

ARBORICULTURAL REPORT

Mill Ball, Binsted, Arundel BN18
OLJ

Prepared by

Jonathan Podwell Cert Arb 14(ABC): TechArborA

December 2019



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SUMMARY

- » **The quality of 4 trees within the influence of a development proposal was assessed.**
- » **An arboricultural impact assessment of the development proposal was prepared.**
- » **The development proposal is for demolition of the existing dwelling and construction of a new dwelling in its place.**
- » **Implementation of the development proposal does not require the removal of any recorded trees.**
- » **Precautionary measures will be required to protect the retained trees throughout the construction process.**

1.0 INTRODUCTION

1.1 I have received instruction from Mr and Mrs Evans to provide arboricultural consultancy services with regard to a development proposal at Mill Ball, Binsted, Arundel BN18 0LJ.

1.2 The purpose of the instruction was to:

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

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

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

2.0 DOCUMENTS PROVIDED

2.1 Plans provided by **Curtis Leeves Technical Ltd:**

1915 PL12	Site and location plan	1:500 @A1
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3.0 SURVEY FORMAT

- 3.1 Trees included in the survey were those with the potential to be affected by the development proposal and with a stem diameter, at 1.5m high, greater than 75mm. The trees were inspected from the ground only and no specialist decay detection was undertaken. Trees were assessed from within the site or from public areas.
- 3.2 The tree identification numbers used are for the purpose of this report and may not reflect numbering used in previous surveys or Tree Preservation Orders.
- 3.3 Data was recorded on a handheld computer, the trees plotted via GPS and their positions marked on the 1:500 @ A4 tree survey plan (**Appendix 4**).
- 3.4 A detailed tree survey sheet is shown as **Appendix 1** with an explanation of the terms and categories covered as **Appendix 2**.
- 3.5 The extent of the survey was limited to collecting sufficient data to inform upon the feasibility of the proposed development, it was not a detailed tree hazard or risk assessment and, unless specified, no guarantee, expressed or implied, can be given regarding the safety of the trees or their suitability for safe long term retention.
- 3.6 This report may comment in general terms on foundation type or design but 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.

4.0 GRADING CATEGORIES

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

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

Category U	0 trees
Category A	0 trees
Category B	4 trees
Category C	0 trees

5.0 STATUTORY CONTROLS

- 5.1 Consultation with the Local Planning Authority confirmed that the application site is not within a designated Conservation Area and none of the trees are subject to a Tree Preservation Order.
- 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 demolition of the existing two-storey dwelling and construction of a new dwelling in its place.

7.0 SITE DESCRIPTION

- 7.1 Mill Ball, consisting of the dwelling and various single-storey outbuildings, is set in broadly-level grounds of around 2.5ha (**Fig.1**). The property is accessed from Binsted Lane via a hard-surfaced driveway that extends to the north of the dwelling and opens into a parking-area in front of the outbuildings nearest the house. 2.5m high, clipped mixed-native species hedgerows separate the property from Binsted Lane to the west. Grass paddocks occupy the north-west corner of the property while orchards extend to the east with a copse of mature native woodland and a lake on the north-east boundary. The south-west corner of the property contains

formal gardens of mown lawns, well-maintained borders and ornamental trees and shrubs.



Fig. 1 – Image courtesy of Google Maps (map data © 2018 Google)

- 7.2 Mill Ball is in a rural location and surrounded by a patchwork of fields and hedgerows. The wider landscape includes individual trees or small groups in domestic settings, as roadside trees, in copses and in hedgerows along field boundaries with more extensive ancient woodland located to the north and east.
- 7.3 The site geology is recorded as London Clay Formation clay, silt and sand sedimentary bedrock while the superficial geology is described by the National Soils Resources Institute as a freely draining, slightly acid loamy soil. No detailed analysis of the soil structure, composition or pH was undertaken and these details should not be relied on for design purposes.

8.0 TREE SURVEY

- 8.1 The surveyed trees were all within the grounds of Mill Ball. Trees too small to be recorded or beyond influence of the proposed development included an ash, oak, two wild cherries and a border of blackthorn immediately to the north of the driveway entrance (shown as G1 at Appendix 4). All the trees along the north, east and southern boundaries along with the orchard trees were beyond influence; while unrecorded trees and shrubs in the formal garden included willow, Portuguese laurel, field maple, contorted hazel, griselinia, pittosporum, cedar, magnolia, holly, elder, tulip tree, birch, lilac, monkey puzzle and a multi-stemmed ash in the south-west corner.

9.0 TREE APPRAISAL

- 9.1 Individual tree details and comments are listed in the appended BS 5837 survey schedule detailed at **Appendix 1**.

ARBORICULTURAL IMPACT ASSESSMENT

10.0 BELOW GROUND CONSTRAINTS – ROOT PROTECTION AREA (RPA)

- 10.1 Section 3.7 of BS 5837: 2012 states that – *“The Root Protection Area (RPA) is a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. ”*
- 10.2 The RPA calculations have been produced using the information gathered from the tree survey and section 4.6.1 of BS 5837:2012. This indicates the RPA in m² and the minimum required all round radial distances for rooting zone protection and allows a view to be taken as to whether the trees can be retained safely without undue damage to their root systems. The RPA calculations are detailed in the appended tree survey and the initial dimensions marked on the 1:500 @ 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 birch (T3) is growing in unsurfaced ground and I think it unlikely that its nominal RPA varies hugely from that indicated at **Appendix 5**. The field maple (T4) is close to the hard-surfaced driveway so its roots are possibly more fully-developed to the south. The actual rooting area of the western red cedar (T1) and the walnut (T2) is unlikely to reflect the nominal, uniform polygons shown at **Appendix 5** due to the proximity of the buildings, to the south and east, and the hard surface of the drive and parking area. While the impervious surface of the carpark 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 fine moisture-absorbing root proliferation with the potential for conducting roots to have then developed in the unsurfaced ground to the north and east.

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 1:500 @ A4 RPA and shade plan (**Appendix 5**).

12.0 COMMENT

- 12.1 It is difficult to accurately assess the rooting area of trees, particularly when there are built structures and hard surfaces to contend with. In this case a mature walnut and western red cedar, showing signs of good vitality, appear to be growing well despite proximity to such constraints and with a limited unsurfaced area at the stem base.
- 12.2 The 1:500 @ A4 development proposal plan (**Appendix 6**) shows that demolition and construction takes place beyond the nominal RPA of the recorded trees. The hard surface of the existing driveway and parking area should provide suitable ground protection where site activity may otherwise have had a negative impact on the RPA of T1 and T2.
- 12.3 I do not consider the current or future growth of the surveyed trees to have a greater impact on the proposed new dwelling than on the current one. The shade pattern throughout the day moves from north-west to east and will not adversely affect light levels any more for the proposed development than for the existing buildings. Whilst the effect of leaf fall is not considered a greater nuisance to the development proposal than at present, provision should be made for ease of maintenance of gutters and gullies.

13.0 CONCLUSION

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

- Implementation of the development proposal will require the removal of a small laburnum, mahonia and *Viburnum bodnantense* but does not require the removal of any of the recorded trees, so the arboricultural characteristics of the area remain largely unchanged.
- I do not consider current or future growth of the retained trees to have a greater impact on the development proposal than on the existing dwelling or to lead to future pressure for removal or unsympathetic pruning.
- 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 tree survey - 04.12.2019
- 14.2 Present at tree survey - Jonathan Rodwell Cert Arb L4(ABC); TechArborA
- 14.3 Date of report - 04.12.2019
- 14.4 Contact details:

CONTACT	NAME	DETAILS
Local Planning Authority	Arun District Council	
Architects	Curtis Leeves Technical Ltd	
Arboricultural Consultants	Beechdown Arboriculture Ltd	

References

Roberts, J. Jackson, N. Smith, M. (2006). *Tree Roots in the Built Environment*. The Stationery Office

BSI British Standards (2012) *BS 5837:2012 Trees in relation to demolition and construction – Recommendations, Fourth (Present) Edition*. BSI

Barrell Tree Consultancy (2018) Manual for managing trees on development sites v2.1 – site guidance notes 2: Fencing protected trees, 3: Ground protection, 4: Pollution control, 11: *Installing services in root protection areas*

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

4th December 2019

ARBORICULTURAL METHOD STATEMENT

The arboricultural method statement includes the following plans:

Appendix 7	1:500@A4	Tree protection plan showing position of: • protective barriers. • construction exclusion zone • trees to be retained with a continuous outline.
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15.0 PROTECTIVE BARRIERS AND CONSTRUCTION EXCLUSION ZONE.

