	**16 trees**
Category C	**15 trees**

5.0 STATUTORY CONTROLS

5.1 Consultation with the Local Planning Authority confirmed that the surveyed trees are not within a Conservation Area but that the English oaks T1, T15, T19-T22 and T24-T26 are subject to Tree Preservation Order number **TPO/AL/1/18**.

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oaks T1, T15, T19-T22 and T24-T26 are subject to Tree Preservation Order number **TPO/AL/1/18**.

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 development proposal is for the construction of 81 new dwellings with associated access, drainage, open space and landscaping requirements.

7.0 SITE DESCRIPTION

7.1 The land at Wings Nursery **(Fig.1)** consists of around 2.6 ha of broadly level grounds. The detached two-storey dwelling, glasshouses and an area of hardstanding occupy the south-east corner of the site with the remaining area predominantly rough grassland with localised overgrown areas of nettles, brambles and thistles. Access to the site is via farm gates from Lidsey Road at the north-east and south-east corners with a third entrance immediately to the south of Wings. A 1.2m high stock-proof fence extends along the north, west and south boundaries with a post and rail fence along the southern section of the eastern boundary.

7.2 The wider landscape is semi-rural with individual trees or small groups as roadside planting, in domestic settings and hedgerows.

7.3 The site geology is London Clay Formation clay, silt and sand sedimentary bedrock while the superficial geology is described by the National Soils Resources Institute as a loamy soil with naturally high groundwater. No detailed analysis of the soil structure, composition or pH was undertaken and details from this report should **not** be used for calculating foundation depth. Foundation depth should be determined by the architect or a structural engineer and with reference to NHBC Chapter 4.2 – Building near trees.

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

8.0 TREE SURVEY

8.1 Surveyed trees consisted of 26 within the site and 10 beyond the site perimeter. Leyland cypress hedges, marked as Group 1 and 2 on the survey plan, were recorded and are detailed below. Trees and hedgerows too small to be recorded or beyond influence of the site included a small group of coppiced field maple, elder and grey willow between T20 and T21and a hedgerow of ivy-covered field maple, hawthorn, blackthorn and elder in the grounds of Stockhearn and Stockhearn House to the south.

- **Group 1** ***(category C)*** – Leyland cypress hedge; height 8m; 4m-5m wide; average stem ø 150mm.

- **Group 2** ***(category C)*** – Leyland cypress hedge; height 4-5m; 4m-5m wide; average stem ø 200mm.

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9.0 TREE APPRAISAL

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

- **T1 to T11 (mixed category U, B and C) –** trees recorded included oak, ash, hawthorn and coppiced hazel amongst a mixed species native hedgerow of 4m-6m tall coppiced hazel, hawthorn, field maple and elder in dense bramble cover on both sides of the ditch. Maintenance of the mixed hedgerow has lapsed with partially collapsed trees identified and low branches extending across the grass verge towards the pavement.

- **T16 to T24 (mixed category A, B and C) –** a linear group of well-spaced mature oak, two Lombardy poplar and one small coppiced goat willow. One dead tree to the north of T18 was noted but the trees are beyond the western boundary and their management is the responsibility of others.

- **T21 (category B) –** a mature English oak with veteran characteristics. Extensive heartwood decay was identified but failure of the tree represents a low risk at present. The tree is prominent within the site and careful pruning may allow its long-term retention as a relatively low risk tree with good habitat potential.

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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 1:1250 @ 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 recorded 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 English oaks (T25 &T26) to the access drive to Willows means their rooting pattern is likely to be more extensive in the open ground to the north. The extent of existing hard-surfacing at the base of the English oaks (T1&T15), shown in purple at **Fig. 2** below, will have had some impact on root morphology but while the impervious surface will reduce rainfall infiltration and limit available water, it is possible that condensation of moisture, due to temperature differentiation, on the underside of the asphalt has allowed the development of fine moisture-absorbing roots so the nominal RPA depicted is probably a reasonable representation.

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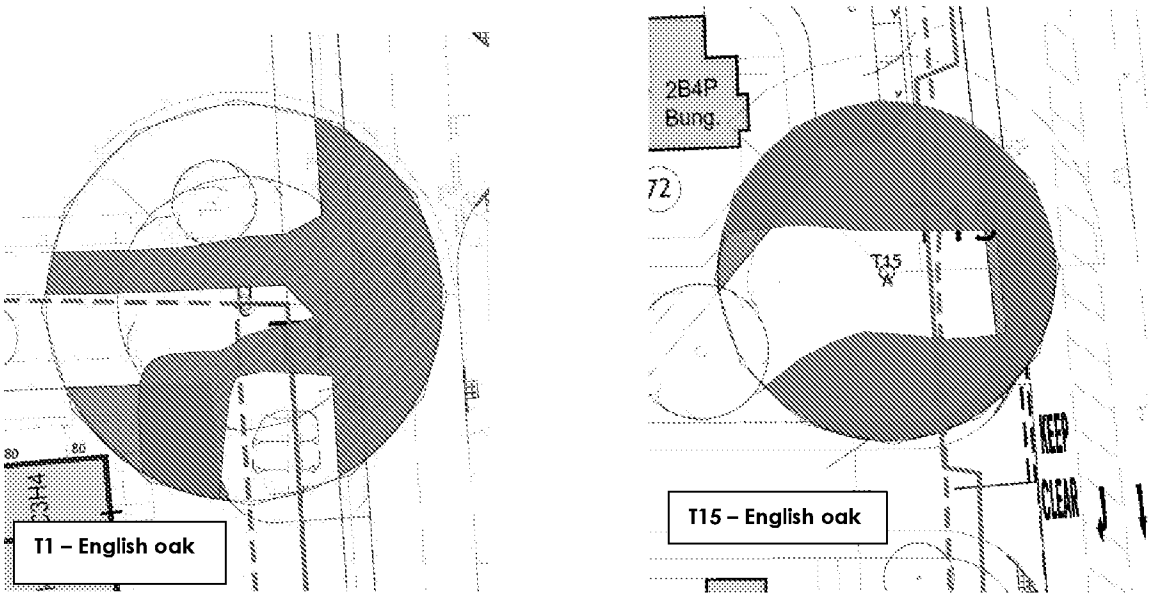


Fig.2 – Existing hard-surfacing within RPA shown in purple

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 1:1250 @ A4 RPA and shade plan (**Appendix 5**).

12.0 COMMENT

12.1 The 1:1250 @ A4 development proposal plan (**Appendix 6**) shows that implementation of the development takes place beyond the RPA of the mature English oak (T21), in the centre of the site, and all third-party trees to the north, south and west of the site.

12.2 Site layout impacts directly on, and will require the removal of, the Category U Leyland cypress (T3); Category C oak (T2), spruce (T27), Lawson cypress (T32), holly (T33) and western red cedar (T36); and Category B ash (T4), oaks (T12&T13), cedar (T30), and gum (T34). Development will also require the removal of the Category C Leyland cypress hedges recorded as Group 1 and Group 2.

12.3 The majority of the recorded roadside trees, and dense understorey of bramble-covered hazel, hawthorn and elder, between the English oaks (T1&T15), shown at **Fig. 3** below, are not directly affected by the development proposal; however, management of this group has lapsed and while it currently provides good habitat and screening,

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work to clear and improve the ditches/culverts and accessibility to pavements and verges will result in the loss of the majority of the low-level cover and retention of just individual trees of relatively poor form with increased exposure and greater potential for failure.



Fig. 3 – Image courtesy of Google Maps (map data © 2020 Google)

12.4 Construction of the private driveway and parking spaces to plot 80 impacts on around 3% of the unsurfaced RPA of the English oak (T1), shown in orange at **Fig. 2**, while proposed pedestrian access, also shown in orange at **Fig.2** extends over just 2% of T15's RPA. The southern end of the proposed access drive also extends into the RPA of T15 but only into existing hard-surfaces.

13.0 CONCLUSION

13.1 With appropriate precautionary measures I consider the development proposal at Wings Nursery is feasible, in relation to the surveyed trees, for the following reasons:

- **Although initial losses of some of the roadside trees and low-level cover between the English oaks (T1&T15), the eucalyptus (T34), conifer hedges and smaller ornamentals around the dwelling at Wings will have an immediate impact on the arboricultural characteristics of the site, a planting scheme that incorporates mixed native-species hedging and individual standards throughout the site, rather than limited to the north-east corner, and managed carefully will result in a greater level of tree cover.**

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- **I believe that site layout will have a minimal impact on T1 and that ultimately an increase in unsurfaced ground within the RPA of T15, along with the use of no-dig surfacing for footpath construction, means that protective measures, supervision and monitoring will be effective in preventing a negative impact on the RPA.**

- **I do not consider the current or future growth of the retained trees to have a detrimental impact on the development proposal or to lead to future pressure for removal or unsympathetic pruning; however, regular inspections to assess the structural integrity of the English oak (T21) should be undertaken to determine the risk it poses and advise on management.**

- **The use of protective barriers, precautionary measures and arboricultural supervision and monitoring will prevent damage and potentially negative effects on the current and long-term health of the trees.**

14.0 DETAILS

14.1 Date of survey - 20.09.2017 & 17.03.2020

14.2 Present at site visits - Jonathan Rodwell Cert Arb L4(ABC);TechArborA

14.3 Date of report - 01.06.2020

14.4 Contact details:

CONTACT	NAME	DETAILS
Local Planning Authority	Arun District Council	**Tel -** 01903 737756 **Email** – Planning@arun.gov.uk
Architects	MHA	**Tel** - 01243 774748 **Email** – admin@mharchitects.co.uk
Arboricultural Consultants	Beechdown Arboriculture Ltd	**Tel –** 01243 814740 **Email –** jonathan.rodwell@beechdown.com

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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, 8: Removing surfacing & structures in root protection areas,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 1st June 2020

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ARBORICULTURAL METHOD STATEMENT

The arboricultural method statement includes the following plans:

Appendix 7	**1:1250@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.**

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 vulnerable 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 would typically 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.

15.5 In this case it is proposed that the protective barriers, along with site security fencing, will be weld mesh panels fitted securely to concreted vertical wooden posts **(Fig. 4)** – which I consider to be an appropriate alternative to the above. While the existing hard-surfacing around the

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English oaks (T1&T15) remains *in situ* above ground stabilising using struts mounted on a block tray, constructed as per figure 3 b) of BS 5837:2012 may be used.



Fig. 4 – alternative protective barriers.

15.6 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 DEMOLITION

16.1 Demolition of the existing dwelling at Wings and removal of the areas of hard-standing will take place in two stages. The dwelling will be demolished first with all hard surfaces within RPAs retained as ground protection.

16.2 Demolition of the dwelling will take place from beyond the vulnerable RPA and construction exclusion zone.

16.3 Arboricultural supervision of the demolition process will manage any risk of damage to the trees. If the demolition is undertaken during the

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summer months it may be necessary to hose down the trees if there is an accumulation of dust on the foliage.

16.4 Removal of the hard-standing should wait until there is no further need for ground protection during site activity. Where tree roots may be present the removal should be undertaken using hand tools or plant, under arboricultural supervision, working backwards and using the remaining hardstanding as ground protection.

16.5 Site guidance notes *8: Removing surfacing & structures in root protection areas* provided by Barrell Tree Consultancy and shown at **Appendix 11** outlines different techniques for safely removing structures and surfaces within root protection areas.

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 RPA of any retained trees and should not require arboricultural supervision; however, if roots <u>are</u> 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 CONSTRUCTION OF PEDESTRIAN ACCESS WITHIN RPA

18.1 Further investigation will determine whether construction of the short sections of pedestrian access/path extending through the unsurfaced RPA of T15 and T21 will require a no-dig construction.

