TREE PROTECTION PLAN AND ARBORICULTURAL METHOD STATEMENT

VICTORIA ROAD WEST

MAY 2017

FINAL

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PROJECT NAME	Victoria Road West
PROJECT NUMBER	4671

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REPORT VERSION	STATUS	DATE	AUTHOR	PROOF READ	APPROVED
R01	Draft	28.07.16	DB	MR	JS
R02	Final	18.10.16	DB/SW	SW	DB
R03	Final (update)	14.11.16	DB	MP	EB
R04	Update	02.12.16	DB	MP	EB
R05	Plan update	16.12.16	DB	MP	EB
R06	Plan update	09.01.17	DB		EB
R07	Plan Update	24.04.17	HN	MR	DS
R08	Plan update	03.05.17	DB		DS
R09	Update	17.05.17	HN		DS

E³ Ecology Ltd accepts no responsibility for injury that may occur as a result of incorrectly interpreting this report. Trees are living organisms whose health and condition can change rapidly as a result of environmental changes. All trees, even healthy ones, are at risk from unpredictable climatic and man-made events. The assessment of risk for these trees is based upon factors evident at the time of the inspection, the potential an individual tree has for survival, and the interpretation of those factors by the inspector. The health, condition and safety of these trees should be checked on a basis commensurate with the level of risk as specified in this report.

If works are not likely to start within 12 months of this report, it is recommended that an updating survey is undertaken to ascertain any changes which may have occurred to trees surveyed, where failure to carry out the prescribed works within the specified time frames has occurred.

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A. SUMMARY

E3 Ecology Ltd was commissioned by Miller Homes to create a Tree Protection Plan (TPP) with relevant arboricultural method statements (AMS), for trees at the former Siemens site adjacent to Victoria Road West, South Tyneside.

A pre-development Tree Constraints Assessment (TCA) was conducted by E3 Ecology Ltd on the 17th June 2016, the results of which inform this TPP. Updating surveys were carried out on the 20th September and 17th October 2016.

It is proposed to develop 334 residential properties within the site. Plans currently include the creation of two access points along the eastern site boundary with associated visibility splays.

Consultation with South Tyneside Council planning department on the 29th June 2016, indicated that all of the trees within the site boundary are protected under group Tree Preservation Order number 309 (2014)/L (97)261- 'Former Siemens Site, Victoria Road West, Hebburn. The site is not within a Conservation area.

Of the 70 trees and 26 characteristic tree groups surveyed, 36 young to mature trees and 21 groups of trees will be removed. Trees T1 – T32 and group 26 are outside the site boundary. Many of the tree groups are well developed with understoreys comprising naturally recruited regeneration. Natural recruits from these groups will be transplanted around the margins of the site and included within general site landscaping.

From an ecological perspective, all of the trees and groups of trees provide well developed nesting and foraging habitat for birds and shelter for terrestrial mammals. Consequently all tree removal and scrub clearance will be carried out during the dormant period (autumn to early spring).
Mature willow trees within group five were assessed as having a moderate risk of supporting roosting bats. An aerial inspection of a single tree for the presence of roosting bats was conducted on the 17th October 2016. Although no sign of bats were found at the time of survey, the tree still has features with a high risk of supporting roosting bats and will therefore need to be felled to the method statement within the annexed report: 4671 VRW/ Ecological appraisal R04.

The roots and crowns of trees to be retained be protected in accordance with the prescriptions of this TPP and future site management. According to the Arboricultural Implications Assessment (AIA) (Appendix 2), all the trees to be retained are of low to moderate ecological, landscape and arboricultural value to the site, with safe use life expectancies of between 10 and 20 years.

Any future landscaping and tree planting within the site will be designed to maintain wildlife linkages around the site, to soften the general appearance of the new development from the perspective of surrounding residents.

Specific tree details are in the accompanying Tree Constraints Assessment (TCA) (E3 Ecology report 4671 R02 Victoria Road West TCA). Further recommendations for tree works are covered in section D.

An arboricultural method statement for contractors is provided in Appendix 3.

A high resolution pdf and CAD file at A1of the tree protection plan (figure 3) will be sent as an addendum.

B. INTRODUCTION

E3 Ecology Ltd was commissioned by Miller Homes to create a Tree Protection Plan (TPP) with relevant arboricultural method statements (AMSs), for trees at the former Siemens site, Hebburn. A Tree Constraints Assessment (TCA) is the subject of a separate report (E3 Ecology report 4671 R02 Victoria Road West TCA). The current masterplan for the site is provided in figure 2 below.

B.1 BACKGROUND TO DEVELOPMENT

The site is located within the southern area of Hebburn, South Tyneside at an approximate central grid reference of NZ3039 6349. The site location is illustrated below in Figure 1.