- 15.1 Prior to the commencement of construction work and before any machinery or materials are brought onto the site, protective barriers, marked as a light purple dotted line on the tree protection plan (**Appendix 7**), must be erected, around the 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 should be constructed as per figure 2 of BS 5837:2012 (shown at **Appendix 8**) and consist of a vertical and horizontal scaffold framework, well braced to resist impacts. The vertical tubes should be spaced at a maximum interval of 3m and driven securely into the ground. Onto this, weld mesh panels should be fixed with wire or scaffold clamps. Care should be taken when locating the vertical and bracing poles to avoid roots; if the presence of roots precludes the use of driven poles, above ground stabilising using struts mounted on a block tray, constructed as per figure 3 b) of BS 5837:2012 may be used.

- 15.5 Site guidance notes 2: *Fencing protected trees* and 3: *Ground protection* 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 takes place beyond the vulnerable RPA of any retained trees.

17.0 GROUND PROTECTION

- 17.1 The relatively narrow driveway means there will be restricted access for heavy plant so I anticipate that the existing hard surface will provide suitable ground protection for anticipated levels of plant and machinery activity.

18.0 FOUNDATION CONSTRUCTION

- 18.1 Foundation depth should be determined by the architect or a structural engineer and with reference to NHBC Chapter 4.2 – Building near trees.
- 18.2 Excavation and construction of foundations takes place beyond the RPA and should not require arboricultural supervision; however, if roots are encountered during excavation -
- ❖ Careful use of hand tools will avoid bark damage of retained roots at the edge of the foundation if present;
 - ❖ exposed roots or fibrous root masses that are to be retained should be immediately covered – with hessian or similar - to prevent drying;
 - ❖ individual roots less than 25mm diameter that need to be removed should be cleanly severed, with secateurs or a pruning saw, far enough back from the edge of the foundation (>100mm) that the effects of uncured cement do not impact tree health;
 - ❖ the project arboriculturalist will determine whether it is possible to sever roots greater than 25mm diameter or whether the pad should be repositioned;
 - ❖ use of impermeable membranes to line the excavations before the concrete is poured will help prevent damage by the alkaline properties of cement.

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.
- 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 contractor to ensure that any conditions attached to the planning consent are adhered to at all times and that a monitoring regime with regard to tree protection on site is adopted.
- 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.

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.

BS5837:2012 Tree Survey

Beechdown Arboriculture Ltd

Client: Mr and Mrs Evans
 Project: Mill Ball
 Survey Date: 04/12/2019
 Surveyor: Jonathan Rodwell

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

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
T1												
Western Red Cedar <i>Thuja plicata</i>	19	1	1009	N	5	1.5	M	A: 460.6 R: 12.1	Good	C: Good S: Fair B: Fair		B.1 >40 yrs
T2												
Common Walnut <i>Juglans regia</i>	13	1	660	N	5	3.5	M	A: 197.1 R: 7.92	Fair	C: Fair S: Fair B: Fair		B.1 20 to 40 yrs
T3												
Silver Birch <i>Betula pendula</i>	4	1	190	N	3.5	0.5	M	A: 16.3 R: 2.27	Good	C: Good S: Good B: Good		B.1 20 to 40 yrs
T4												
Field Maple <i>Acer campestre</i>	12.5	1	340	N	4	4	M	A: 52.3 R: 4.08	Good	C: Good S: Good B: Good		B.1 >40 yrs

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

Appendix 2 – tree survey definition of terms

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

Beechdown ref: B/0249/19

Mill Ball – BS 5837 tree survey/report – December 2019

Trees unsuitable for retention

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

Trees to be considered for retention

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

Appendix 3 – BS 5837 grading categories

	<u>3 - Mainly cultural values, including conservation</u> – trees with material conservation or other cultural values.
Category C	Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter under 150mm - shown in grey on plans. <u>1 - Mainly arboricultural qualities</u> – unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories. <u>2 - Mainly landscape qualities</u> – trees present in groups or woodlands but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary landscape benefits. <u>3 - Mainly cultural values, including conservation</u> – trees with no material conservation or other cultural values.

Beechdown Arboriculture Limited

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

Mill Ball Appendix 4 - tree survey plan

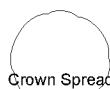
SCALE :
1 : 500

DATE :
04/12/2019



Beechdown ref: B024813
Mill Ball - 95-3571 tree survey report - December 2019

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Crown Spread



Root Protection Area



Shading Arc



Category 'A'



Category 'B'

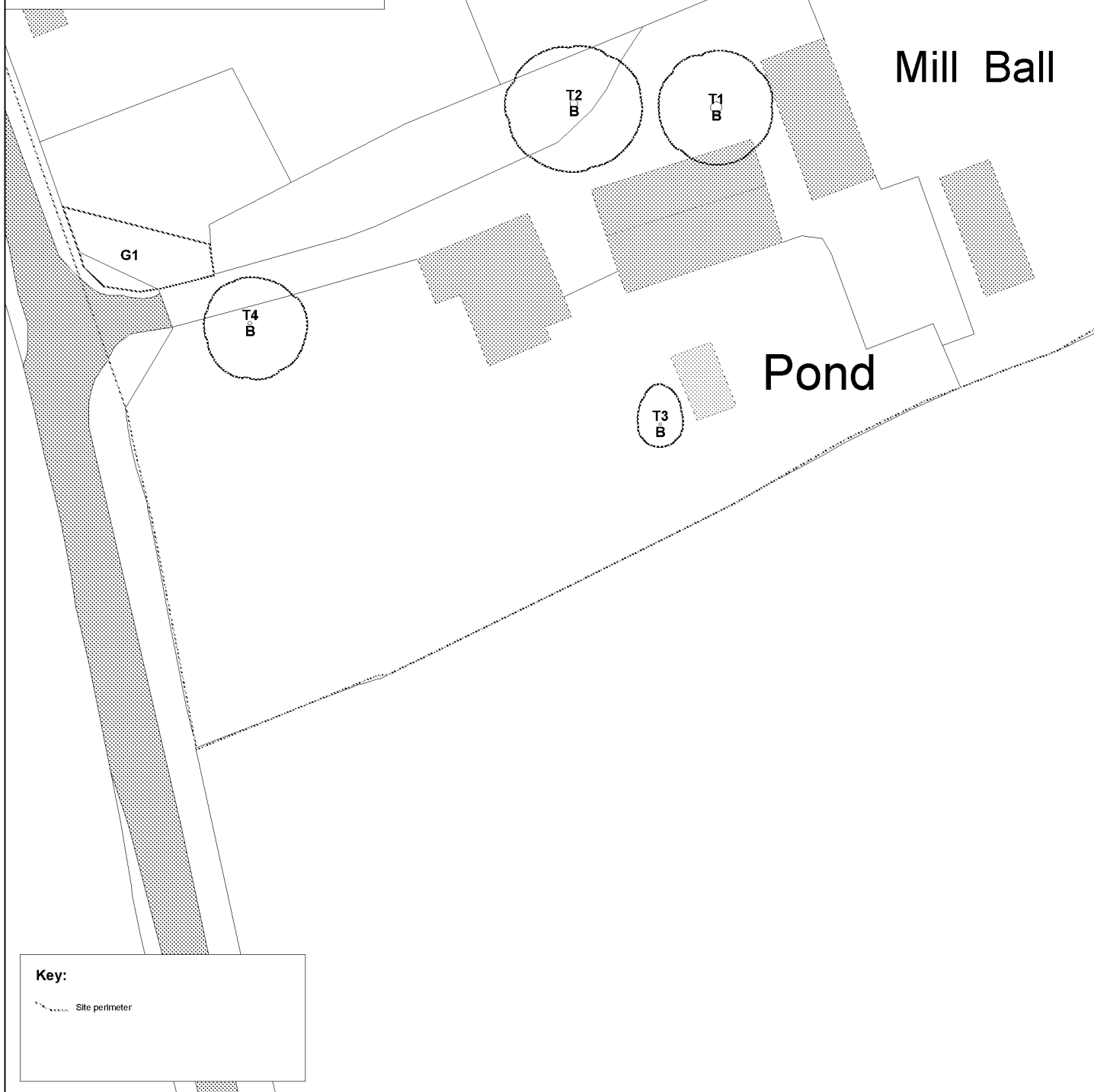


Category 'C'



Category 'U'

0 30m



Beechdown Arboriculture Limited

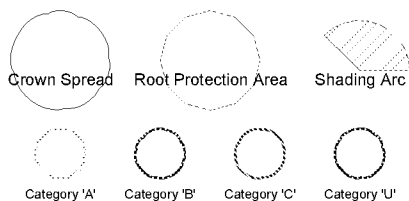
Club Cottage, Slindon, Arundel, W. Sussex BN18 0RP
Tel - 01243 814740 Email - jonathan.rodwell@beechdown.com