18.2 If significant root development is encountered a no-dig specification with a porous and permeable base layer and surface finish should be

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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.

18.3 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.

19.0 INFRASTRUCTURE REQUIREMENTS

19.1 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.**

20.0 ADDITIONAL PRECAUTIONS

20.1 No storage or mixing of materials to take place within the construction exclusion zone or in the ground protected RPA.

20.2 No storage or mixing of materials will take place in any location where they may leak into the construction exclusion zone or RPA.

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20.3 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.

20.4 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.

21.0 SUPERVISION AND MONITORING

21.1 It will be the responsibility of the main contactor 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.

21.2 An arboriculturalist should be appointed to monitor tree protection measures and address any arboricultural issues that may arise.

21.3 The project arboriculturalist should mark the positions of the protective barriers and inspect them once erected and prior to site work commencing.

21.4 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.

21.5 A copy of a site visit and arboricultural supervision record is shown at **Appendix 9**.

21.6 A copy of an arboricultural monitoring record is shown at **Appendix 10**.

21.7 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.

21.8 The main contractor will ensure that the build sequence is appropriate to ensure that no damage occurs to the trees during the development process.

22.0 SEQUENCE OF EVENTS

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

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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.

22.2 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.

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BS5837:2012 Tree Survey

Beechdown Arboriculture Ltd
Club Cottage, Top Road
Slindon
Arundel
West Sussex
BN18 0RP
Phone: 01243 814740

Client: Thakeham Client Ltd on behalf of Southern Housing Group Ltd
Project: Wings Nursery
Survey Date: 20/09/2017 - 17/03/2020
Surveyor: Jonathan Rodwell

Tree and Tag No / Species	Hght (m)	Stems No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations / Survey Comment	Cat ERC
T1											
Common Oak	15	2	1173 (Eq)	N 6	3	M	A: 622.4	Fair	C: Poor		C.1.2.3
Quercus robur				E 5	3		R: 14.07		S: Fair	Evidence of historic crown reduction; major deadwood in crown; bark wounds and exposed tissue noted.	
				S 7	2				B: Fair		
				W 7	2.5						
T2											
Common Oak	11	1	560	N 4	0.5	M	A: 141.9	Poor	C: Poor		C.2.3
Quercus robur				E 5	2		R: 6.72		S: Ivy		>40 yrs
				S 4	3				B: Poor		
				W 3	1						
T3											
Leyland Cypress	5	1	480	N 0	0	M	A: 104.2	Decline	C: Poor		U.2
X Cupressocyparis leylandii				E 5	2		R: 5.75		S: Poor	Stump of a felled tree with some low, live branches retained.	<10 yrs
				S 4	1				B: Poor		
				W 1	1						
T4											
Common Ash	12	2	347 (Eq)	N 3	5	SM	A: 54.4	Good	C: Fair		B.2
Fraxinus excelsior				E 1	2		R: 4.16		S: Ivy		>40 yrs
				S 4	6				B: Fair		
				W 5	3						

Age Classifications: N Newly planted; Y Young; SM Semi-mature; EM Early Mature; M Mature; OM Over Mature

Condition: C Crown; S Stem; B 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 No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
T5											
A Group - -	7	10	253 (Eq)	N 3 E 5 S 4 W 3	0.5 0.5 0.5 0.5		A: 29 R: 3.03	Fair	C: Fair S: Fair B: Fair	Multi-stemmed group of coppiced hazel and hawthorn.	C.2 >40 yrs
T6											
Common Hawthorn *Crataegus monogyna*	8	10	253 (Eq)	N 4 E 2 S 1 W 4	0.5 0.5 0.5 0.5	M	A: 29 R: 3.03	Good	C: Fair S: Fair B: Fair		C.2
T7											
Common Ash *Fraxinus excelsior*	10	1	320	N 2 E 6 S 2 W 1	4 4 6 6	SM	A: 46.3 R: 3.83	Fair	C: Fair S: Fair B: Fair	Coppiced hazel at base of tree.	C.2 20 to 40 yrs
T8											
Common Hazel *Corylus avellana*	8	10	221 (Eq)	N 3 E 4 S 2 W 1	0.5 0.5 0.5 0.5	M	A: 22.2 R: 2.65	Fair	C: Fair S: Fair B: Fair		C.2 >40 yrs
T9											
Common Hawthorn *Crataegus monogyna*	5	10	253 (Eq)	N 2 E 7 S 1 W 1	0.5 0.5 0.5 0.5	M	A: 29 R: 3.03	Fair	C: Poor S: Poor B: Fair		C.2 20 to 40 yrs
T10											
Common Hawthorn *Crataegus monogyna*	6	3	474 (Eq)	N 4 E 4 S 6 W 5	0.5 0.5 0.5 0.5	Veteran	A: 101.6 R: 5.68	Fair	C: Fair S: Ivy B: Fair		B.1.2.3 >40 yrs

Age Classifications: N Newly planted; Y Young; SM Semi-mature; EM Early Mature; M Mature; OM Over Mature

Condition: C Crown; S Stem; B Basal area

Stems: Ø Diameter; (Eq) Equivalent stem diameter using BS5837:2012 definition

ERC: Estimated Remaining Contributio

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Tree and Tag No Species	Hght (m)	Stems No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
T11											
Common Ash	13	1	330	N 4	6	M	A: 49.3	Fair	C: Fair		B.1.2
Fraxinus excelsior				E 4	4		R: 3.96		S: Fair		>40 yrs
				S 3	4				B: Fair		
				W 4	5						
T12										Estimated Measurements	
Common Oak	10	1	290	N 3	1	Y	A: 38.1	Good	C: Good		B.1
Quercus robur				E 3	1		R: 3.48		S: Fair		>40 yrs
				S 3	1				B: Good		
				W 3	1						
T13											
Common Oak	8	1	285	N 3	1	Y	A: 36.8	Good	C: Good		B.1
Quercus robur				E 4	1		R: 3.42		S: Good		>40 yrs
				S 4	0.5				B: Good		
				W 3	0.5						
T14										Estimated Measurements	
Common Ash	15	1	350	N 5	4	M	A: 55.4	Fair	C: Fair		B.1
Fraxinus excelsior				E 6	5		R: 4.19		S: Ivy		>40 yrs
				S 6	5				B:		
				W 5	6						
T15											
Common Oak	16	1	1030	N 9	4	M	A: 480	Good	C: Good		A.1
Quercus robur				E 8	2		R: 12.36		S: Ivy		>40 yrs
				S 6	2				B: Good		
				W 8	3						
T16										Estimated Measurements	
Field Maple	9	1	380	N 6	4	M	A: 65.3	Good	C: Fair		B.1.3
Acer campestre				E 5	4		R: 4.55		S: Ivy		>40 yrs
				S 6	3				B:		

Age Classifications: N Newly planted; EM Early Mature; Y Young; M Mature; SM Semi-mature; OM Over Mature

Condition: C Crown; S Stem; B 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 No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
T17											Estimated Measurements
Lombardy Poplar	29	1	600	N 2	6	M	A: 162.9	Good	C: Fair		B.1
Populus nigra 'Italica'				E 3	6		R: 7.2		S: Ivy	4.5 m from fence	20 to 40 yrs
				S 2	7				B:		
				W 3							
T18											Estimated Measurements
Lombardy Poplar	29	1	500	N 2	5	M	A: 113.1	Fair	C: Fair		B.1
Populus nigra 'Italica'				E 1	5		R: 6		S: Ivy	Ivy-covered dead tree to north.	20 to 40 yrs
				S 1	5				B:		
				W 3							
T19											Estimated Measurements
Common Oak	18	1	650	N 5	2	M	A: 191.2	Good	C: Good		B.1.3
Quercus robur				E 5	2		R: 7.8		S: Ivy	5m from fence	>40 yrs
				S 6	3				B:		
T20											Estimated Measurements
Common Oak	17	3	877 (Eq)	N 9	3	M	A: 348.4	Good	C: Fair		A.1.2.3
Quercus robur				E 10	2		R: 10.53		S: Fair	2.2m from fence	>40 yrs
				S 11	3				B:		
T21											
Common Oak	16	1	1480	N 9	2	M	A: 707	Fair	C: Fair		B.1.3
Quercus robur				E 9	2		R: 15		S: Poor		>40 yrs
				S 9	1.5				B: Poor	Extensive heartwood decay and multiple fungal fruiting bodies; potentially valuable habitat tree with veteran characteristics.	
				W 9	3						
T22											Estimated Measurements
Common Oak	18	2	814 (Eq)	N 10	3	M	A: 299.7	Good	C: Fair		A.1.2.3
Quercus robur				E 10	2		R: 9.76		S: Fair	4m from fence	>40 yrs
				S 11	2				B:		

Age Classifications:	N	Newly planted	EM	Early Mature	**Condition:**	C	Crown
	Y	Young	M	Mature		S	Stem
	SM	Semi-mature	OM	Over Mature		B	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 No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations / Survey Comment	Cat ERC
T23										Estimated Measurements	
Goat Willow	8	10	190 (Eq)	N	4	2	SM	A: 16.3	Good	C: Fair	C.1
Salix caprea				E	3	1		R: 2.27		S: Fair	20 to 40 yrs
				S	4	2				B: Fair	
				W	4	2					
T24										Estimated Measurements	
Common Oak	9	1	550	N	7	4	M	A: 136.9	Good	C: Fair	B.1.2
Quercus robur				E	6	3		R: 6.6		S: Ivy	>40 yrs
				S	8	3				B:	4m from fence
T25										Estimated Measurements	
Common Oak	19	1	700				M	A: 221.7	Good	C: Fair	A.1.2.3
Quercus robur				E	12	4		R: 8.4		S:	>40 yrs
				S	8	4				B:	8m from the fence.
				W	9	2					
T26										Estimated Measurements	
Common Oak	17	1	500				M	A: 113.1	Good	C: Good	B.1.2
Quercus robur				E	6	5		R: 6		S: Ivy	>40 yrs
				S	7	6				B:	7m from fence
				W	8	5					
T27											
Colorado Blue Spruce	6	1	120	N	1	0.5	SM	A: 6.5	Fair	C: Fair	C.1
Picea pungens var glauca				E	1	0.5		R: 1.43		S: Fair	20 to 40 yrs
				S	1	0.5				B: Fair	
				W	2	0.5					
T28											
Common Hawthorn	7	2	234 (Eq)	N	2	3	M	A: 24.8	Fair	C: Poor	C.1
Crataegus monogyna				E	4	2		R: 2.8		S: Ivy	10 to 20 yrs
				S	2	2				B: Fair	
				W	3	3					

Age Classifications: N Newly planted; Y Young; SM Semi-mature; EM Early Mature; M Mature; OM Over Mature

Condition: C Crown; S Stem; B 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 No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
T29											
Common Oak *Quercus robur*	11	2	450 (Eq)	N 2 E 8 S 5 W 4	3 3 1.5 3	SM	A: 91.6 R: 5.39	Good	C: Fair S: Ivy B: Fair		B.1 >40 yrs
T30											
Atlas Cedar *Cedrus atlantica*	12	1	380	N 5 E 4 S 4.5 W 4	1 2 0.5 0.5	SM	A: 65.3 R: 4.55	Good	C: Good S: Good B: Good		B.1 20 to 40 yrs
T31											
Leyland Cypress *X Cupressocyparis leylandii*	11	1	300	N 3 E 4 S 3 W 2	0.5 0.5 0.5 0.5	M	A: 40.7 R: 3.59	Good	C: Fair S: Fair B: Fair	Individual lapsed stem within clipped hedge	C.1 10 to 20 yrs
T32											
Lawson Cypress *Chamaecyparis lawsoniana*	7.5	6	220 (Eq)	N 1.5 E 1.5 S 1.5 W 1.5	0.1 0.1 0.1 0.1	SM	A: 22 R: 2.64	Good	C: Good S: Good B: Good		C.1 20 to 40 yrs
T33											
Holly 'Golden King' *Ilex x altaclarensis 'Golden King'*	3.6	2	103 (Eq)	N 1 E 1 S 1 W 1	0.5 0.2 0.5 0.5	SM	A: 4.8 R: 1.23	Good	C: Good S: Fair B: Good		C.1 20 to 40 yrs
T34											
Blue Gum *Eucalyptus globulus*	18.5	1	810	N 7 E 7 S 6 W 4	2.5 3 2.5 2	M	A: 296.9 R: 9.72	Good	C: Good S: Fair B: Fair	Typical swept lower stem; some root lifting may indicate historic partial windthrow.	B.1 20 to 40 yrs