Mill Ball Appendix 5 - RPA and shade plan

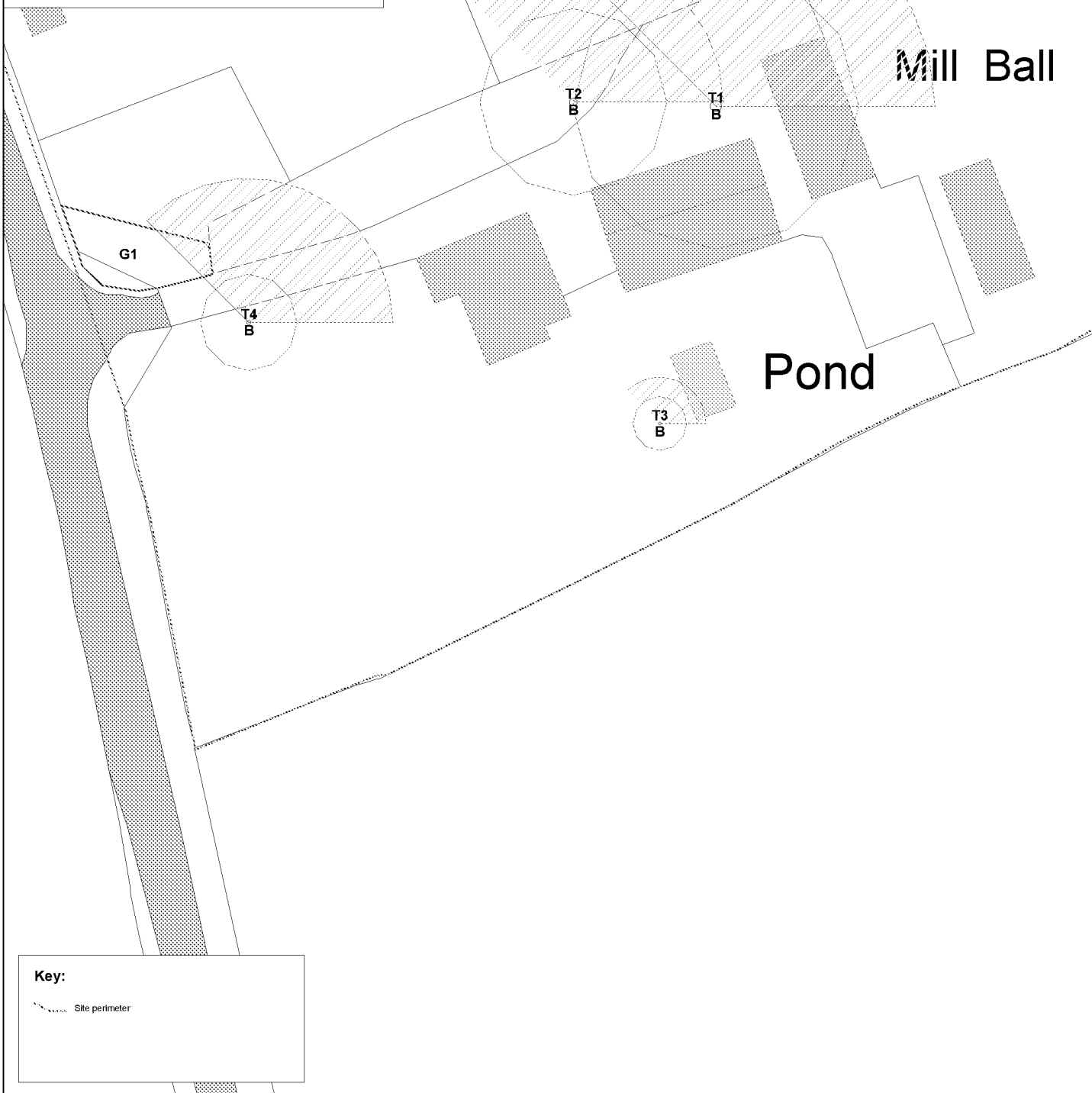
SCALE : 1 : 500 DATE : 04/12/2019

Beechdown ref: 8924818
Mill Ball: 95-3637 tree survey report - December 2018

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0 30m



Beechdown Arboriculture Limited

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

Mill Ball

Appendix 6 - development proposal in relation to RPA

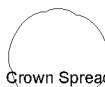
SCALE :
1 : 500

DATE :
04/12/2019



Beechdown ref: B024813
Mill Ball - 95-3371 tree survey report - December 2019

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Crown Spread



Root Protection Area



Shading Arc



Category 'A'



Category 'B'

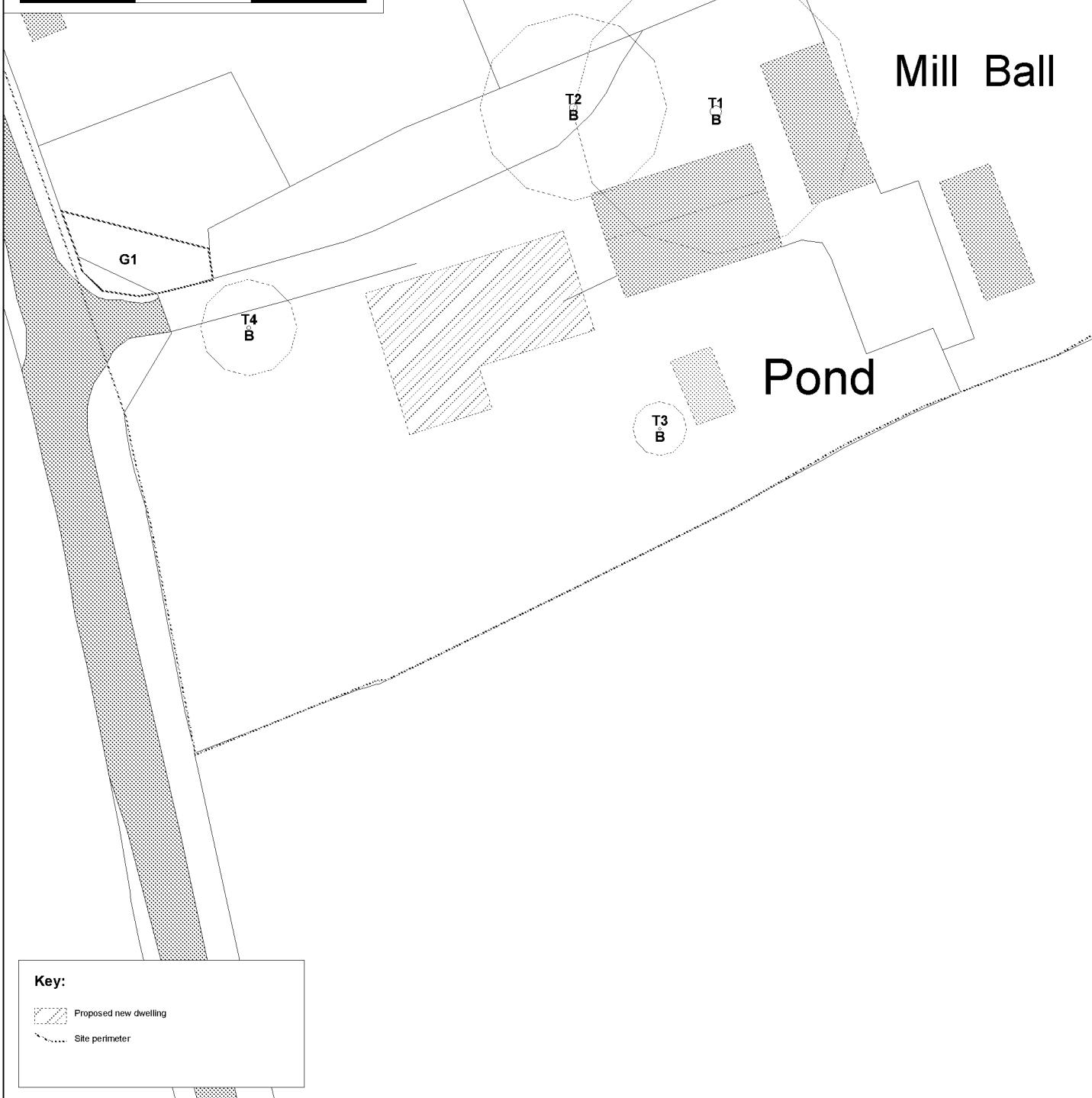


Category 'C'



Category 'U'

0 30m



Beechdown Arboriculture Limited

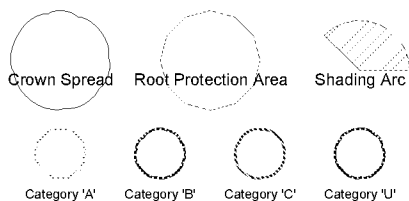
Club Cottage, Slindon, Arundel, W. Sussex BN18 0RP
Tel - 01243 814740 Email - jonathan.rodwell@beechdown.com

Mill Ball Appendix 7 - tree protection plan

SCALE : 1 : 500
DATE : 06/12/2019

Beechdown ref: B024813
Mill Ball - 95-3671 tree survey report - December 2019

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0 30m

Hard-surface of existing driveway
will provide suitable ground
protection for anticipated levels
of activity.

Mill Ball

The construction exclusion zone, shown as
green horizontal hatching, will be afforded
protection at all times during the
development process; strictly no access,
construction activities, mixing materials or
storage will be permitted.

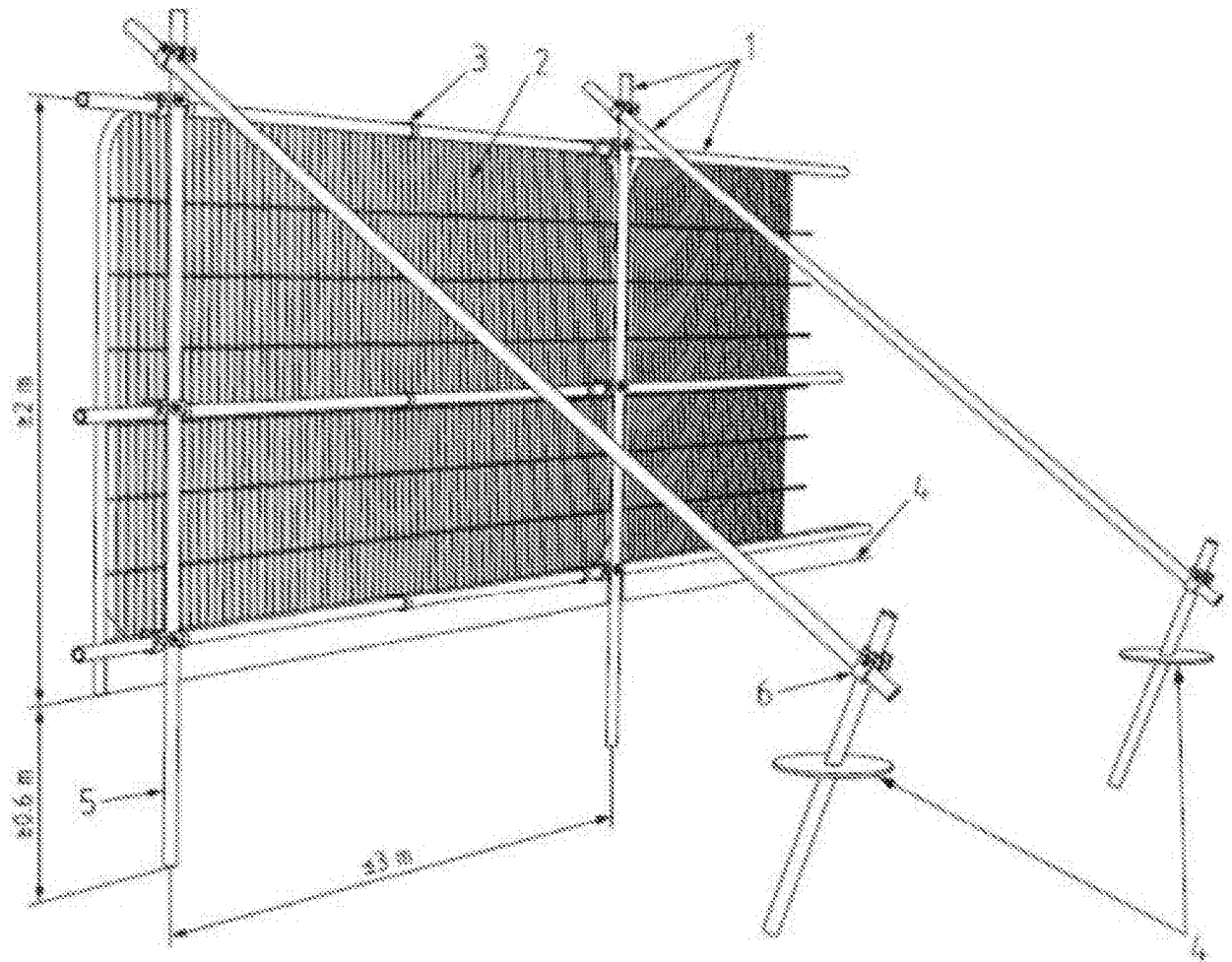
Barriers, marked as light purple
dotted line and constructed as
per Appendix 8, providing protection
to main stems of T1 and T2.

Position of protective barriers, marked
as light purple dotted line, forming
construction exclusion zone.

Key:

- Proposed new dwelling
- Site perimeter
- Construction exclusion zone
- Protective barriers