Age Classifications: N Newly planted; EM Early Mature; Y Young; M Mature; SM Semi-mature; OM Over Mature

Condition: C Crown; S Stem; B 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 No	Stems Ø (mm)	Crown Spread (m)	Crown Clear (m)	Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations / Survey Comment	Cat ERC
T35											
Cherry	4.5	4	173 (Eq)	N 2	2	SM	A: 13.5	Good	C: Fair		C.1
Prunus sp.				E 3	2		R: 2.07		S: Fair		10 to 20 yrs
				S 1.5	3				B: Good		
				W 2	3						
T36											
Western Red Cedar	5.5	2	142 (Eq)	N 1.5	0.1	SM	A: 9.1	Good	C: Good		C.1
Thuja plicata				E 1.5	0.1		R: 1.7		S: Good		20 to 40 yrs
				S 1.5	0.1				B: Good		
				W 1.5	0.1						

Age Classifications:	N	Newly planted	EM	Early Mature	**Condition:**	C	Crown
	Y	Young	M	Mature		S	Stem
	SM	Semi-mature	OM	Over Mature		B	Basal area

Stems:	Ø	Diameter
	(Eq)	Equivalent stem diameter using BS5837:2012 definition
ERC:		Estimated Remaining Contributio

Category	Definition	
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.
	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.	

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Trees unsuitable for retention

Category	Definition
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

Category	Definition
Category A	Trees of high quality with an estimated remaining life expectancy of at least 40 years - shown in light green on plans.
	1 - Mainly arboricultural qualities – 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. *2 - Mainly landscape qualities* – trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features. *3 - Mainly cultural values, including conservation* – 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
	1 - Mainly arboricultural qualities – 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. *2 - Mainly landscape qualities* – 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.

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	3 - *Mainly cultural values, including conservation* – 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.
	1 - *Mainly arboricultural qualities* – unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.
	2 - *Mainly landscape qualities* – 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.
	3 - *Mainly cultural values, including conservation* – trees with no material conservation or other cultural values.

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Beechdown Arboriculture Limited

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

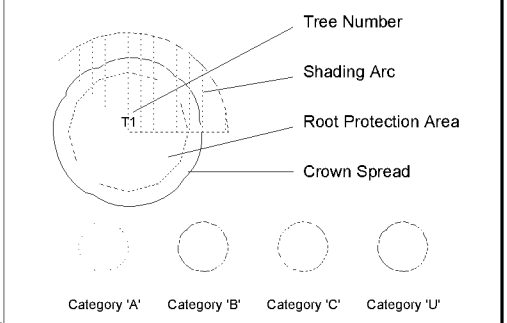
Wings Nursery
Appendix 4 - tree survey plan

SCALE : 1 : 1250	DATE : 08/06/2020

Beechdown ref: B/0269/20
Wings Nursery - BS 5837 tree survey/report June 2020

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N



0 80m

Key:

Woody vegetation

Perimeter

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Wings Nursery
Appendix 5- RPA & shade plan

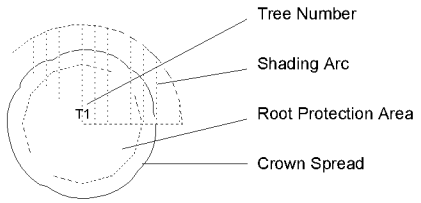
SCALE : 1 : 1250

DATE : 08/06/2020

Beechdown ref: B/0269/20
Wings Nursery - BS 5837 tree survey/report June 2020

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0 80m

Key:

Woody vegetation

Perimeter

Beechdown Arboriculture Limited

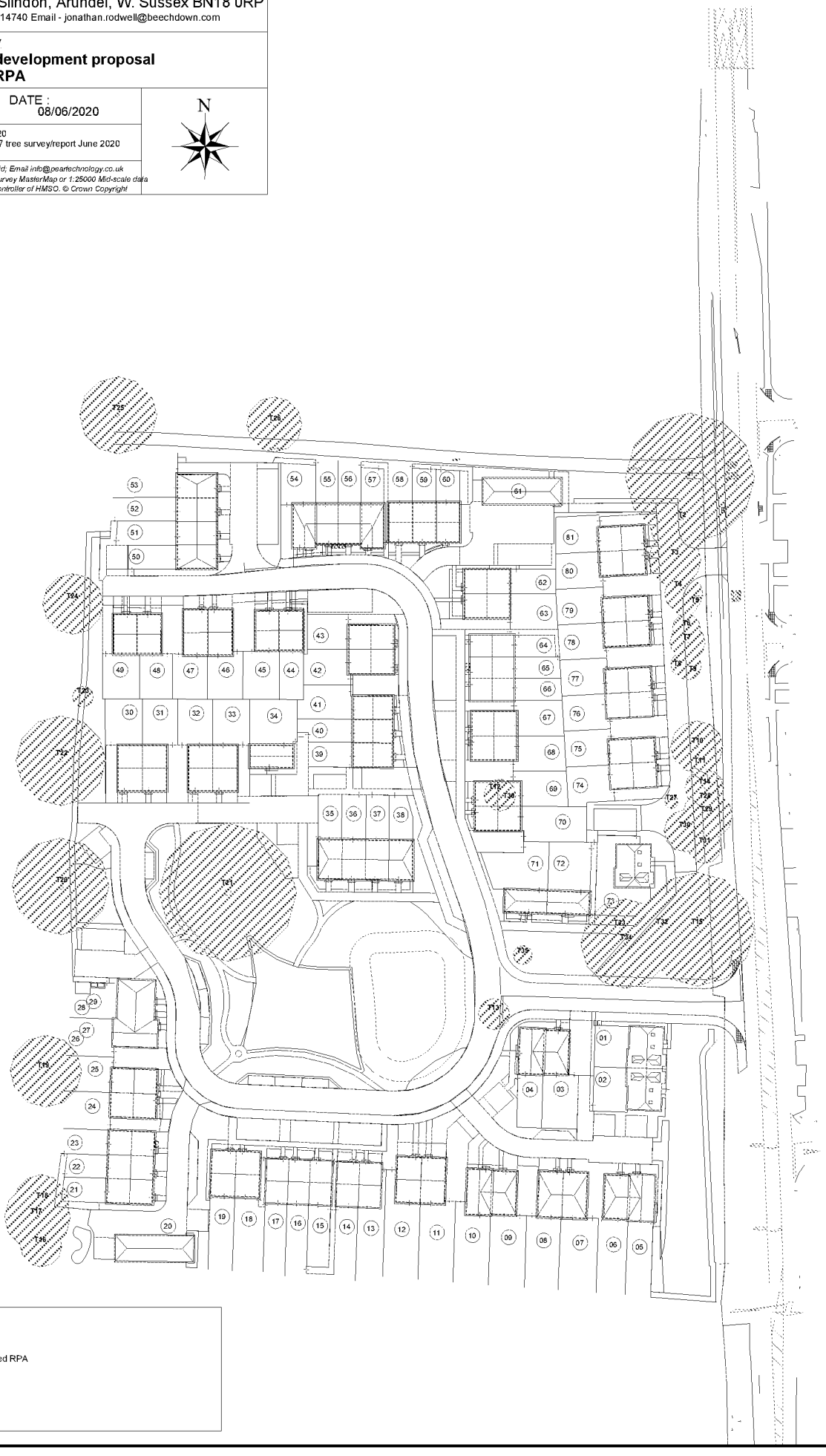
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Wings Nursery
Appendix 6 - development proposal in relation to RPA

SCALE : 1 : 1250	DATE : 08/06/2020

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Key:

Combined RPA

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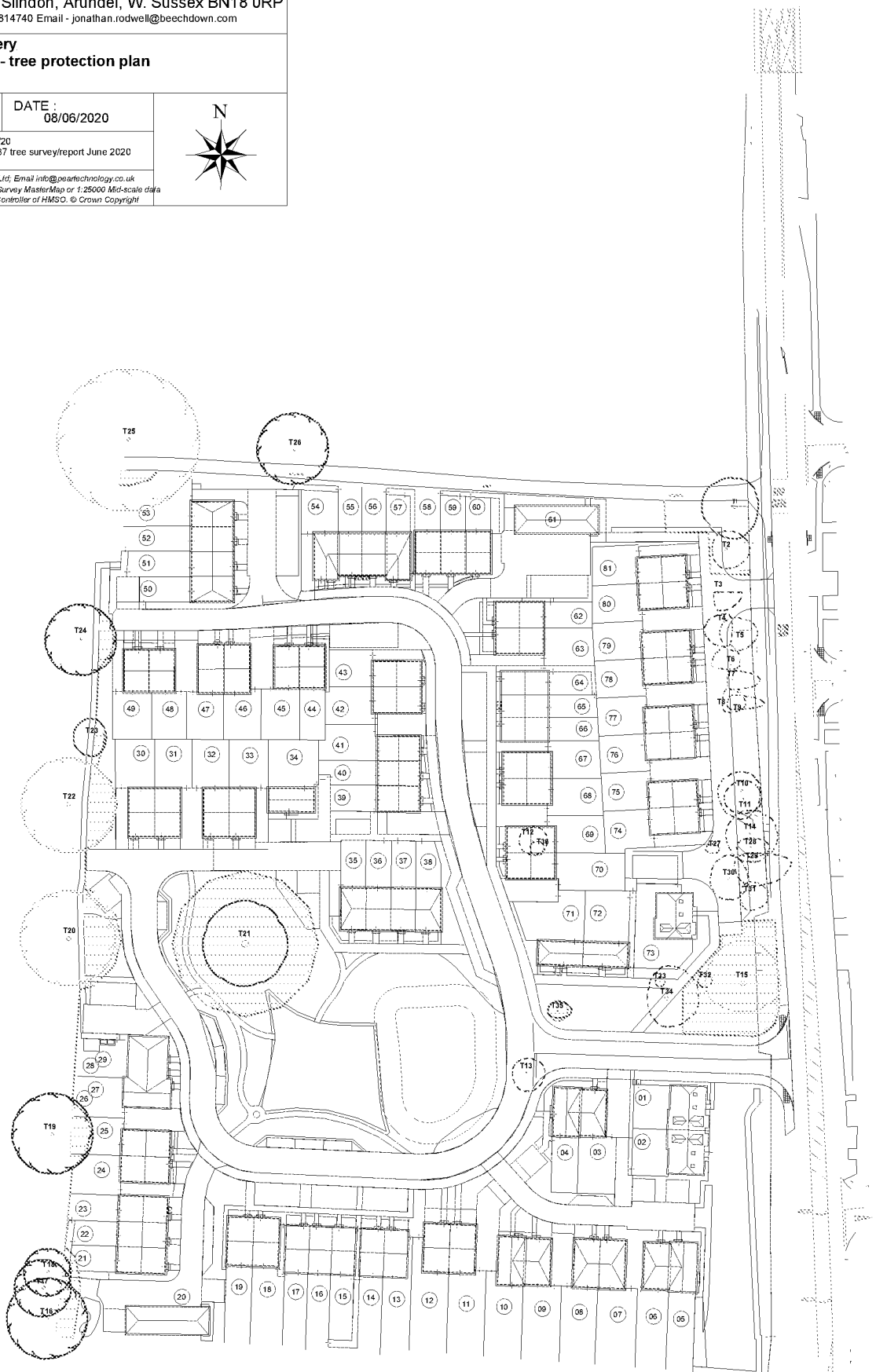
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Wings Nursery
Appendix 7 - tree protection plan