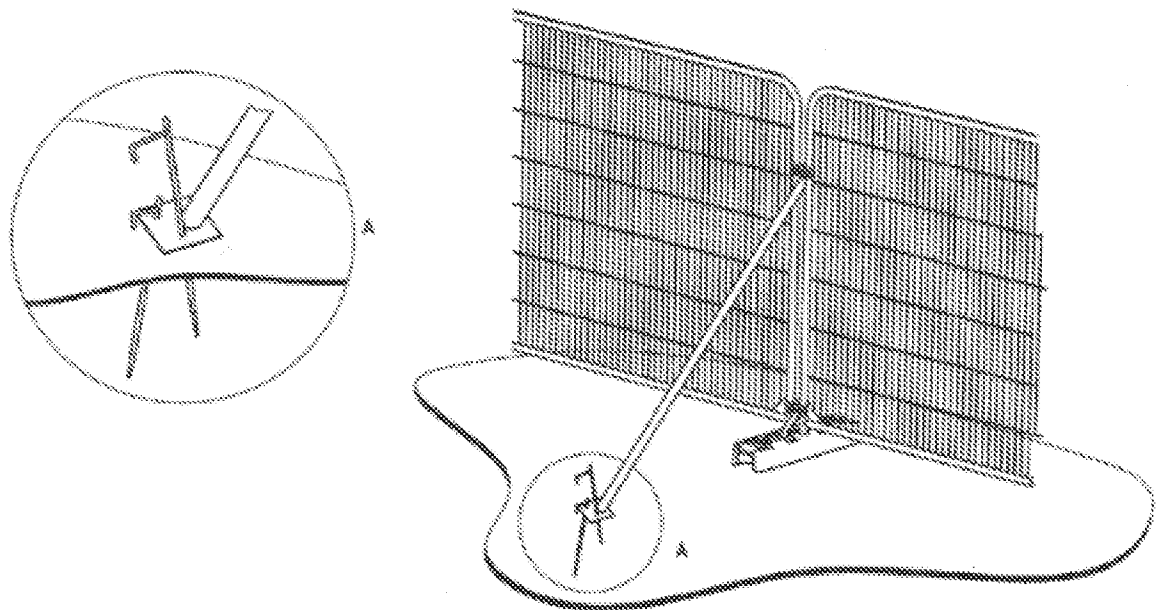
Appendix 8 – Protective Barrier



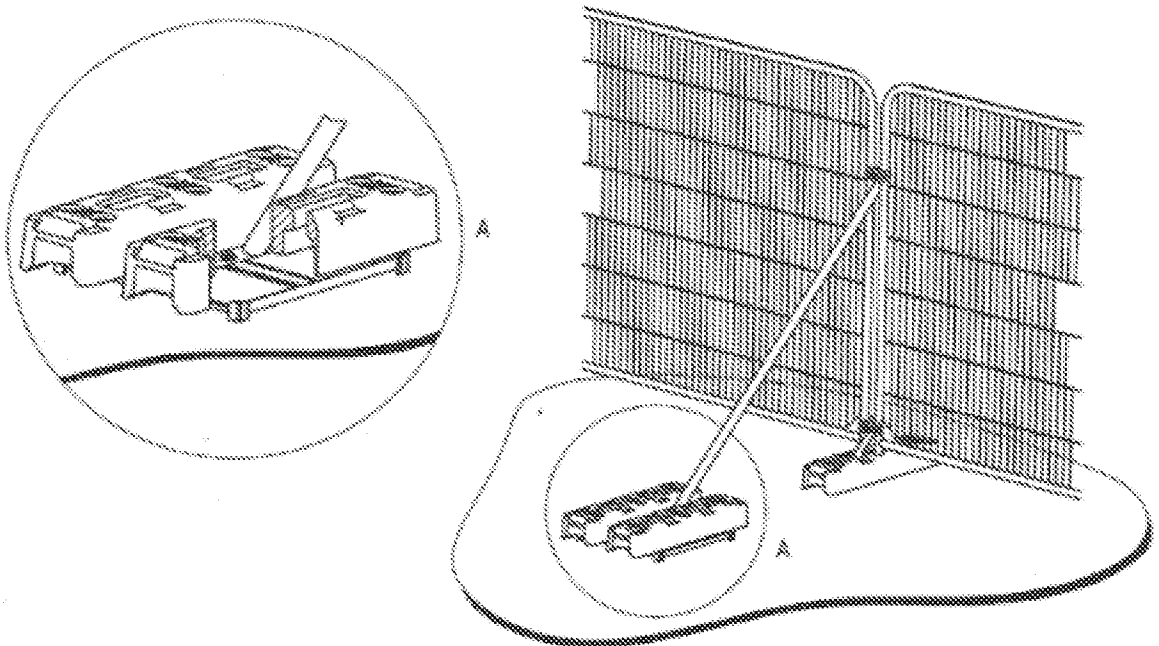
Key

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

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



a) Stabilizer strut with base plate secured with ground pins



b) Stabilizer strut mounted on block tray

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

Appendix 9 – Record of Site Visits and Arboricultural Supervision

Client			Location		
Mr and Mrs Evans			Mill Ball, Binsted, Arundel BN18 0LJ		
Local planning authority	Arun District Council				
Planning application	-				
Development	Demolition of the existing two-storey dwelling and construction of a new dwelling in its place.				

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

Notes	
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Arboriculturalist	
Signed	
Date	

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

Beechdown ref: B/0249/19
 Mill Ball – BS 5837 tree survey/report – December 2019

Appendix 9 – Record of Site Visits and Arboricultural Supervision

Client		Location	
Mr and Mrs Evans		Mill Ball, Binsted, Arundel BN18 0LJ	
Local planning authority	Arun District Council		
Planning application	-		
Development	Demolition of the existing two-storey dwelling and construction of a new dwelling in its place.		

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

Notes	
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Arboriculturalist	
Signed	
Date	

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

Beechdown ref: B/0249/19
 Mill Ball – BS 5837 tree survey/report – December 2019

Appendix 10 - Arboricultural Monitoring Form

Client		Location	
Mr and Mrs Evans		Mill Ball, Binsted, Arundel BN18 0LJ	
Local planning authority	Arun District Council		
Planning application	-		
Development	Demolition of the existing two-storey dwelling and construction of a new dwelling in its place.		

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

Arboriculturalist	
Signed	
Date	

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

Beechdown ref: B/0249/19
Mill Ball – BS 5837 tree survey/report – December 2019



Site Guidance Note 2: Fencing protected trees

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SGN 2: Summary guidance for site operatives

Administration

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

Other relevant SGNs

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

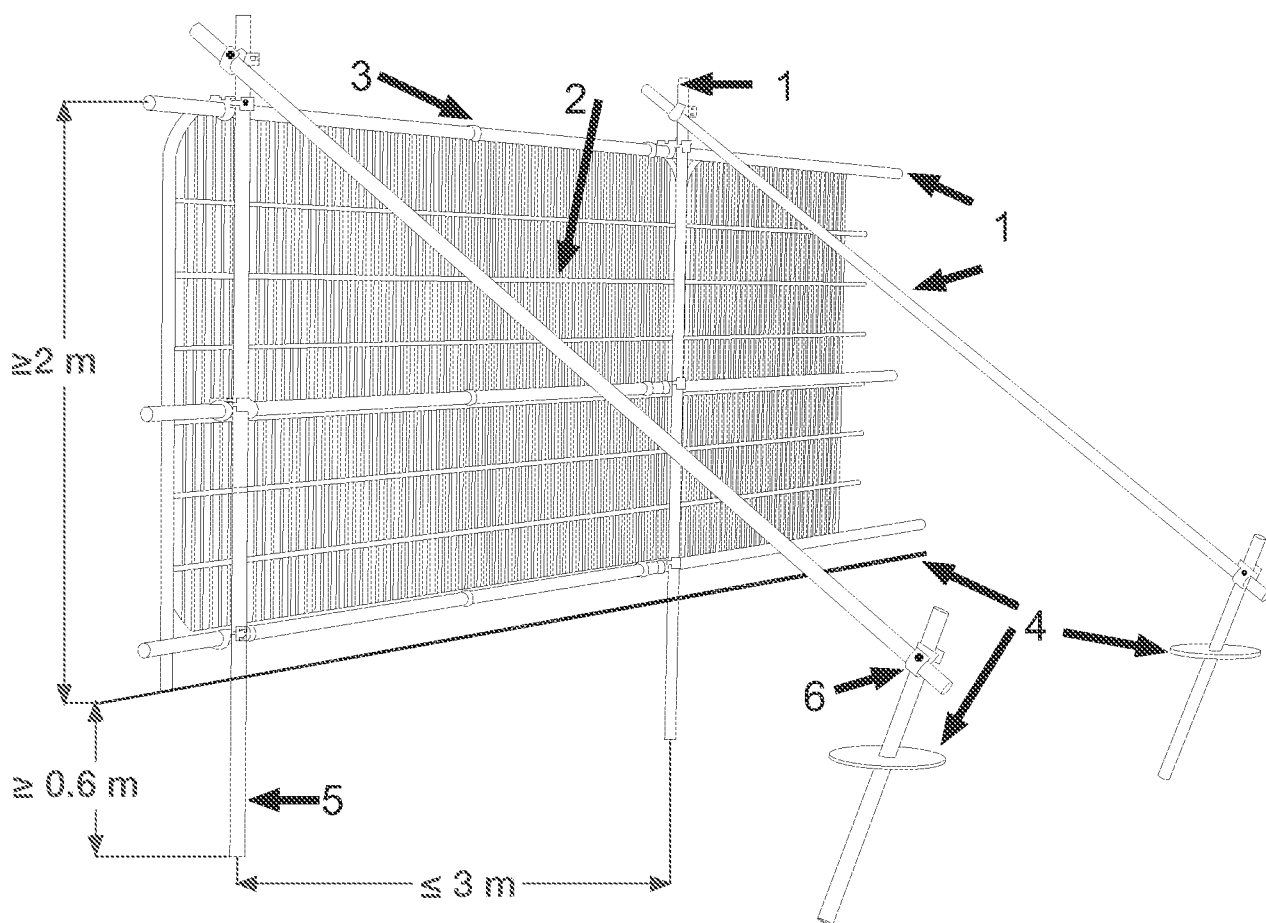
Important reminders

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

SGN 2: Explanatory notes and examples

Purpose

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



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

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

SGN 2: Explanatory notes and examples

General principles and clarifications

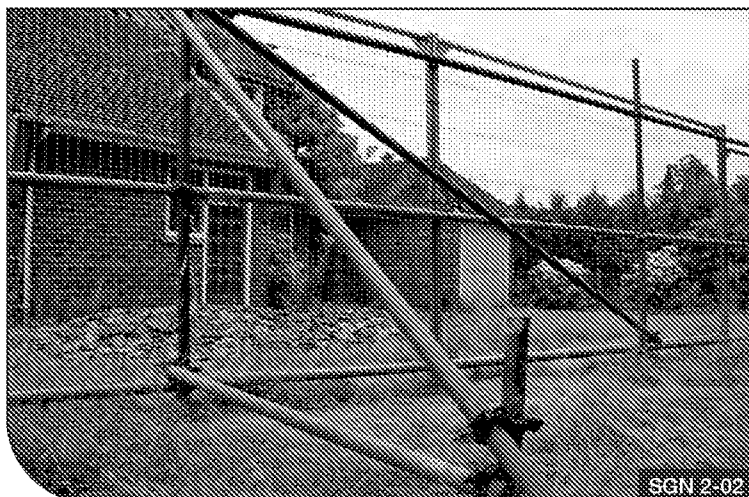
The fencing will be installed at the locations shown on the tree protection plan and agreed by the local planning authority before any construction activity starts on site. It will remain in place until there is no risk of harm from the development activity.

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

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

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

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



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

SGN 2-02

SGN 2: Explanatory notes and examples

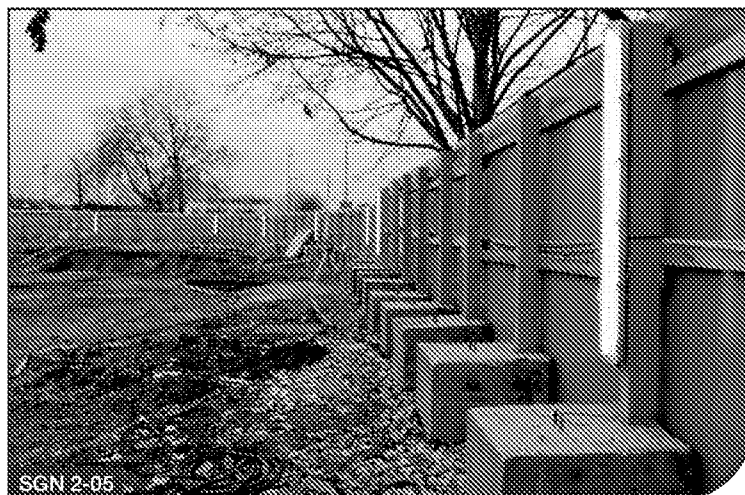
Board specification on secure wooden posts is a suitable alternative to the standard braced scaffold design.



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



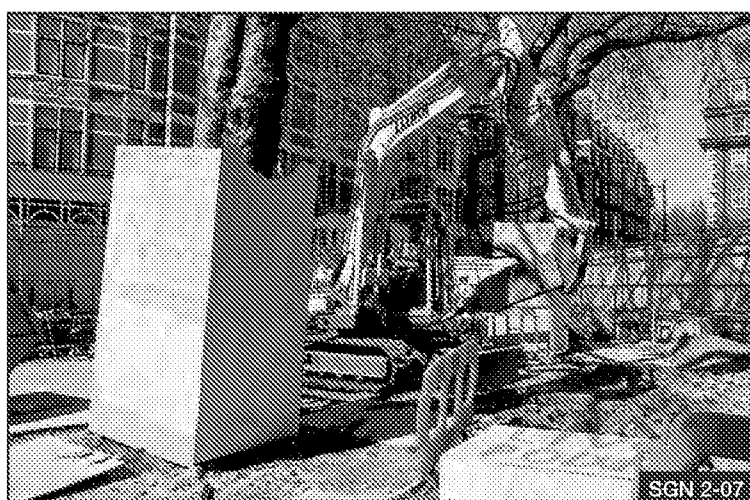
An alternative to dug supports is concrete blocks set outside the RPA.



SGN 2: Explanatory notes and examples



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



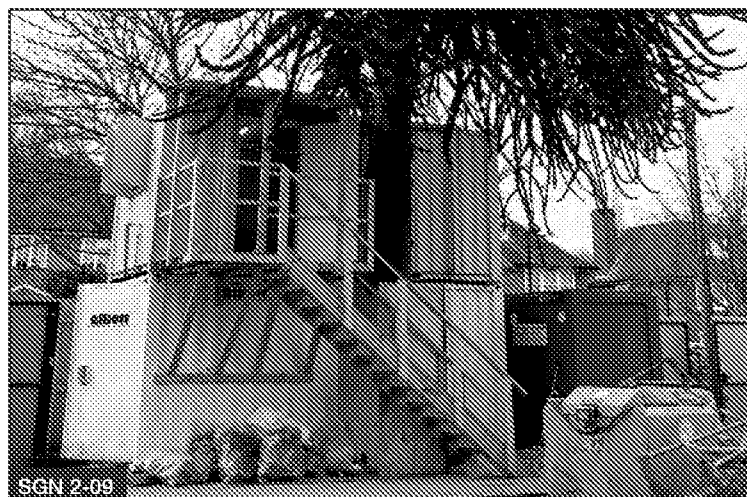
Boards attached to a supporting framework surrounding the trunk reduces the risk of accidental impact.



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

SGN 2: Explanatory notes and examples

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



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

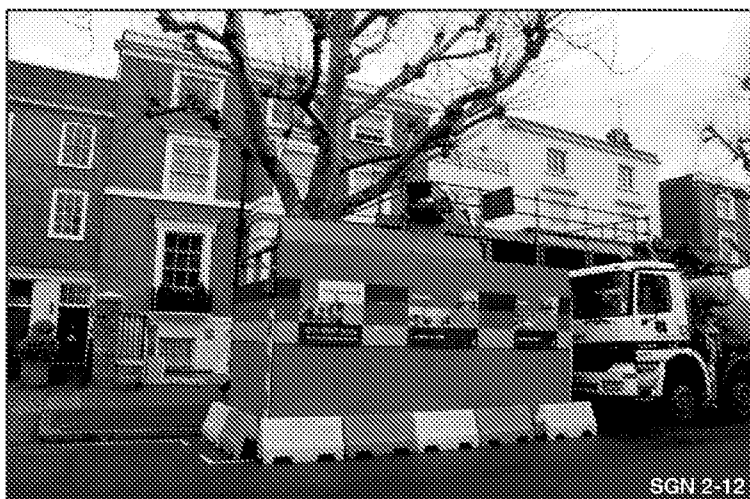


SGN 2: Explanatory notes and examples



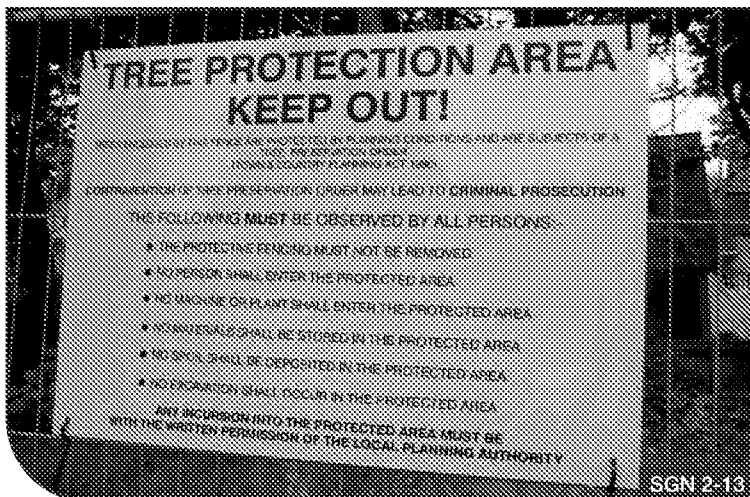
SGN 2-11

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



SGN 2-12

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



SGN 2-13

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

SGN 2: Explanatory notes and examples

Technical reference

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

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



Site Guidance Note 3: Ground protection

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SGN 3: 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. Ground protection will be fit for purpose, i.e. prevent damage to the underlying soil and roots in RPAs.
6. Ground protection will be installed at the locations shown on the tree protection plan.
7. Ground protection locations will not be altered without prior approval of the supervising arboriculturist.
8. Where feasible, retain existing hard standing to act as ground protection.
9. Ground protection will not be removed at the end of construction without prior approval of the supervising arboriculturist.

SGN 3: Explanatory notes and examples

Purpose

SGN 3 describes where ground protection will be installed, what form it can take, and how long it should remain in place to effectively protect trees to be retained, based on the recommendations in BS 5837 (6.2 & 7.3).

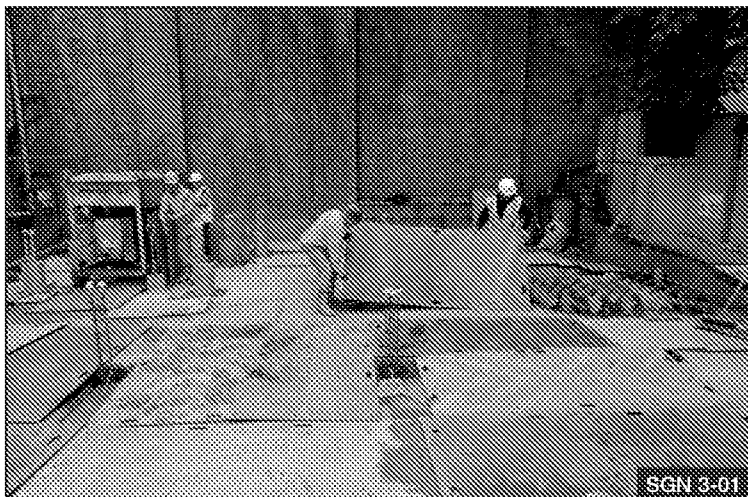


General principles and clarifications

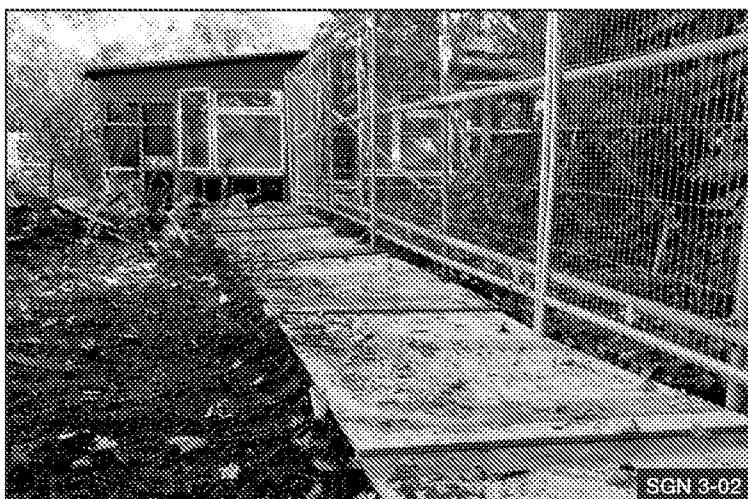
Ground protection is an effective means of preventing damage to the RPAs of retained trees during development activity. In practice, a range of approaches can be used, including retaining existing hard surfacing or structures that already protect the soil, installing new materials, or a combination of both. Whatever the chosen option, the result will be that the underlying soil (rooting environment) remains undisturbed and retains the capacity to support existing and new roots.