SCALE : 1 : 1250	DATE : 08/06/2020

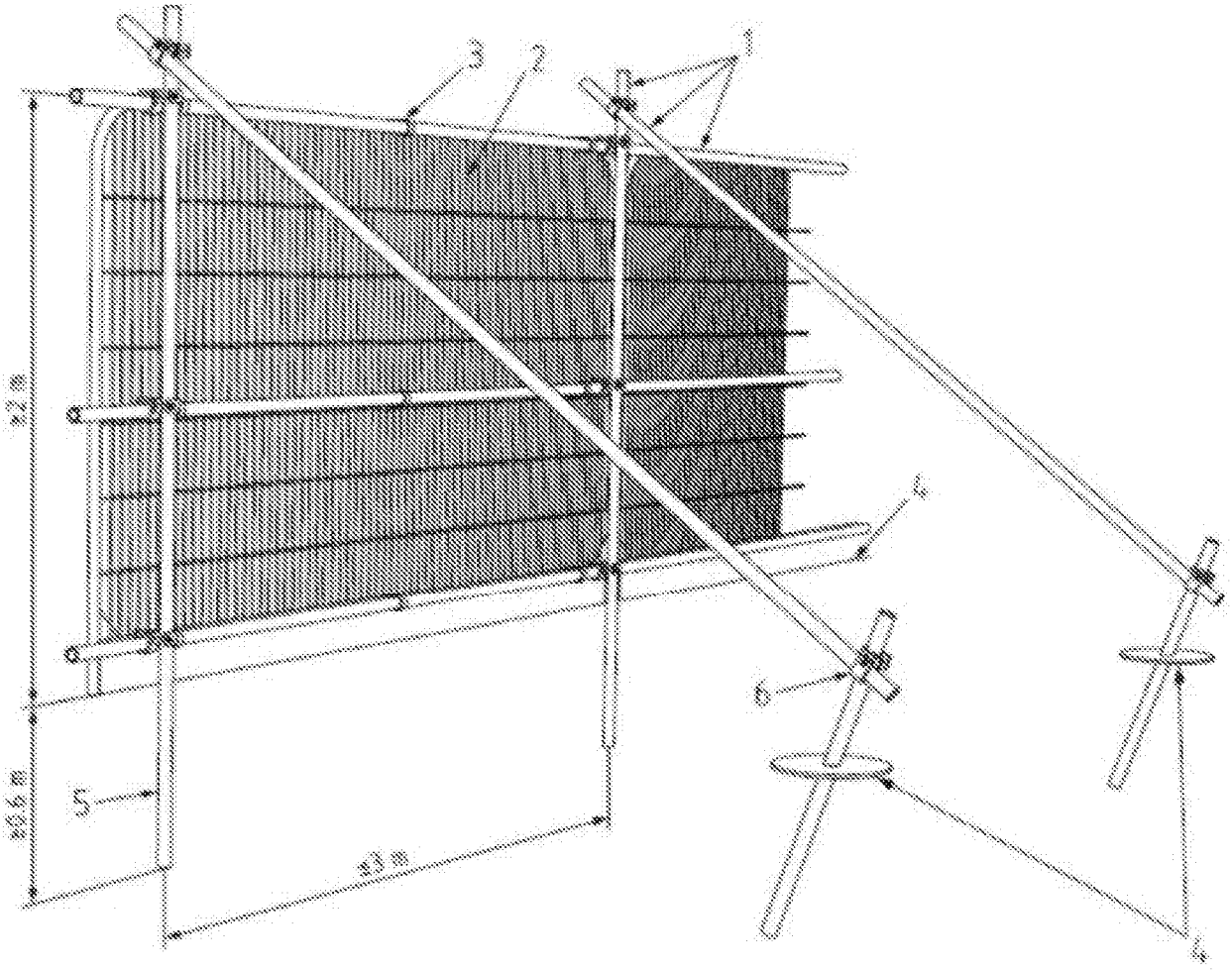
Beechdown ref: B/0269/20
Wings Nursery - BS 5837 tree survey/report June 2020

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Key:

- Construction exclusion zone
- Protective barrier
- Category B removed
- Category C removed
- Category U removed

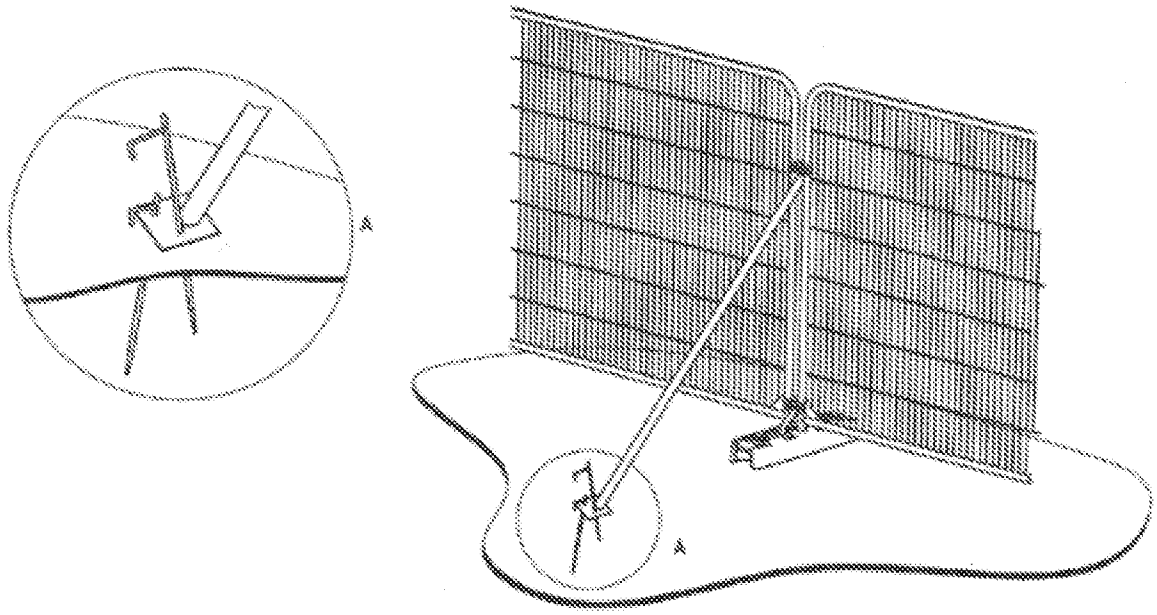


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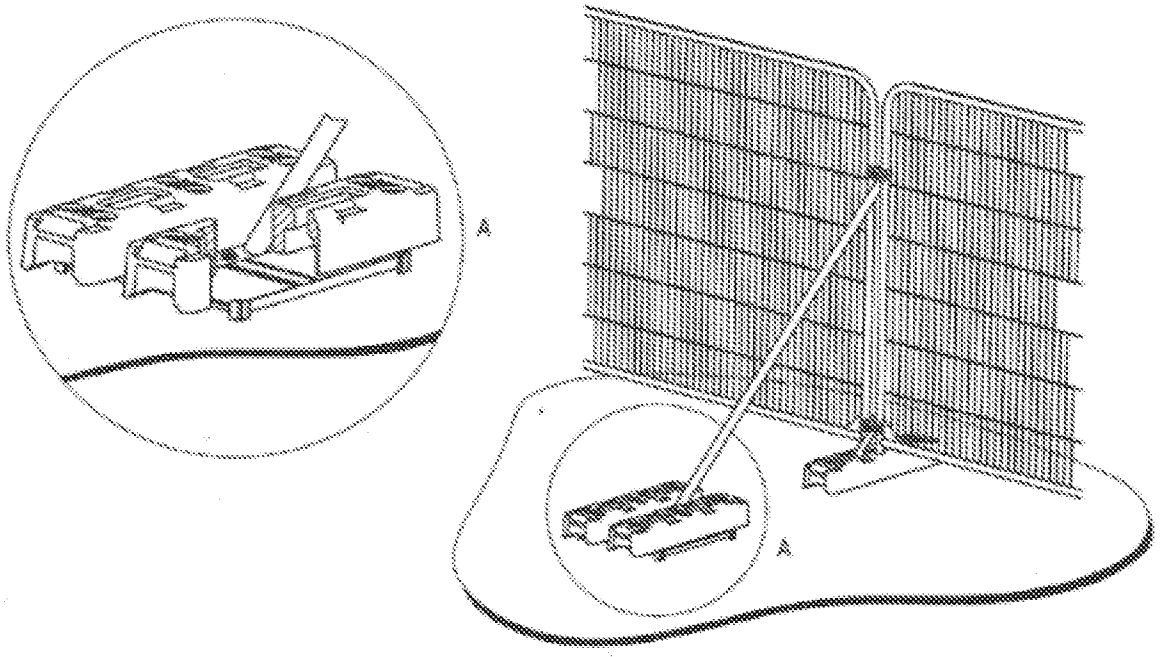
1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

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

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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

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Client	**Location**
Thakeham Client Ltd, on behalf of Southern Housing Group Ltd	Wings Nursery, Lidsey Road, Woodgate, Chichester PO20 3SU

Local planning authority	Arun District Council
Planning application	-
Development	Construction of 81 new dwellings with associated access, drainage, open space and landscaping requirements

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

Notes	

Arboriculturalist	
Signed	
Date	

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

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Client	**Location**
Thakeham Client Ltd, on behalf of Southern Housing Group Ltd	Wings Nursery, Lidsey Road, Woodgate, Chichester PO20 3SU

Local planning authority	Arun District Council
Planning application	-
Development	Construction of 81 new dwellings with associated access, drainage, open space and landscaping requirements

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

Notes	

Arboriculturalist	
Signed	
Date	

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

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Client	**Location**
Thakeham Client Ltd, on behalf of Southern Housing Group Ltd	Wings Nursery, Lidsey Road, Woodgate, Chichester PO20 3SU

Local planning authority	Arun District Council
Planning application	-
Development	Construction of 81 new dwellings with associated access, drainage, open space and landscaping requirements

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

Arboriculturalist	
Signed	
Date	

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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.

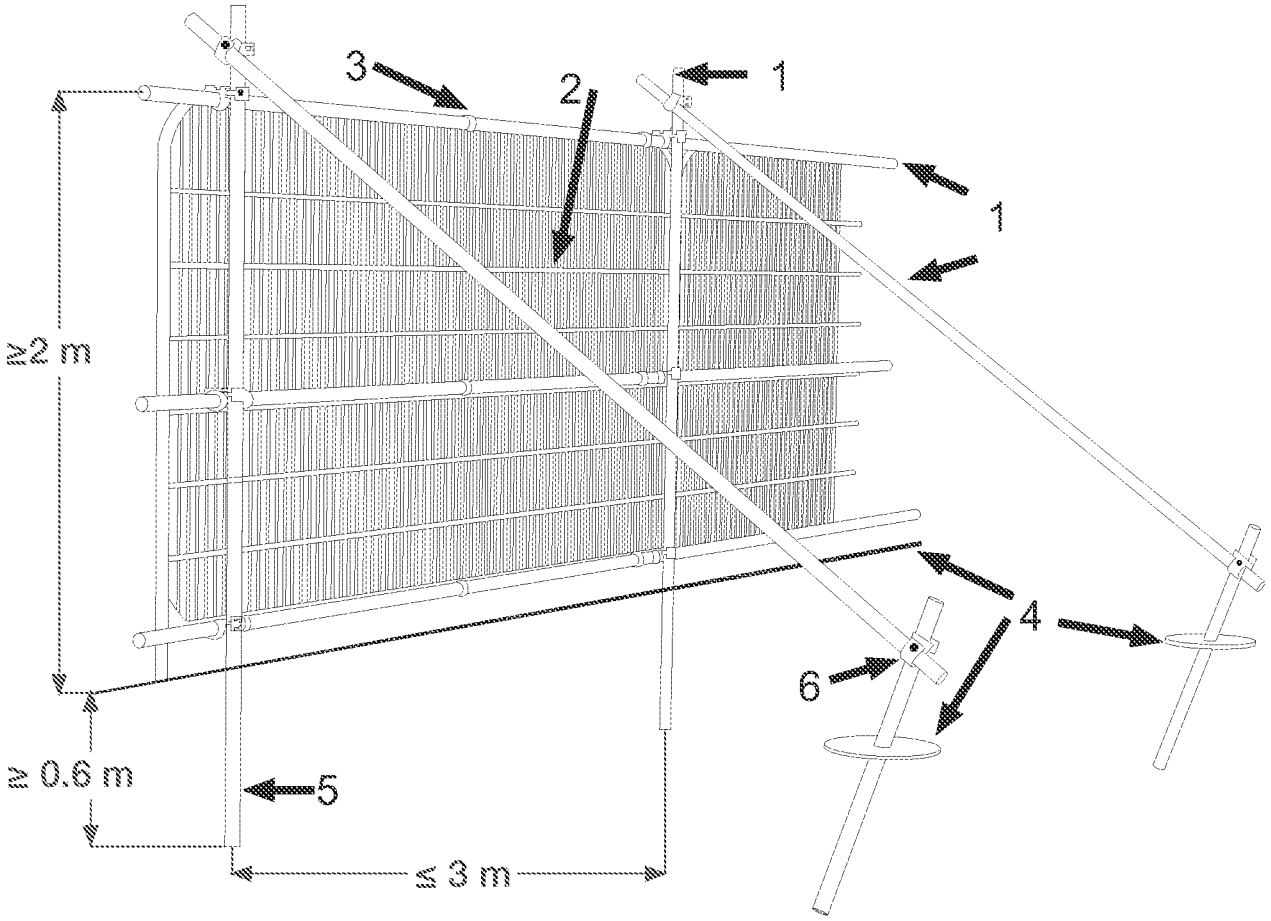
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SGN 2: Explanatory notes and examples

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.

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SGN 2: Explanatory notes and examples

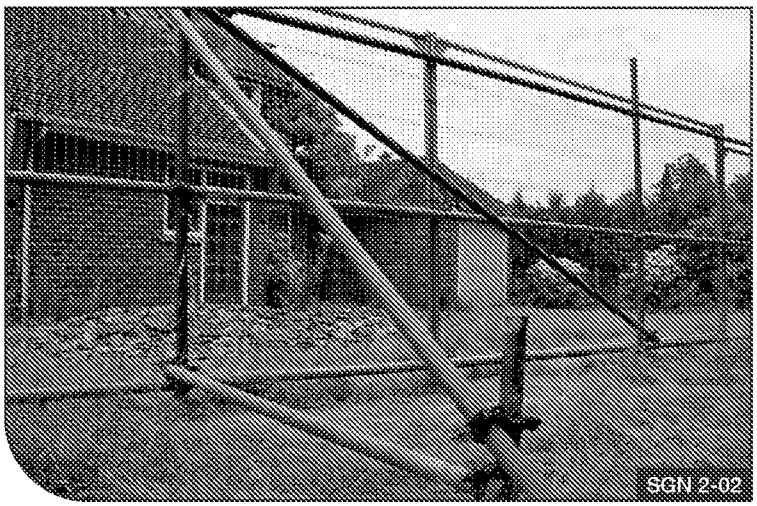
General principles and clarifications

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.

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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.



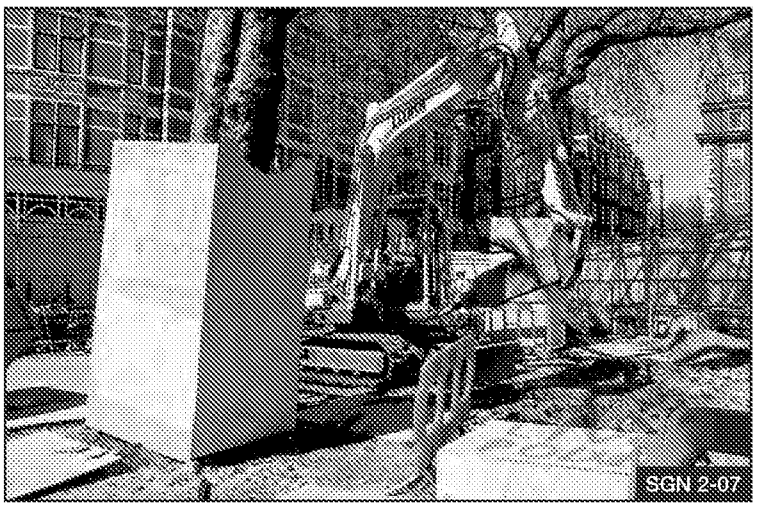
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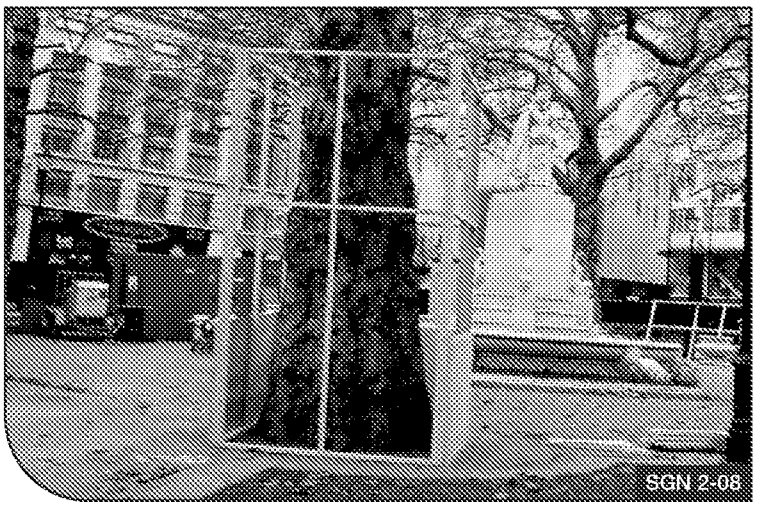
SGN 2: Explanatory notes and examples



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.

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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.



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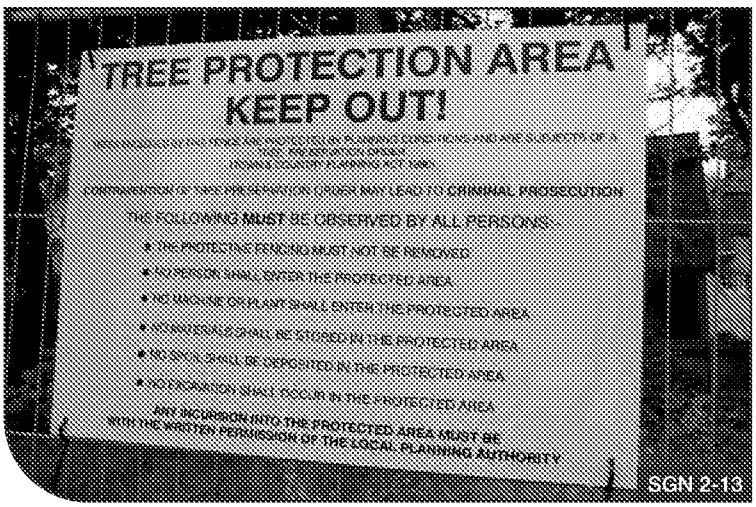
SGN 2: Explanatory notes and examples



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.

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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.*

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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.

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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.

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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.

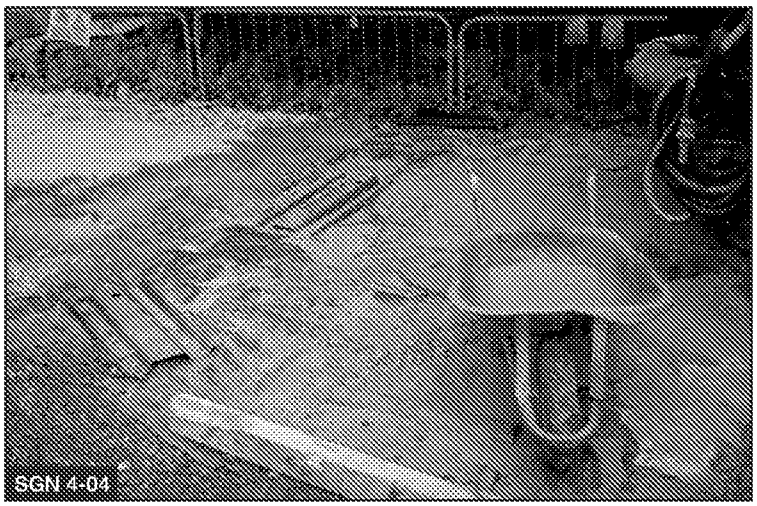


Soil bunding or a supporting framework covered in heavy-duty plastic sheeting will be installed where there is a risk of spillages contaminating RPAs. This specifically applies to cement mixing areas and vehicle washing facilities.

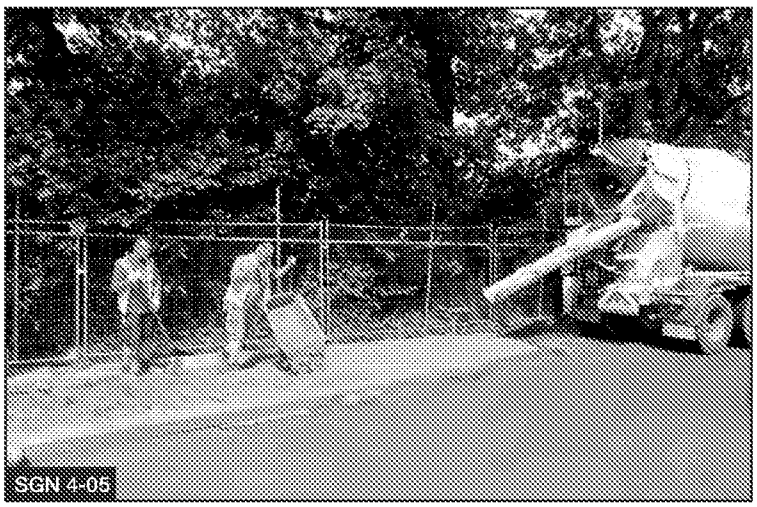
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SGN 4: Explanatory notes and examples

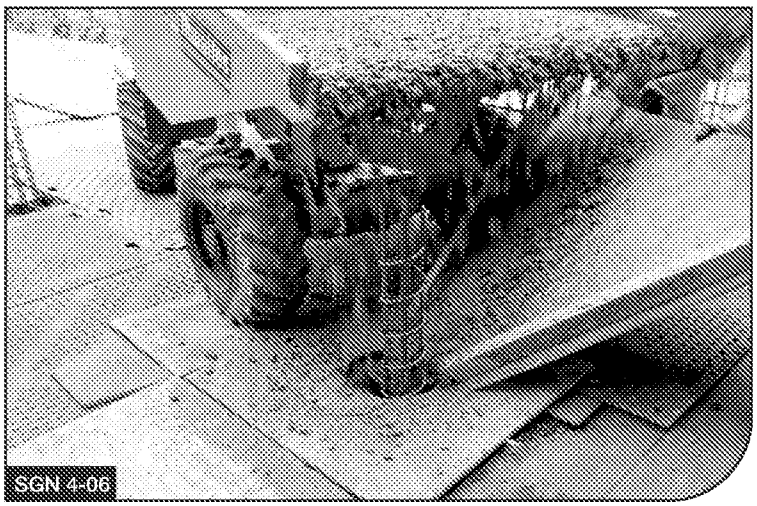
Cement washings are toxic to plants and must be contained in a way that prevents contamination of adjacent RPAs.