Ground protection 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 ground protection will have its location changed or be removed without consulting the supervising arboriculturist. Furthermore, the condition of the ground protection will be regularly monitored to ensure it remains fit for purpose, i.e. sufficient to prevent damage to the RPAs of retained trees.

SGN 3: Explanatory notes and examples



Metal plates and heavy plywood cover this entire area while the piles are being installed and the building is constructed above the RPA.



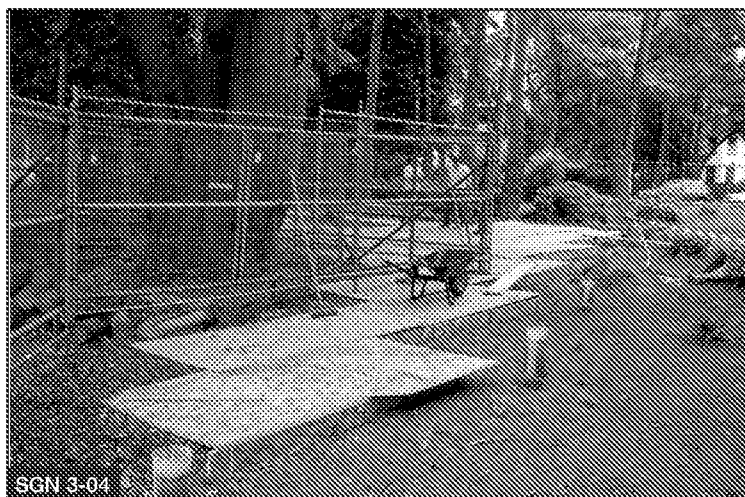
Heavy-duty plywood set onto a compressible woodchip layer and pinned into position is suitable to spread the loading from pedestrian access.



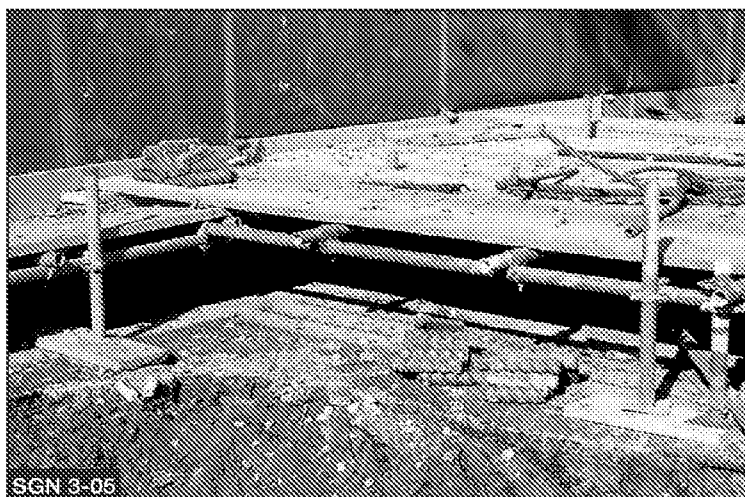
ArborRaft is very effective for use on flat areas to spread load and reduce compaction in sensitive RPAs. Its main benefits over other cellular products are that there is no need to fill it with stone, which saves on stone purchase and haulage costs, and it is reusable. The UK supplier is Wrekin Products (www.wrekinproducts.com).

SGN 3: Explanatory notes and examples

Plywood fixed to a wood frame is another effective method of protecting soil from pedestrian compaction.



A scaffold framework attached to the main scaffold fencing can be used to support either scaffold planks or plywood to create an elevated platform with a gap beneath.



Cellular products are a very effective means of providing ground protection where heavy vehicle use is expected. Here, it is being used to temporarily widen an existing road, to be removed once the construction is finished.



SGN 3: Explanatory notes and examples



SGN 3-07

Custom designed sectional metal tracks can be joined to support very heavy traffic use through sensitive areas.



SGN 3-08

Ground protection must be used where repeated pedestrian traffic could cause compaction in sensitive RPAs. It can be as simple as plywood pinned to the ground, or custom designed plates that interlock to spread the load.

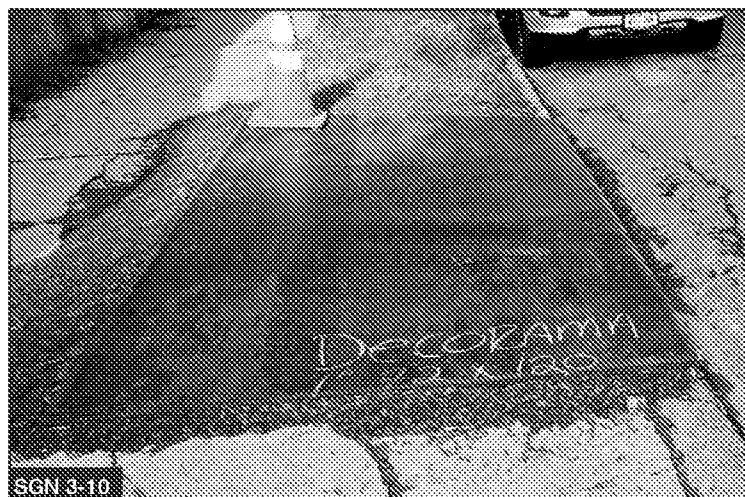


SGN 3-09

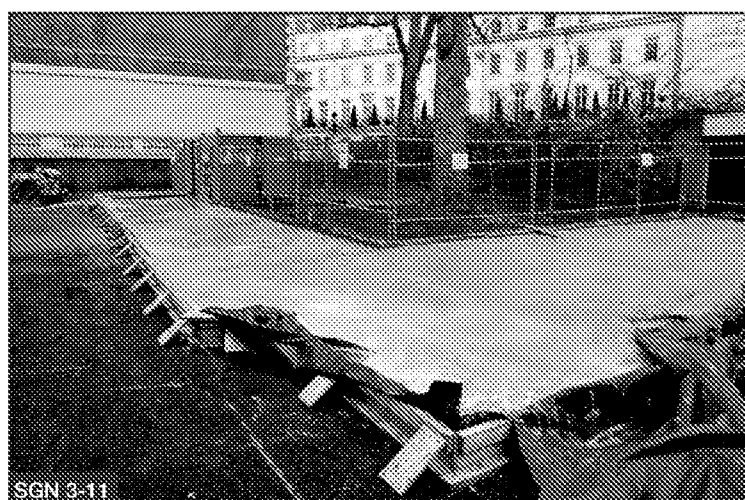
A combination of retaining existing surfacing and using temporary construction cabin accommodation can be a very effective means of preventing damage to sensitive areas.

SGN 3: Explanatory notes and examples

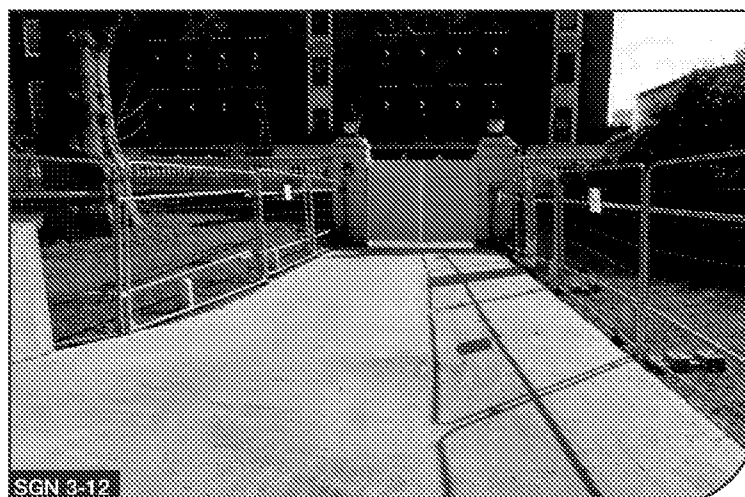
Steel plates can be an effective way of temporarily reinforcing weak surfacing over a construction access during the development activity.