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.



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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.*

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Site Guidance Note 8: Removing surfacing and structures in root protection areas

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SGN 8: 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. Manually break up and remove debris from the RPA using appropriate tools, e.g. pneumatic breaker, crow bar, sledgehammer, pick, mattock, shovel, spade, trowel, fork, and wheelbarrow. Have secateurs and a handsaw available to cut exposed roots to be removed.
8. Remove debris from the RPA without disturbing the adjacent rooting environment, e.g. lifting out with a machine located outside the RPA or manually carry out over ground protection.

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SGN 8: Summary guidance for site operatives

9. Where appropriate, use machines with a long reach if they can work from outside RPAs, or from protected areas within RPAs without encroaching onto unprotected soil.

10. Where appropriate, leave below ground structures in place if their removal will cause excessive RPA disturbance.

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SGN 8: Explanatory notes and examples

Purpose

SGN 8 describes the practical requirements for removing surfacing and structures in RPAs, based on the recommendations in BS 5837 (7.3).

General principles and clarifications

For the purposes of this guidance, the following broad definitions apply:

- **Surfacing:** Any hard surfacing used as a vehicular road, parking, or pedestrian path, including tarmac, solid stone, crushed stone, compacted aggregate, concrete, and timber decking. This does not include compacted soil with no hard covering.

- **Structures:** Any man-made structure above or below ground including service pipes, walls, gate piers, buildings, and foundations. Typically, this would include drainage structures, car-ports, bin stores, and concrete slabs supporting buildings.

In principle, roots frequently grow adjacent to and beneath existing surfacing and structures, so great care is needed during access and demolition. Damage can occur through physical disturbance of roots and/or the compaction of soil around them from the weight of machinery or repeated pedestrian passage. This is not generally a problem while surfacing and structures remain in place because they spread the load on the soil beneath and further protective measures are not normally necessary. However, once that protection is removed and the soil below is exposed, the potential for damage to roots becomes an issue.

Careful consideration should be given to retaining structures and surfacing in place, if that will result in less disturbance to retained roots. For example, if a new wall needs to be constructed on the footprint of an existing wall, it might be better to retain the original footing and build on that, rather than remove it and install a new footing.

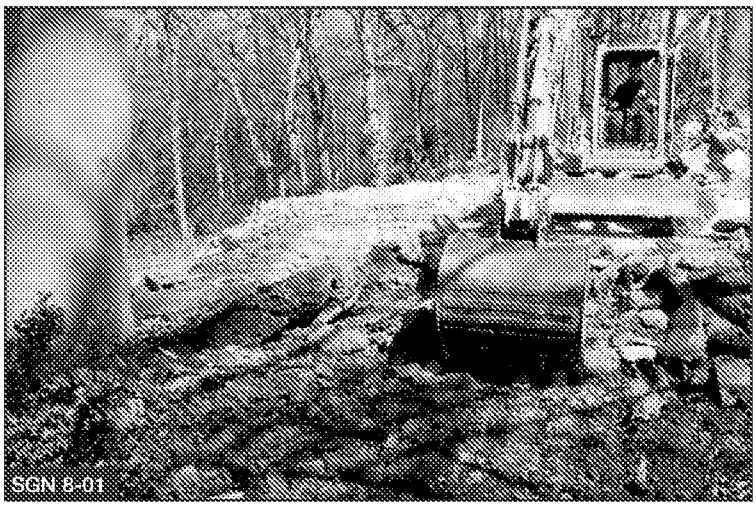
In summary, there should be no vehicular or repeated pedestrian access unless existing ground protection is retained or new protective measures are installed. All exposed RPAs must be protected until there is no further risk of damage.

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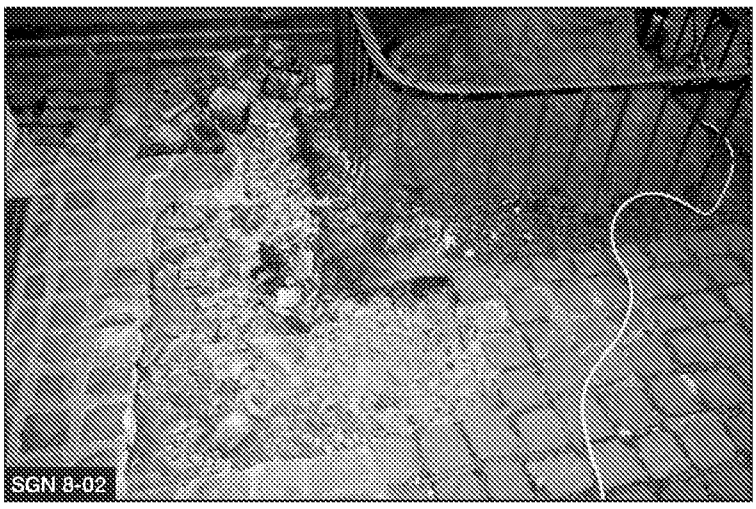
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SGN 8: Explanatory notes and examples

Machines with a long reach can be used to lift out heavy surfacing and structures if the machine sits outside the RPA and the exposed surface is protected before there is any further access.


SGN 8-01

Careful lifting of cemented-in sets round this tree allowed them to be re-laid on a permeable sand base, improving the water input into the soil around the trunk.


SGN 8-02

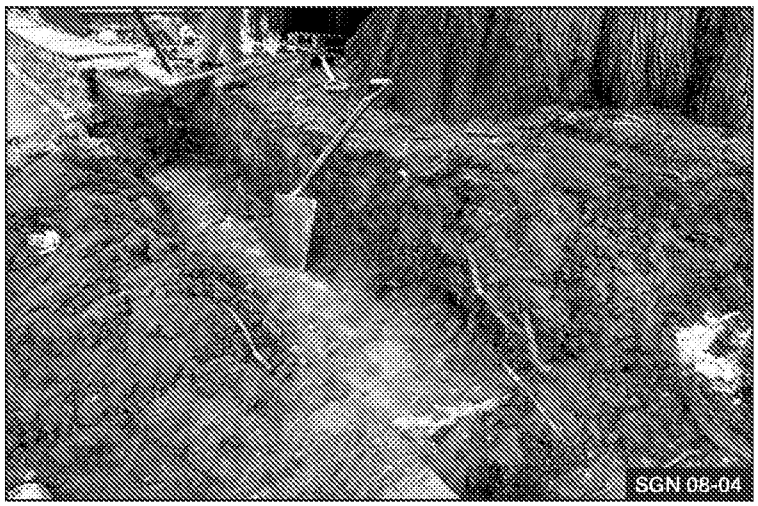
These trees had impermeable surfacing right up to their trunks, which had to be removed by hand before installing new structures.


SGN 8-03

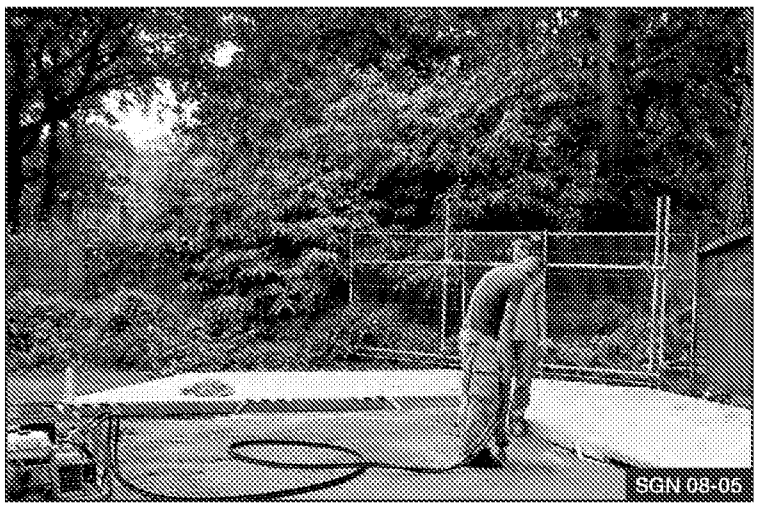
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SGN 8: Explanatory notes and examples



This old concrete footing close to a large mature tree was retained, thus avoiding excessive disturbance of roots below it.



The RPAs for the retained trees around the boundary is protected by a combination of fencing and ground protection. The hard surfacing covering the remaining RPA was then removed using a pneumatic breaker before hand excavation of the soil beneath to install new footings.



If structures are firmly incorporated into roots, it may be best to leave them in place rather than attempt to remove them and irreversibly damage the tree.

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SGN 8: 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 7.3 (Tree protection during demolition) recommends:

   - *7.3.2 RPAs up to the edge of structures to be removed should be protected.*
   - *7.3.3 Demolition plant should either operate outside the RPA or run on ground protection installed before work starts.*
   - *7.3.4 Demolition of buildings near retained trees should be done inwards within the footprint of the existing building.*
   - *7.3.5 Where possible, and after consultation with the supervising arboriculturist, it is preferable to leave redundant structures in RPAs to avoid damage to tree roots.*
   - *7.3.6 Existing surfacing should be removed with care and any machine should work backwards over the area to prevent damage to any exposed RPA. It is preferable to leave any existing sub-base in situ if new surfacing is to be laid.*

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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.

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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.

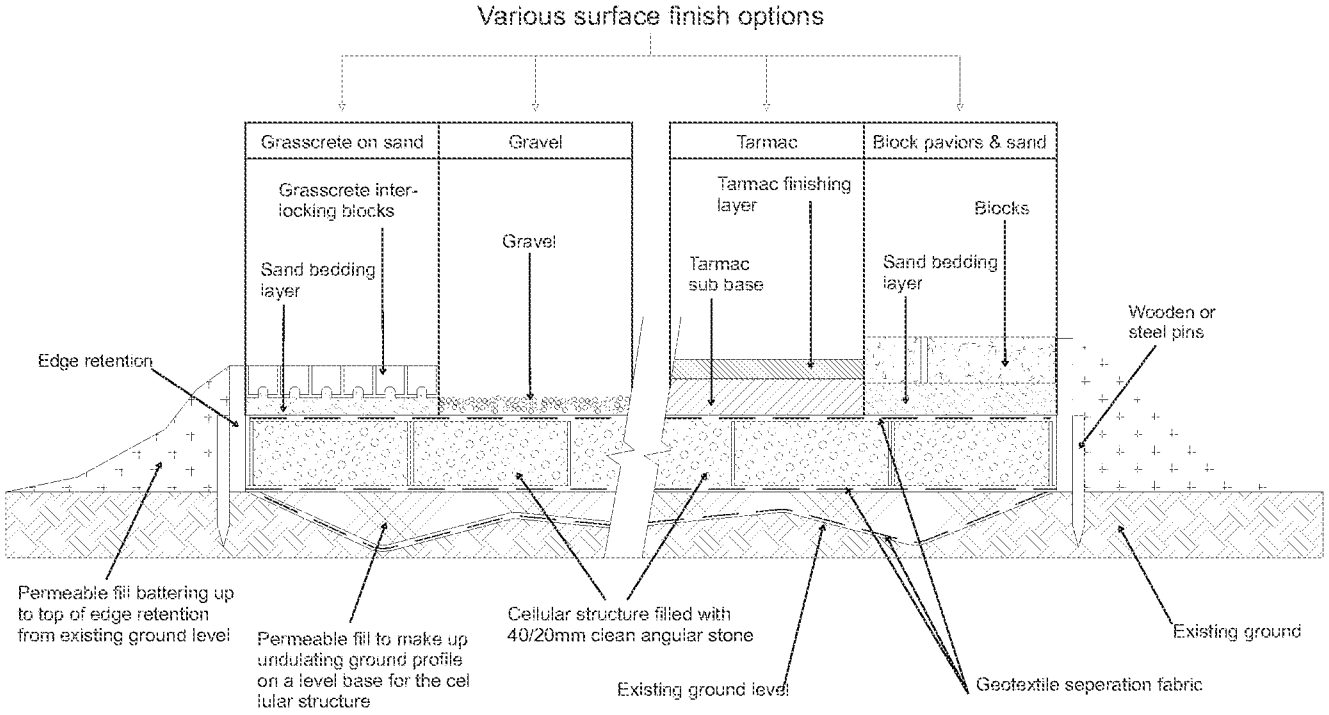
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SGN 9: Explanatory notes and examples

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

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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,

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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 paviours, 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

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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.

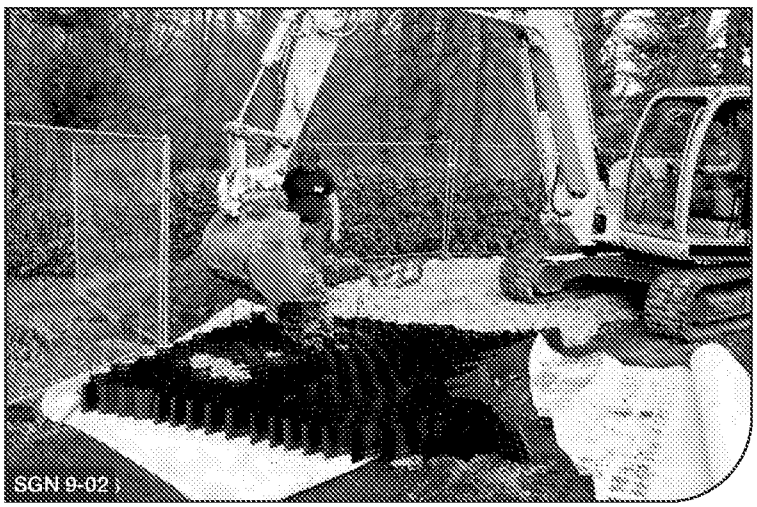
New surfacing near trunks

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).


SGN 9-01

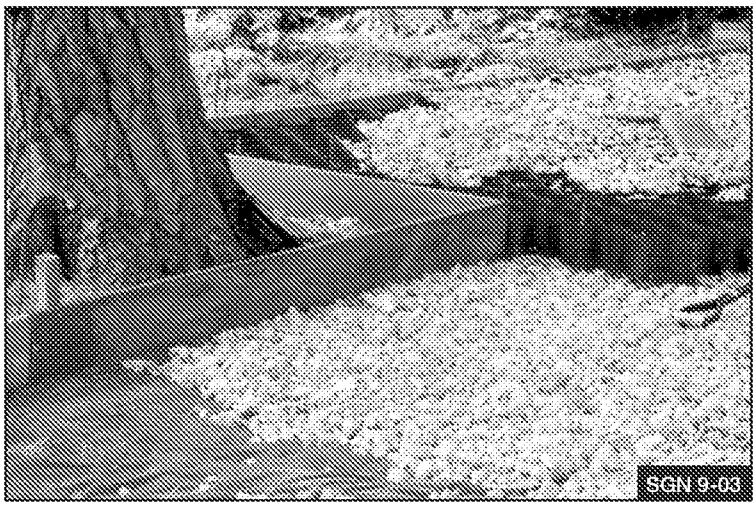
The stone-filled cells spread the load of traffic to prevent localised compaction. The permeable geotextile membrane on the ground allows the movement of water and gasses, but prevents the migration of stone into the soil profile.


SGN 9-02

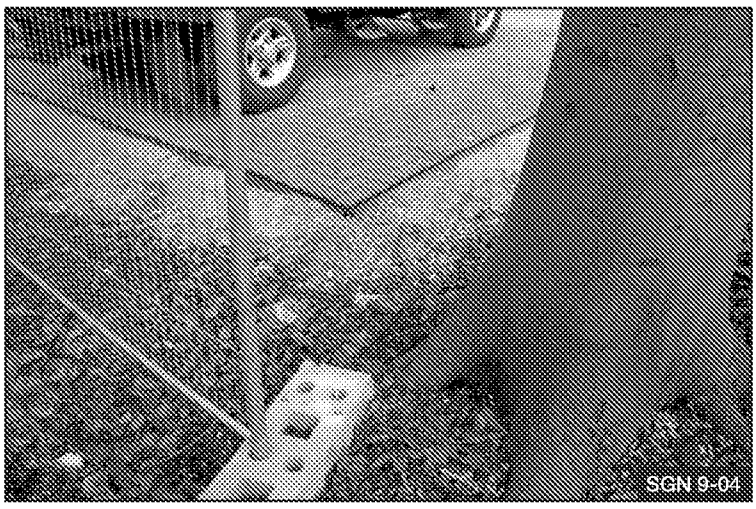
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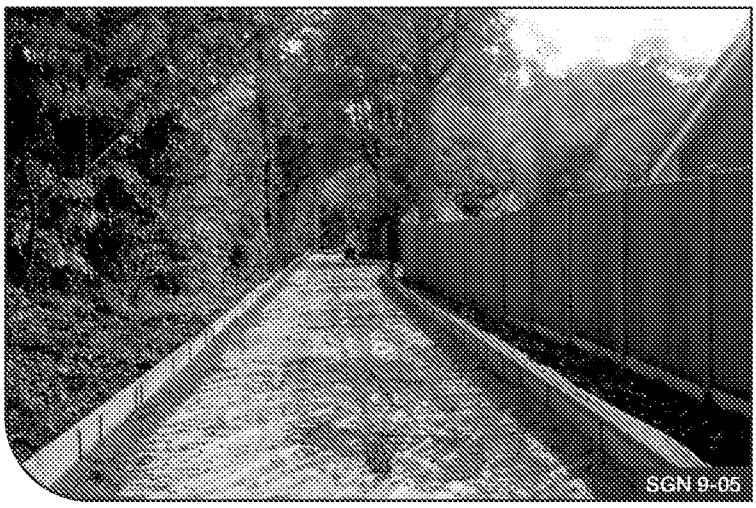
SGN 9: Explanatory notes and examples



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.

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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.


SGN 9-06

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


SGN 9-07

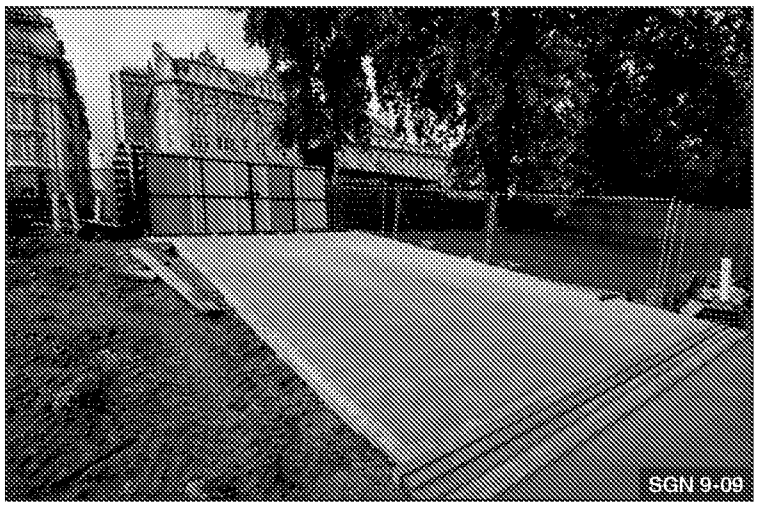
Another option for wooden edges at corner points that allows for vehicles to accidentally track over the edge of the formal surfacing.


SGN 9-08

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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.

ARUN DISTRICT COUNCIL AL/46/20/PL

SGN 9: Explanatory notes and examples

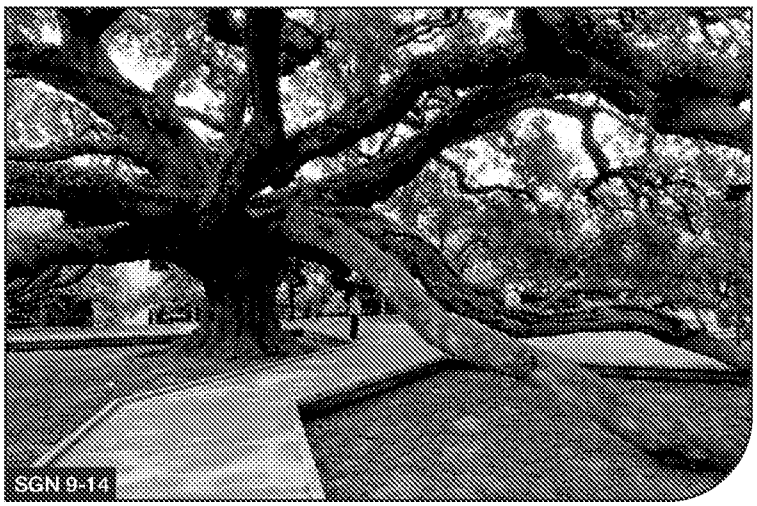
Where new surfacing is to be installed over existing, sometimes it may assist the movement of gasses and water if the existing surfacing is punctured. In this situation, exploratory digging showed important roots directly beneath the existing tarmac, which would have been damaged if the tarmac was removed.


SGN 9-12

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.


SGN 9-13

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 9-14

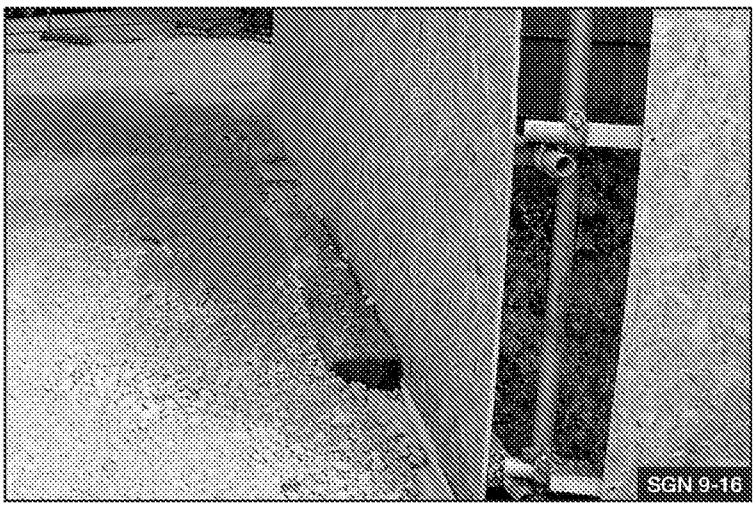
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SGN 9: Explanatory notes and examples



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.