A temporary concrete slab cast directly over existing low load bearing surfacing is an effective way of ensuring that the soil beneath is protected from compaction during development. This is removed once the heavy use is finished.



Temporary concrete slabs on slopes are an effective way of preventing soil damage during the transport of materials on and off site.



SGN 3: 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) recommends:
 - 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.
 - 6.2.3.1 Where deemed appropriate by the project arboriculturist, protective fencing can be set back and the RPA protected with ground protection. Where feasible, existing hard surfacing scheduled for removal should be retained to act as temporary ground protection during construction.
 - 6.2.3.2 If the set-back exposes unmade ground, new temporary ground protection should be installed as part of the tree protection measures before site works start.
 - 6.2.3.3 New temporary ground protection should support all anticipated loading and prevent compaction in the RPA.
 - 6.2.3.4 The location and design of ground protection should be shown on the tree protection plan and detailed within the arboricultural method statement.
 - 6.2.3.5 The objective of ground protection is to avoid soil compaction and prevent adverse impacts on tree root function.
 - 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.
 - 7.3.3 All demolition plant should either operate outside the RPA, or run on ground protection installed before demolition starts.



Site Guidance Note 4: Pollution control

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SGN 4: Summary guidance for site operatives

Administration

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

Other relevant SGNs

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

Important reminders

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

SGN 4: Explanatory notes and examples

Purpose

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



General principles and clarifications

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

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

SGN 4: Explanatory notes and examples



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



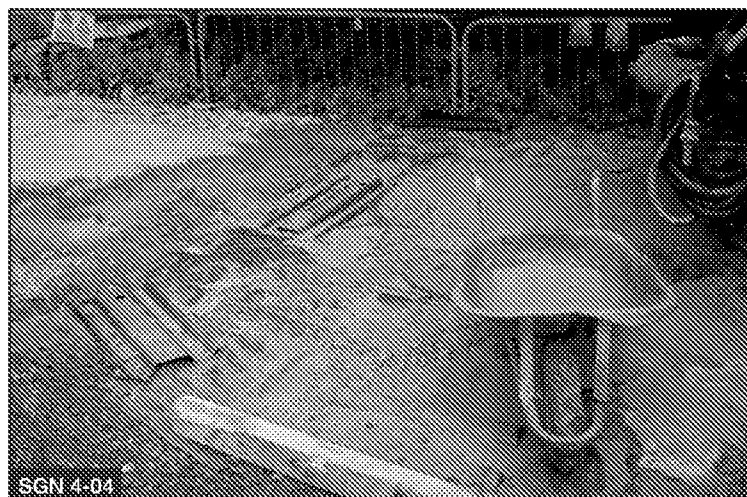
Where fuel or other chemicals are stored on site, risk assessment will be carried out to identify if emergency spillage kits are needed to restrict the environmental impact of accidents.



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

SGN 4: Explanatory notes and examples

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



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



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



SGN 4: Explanatory notes and examples

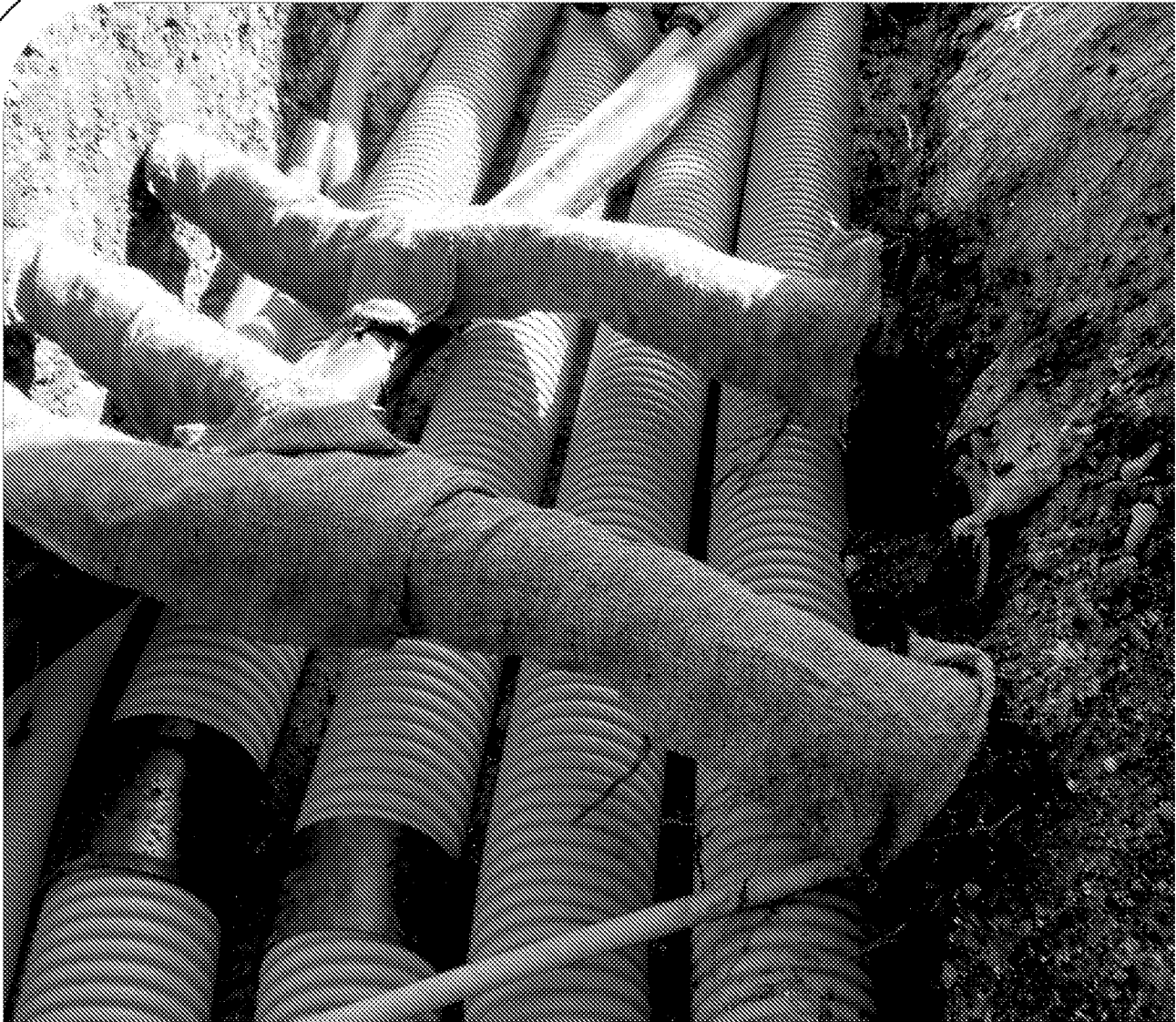


Impermeable liners must be used to prevent contamination of the RPA from the leachate that originates from poured concrete.

Technical reference

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

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



Site Guidance Note 11: Installing services in root protection areas

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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.

SGN 11: Explanatory notes and examples

Purpose

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



General principles and clarifications

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

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

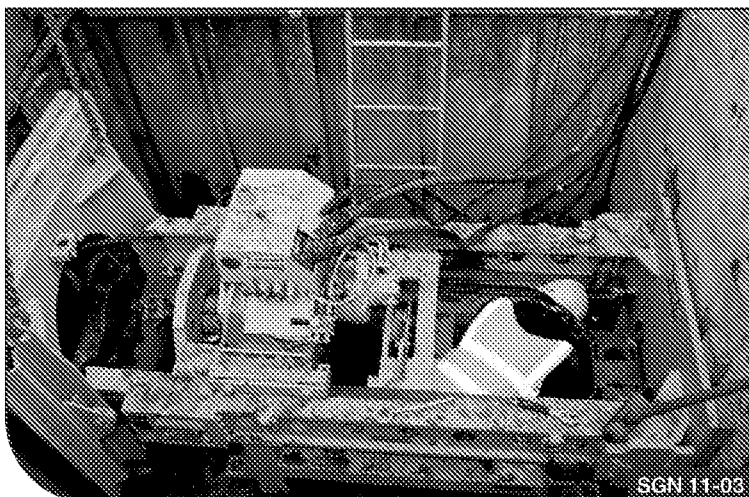
SGN 11: Explanatory notes and examples



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



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



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

SGN 11: Explanatory notes and examples

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



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



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



SGN 11: Explanatory notes and examples

Technical reference

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

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

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

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

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

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

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

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

SGN 11: Explanatory notes and examples

b) Broken Trench – Hand-dug: This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

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