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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.*

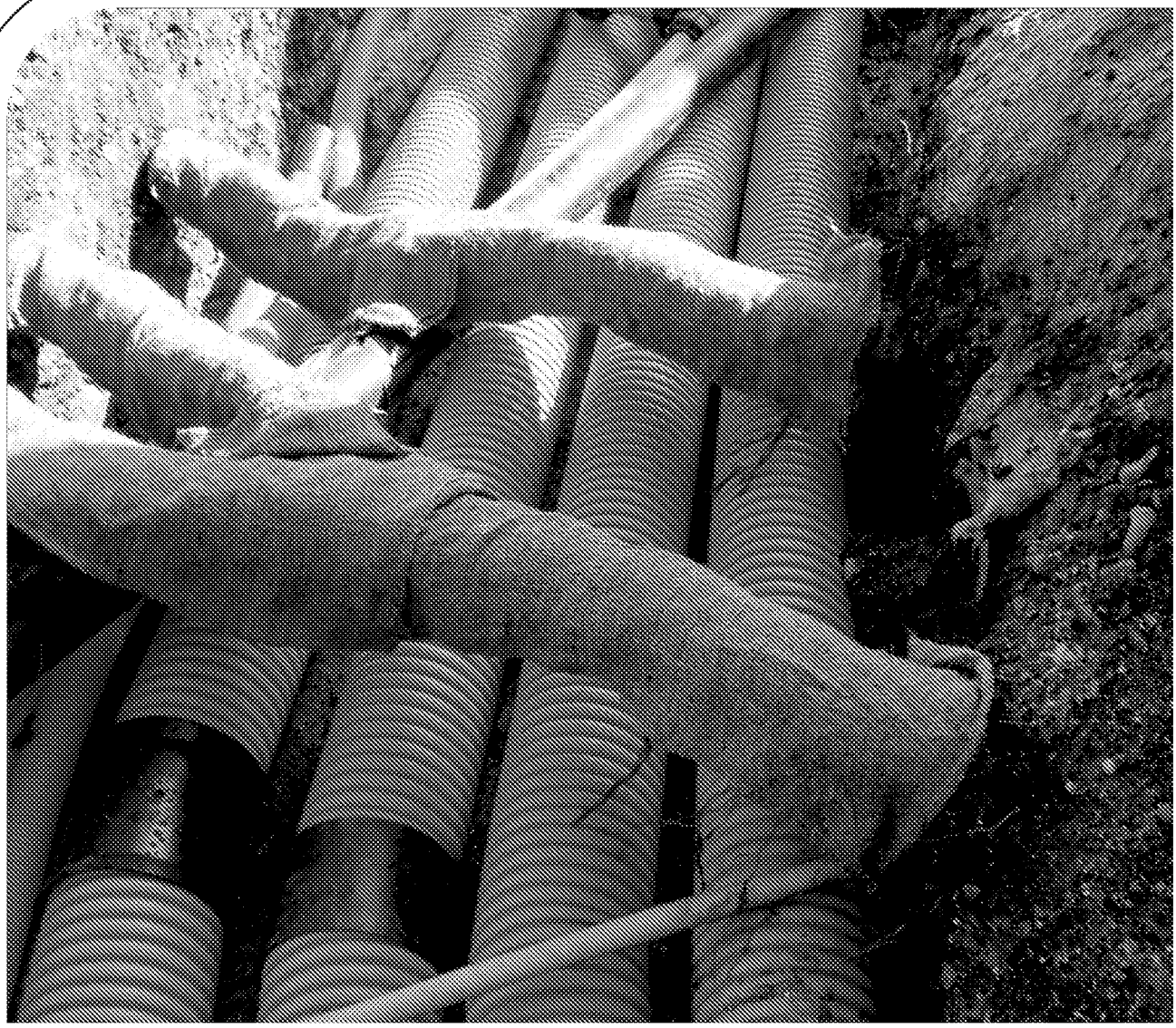
     ***NOTE** Piles, pads, elevated beams, and three-dimensional cellular confinement systems, can be used to support surfaces. If excavation is required, the location of roots greater than 2.5cm in diameter should be determined by exploratory investigations and retained if possible.*
   - *7.4.3 The conventional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

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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.

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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.

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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).



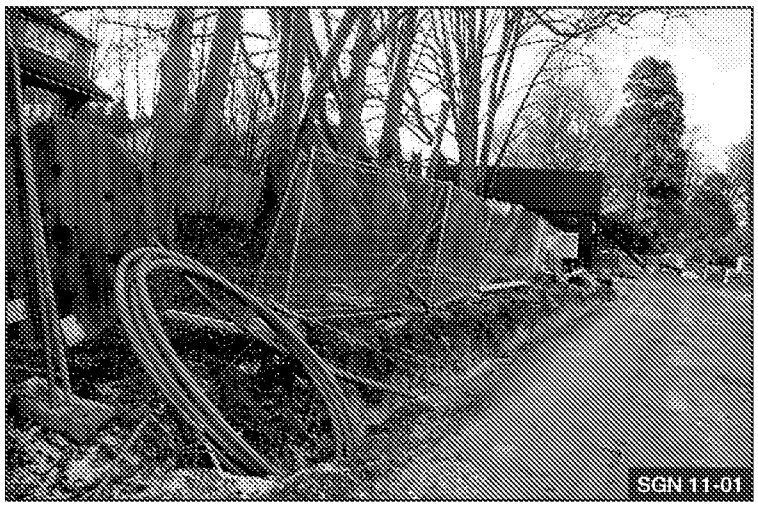
General principles and clarifications

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.

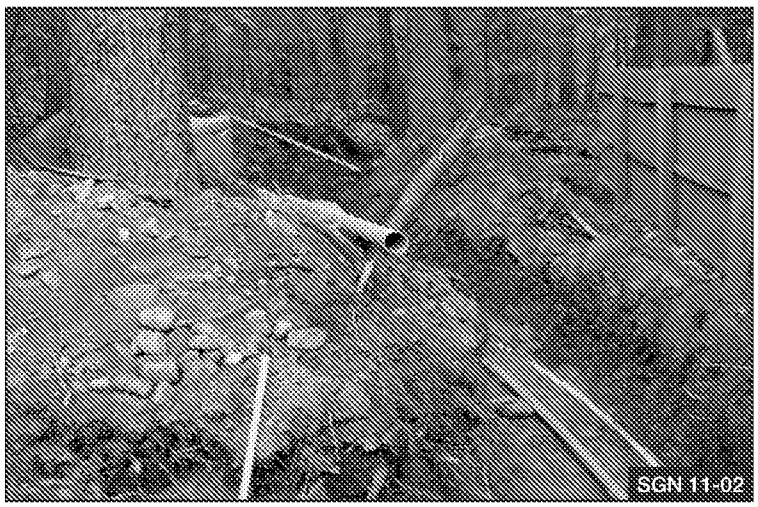
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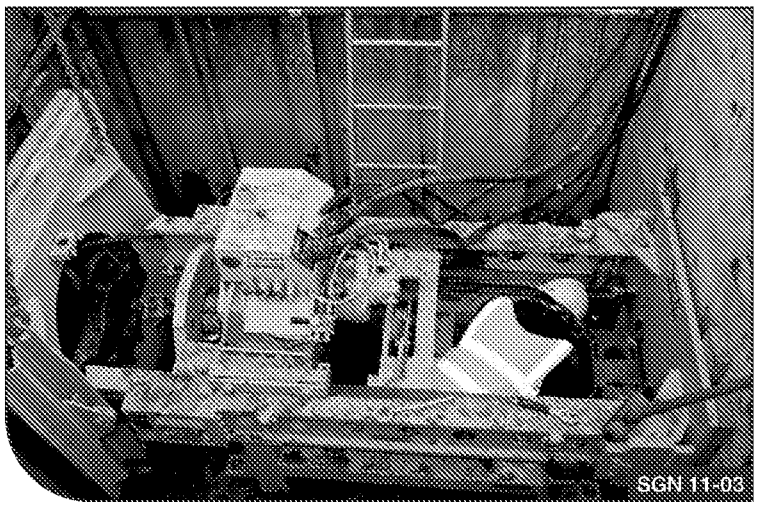
SGN 11: Explanatory notes and examples



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.

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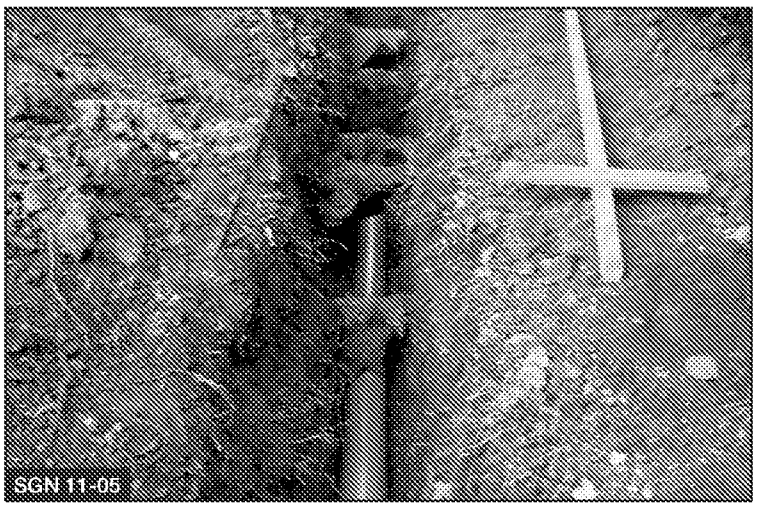
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SGN 11: Explanatory notes and examples

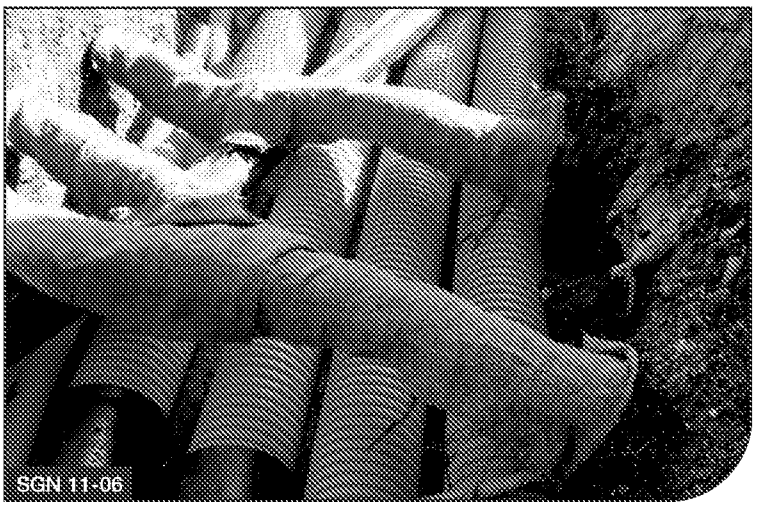
The start and finish pits for thrust boring are substantial and must be outside of RPAs.


SGN 11-04

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.


SGN 11-05

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 11-06

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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.

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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."

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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 hallows 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**

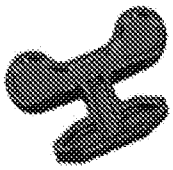
    - Lay out the TRP4000 over the prepared area, overlapping joins by a minimum of 300mm, dependent on soil conditions
    - When overlapping the TRP4000, ensure the overlap is in the same direction as the Geoweb will be extended. This will ensure the geotextile does not pull up when extending the Geoweb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

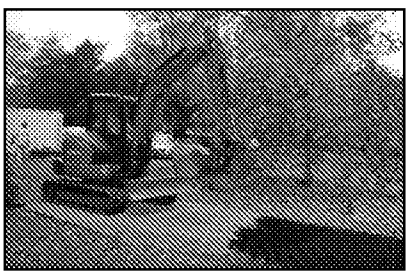
3. **Installation of the Geoweb panels**

    - 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





For enquiries and recommendations please contact

Greenfix. Tel: 01608 666027 Fax : 01608 665468

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Greenfix
Soil Stabilisation and Erosion Control Specialists

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

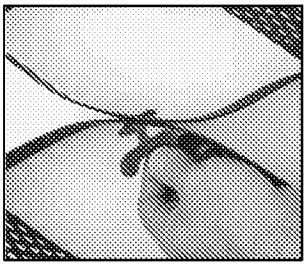
Additional Greenfix services available

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

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