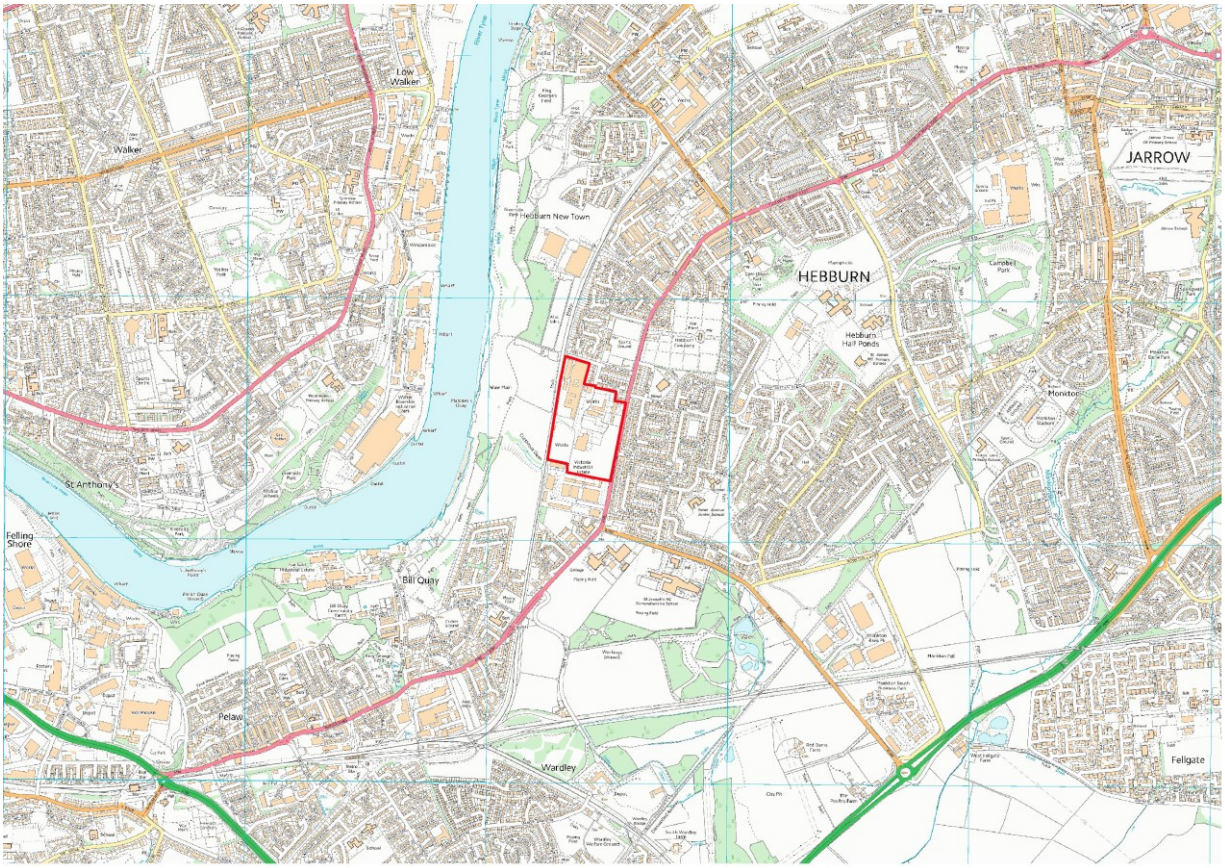


FIGURE 1 – SITE LOCATION
(Reproduced from the ordnance survey map under licence 2016)

B.2 CURRENT DEVELOPMENT MASTERPLAN

FIGURE 2 – MASTERPLAN AS PROPOSED. POD; 544-MIL/SD-10.11/AD

B.3 LEGISLATIVE CONTEXT

All of the trees within the site boundary are protected under group Tree Preservation Order number 309 (2014)/L (97)261- 'Former Siemens Site, Victoria Road West, Hebburn. The site is not within a Conservation area. The full citation for the TPO is contained within the tree constraints assessment.

B.4 PERSONNEL

Survey work and reporting was undertaken by:

- Darryl Birch BSc MArborA, Lantra Professional Tree Inspector

The project was supervised/checked by:

- James Streets BSc MSc MCIEEM

Details of experience and qualifications are available at www.e3ecology.co.uk.

B.5 OBJECTIVES

The objectives of the Tree Protection Plan (TPP) are as follows:

- To confirm the trees that are to be retained on site.
- To confirm the extent of the root protection areas (RPAs) required for the trees to be retained.
- Propose an acceptable location for the installation of fencing to create a construction exclusion zone or root protection zone.
- To specify the nature, design and extent of the protective fencing required.
- Propose proactive tree care methods which will be of benefit to the trees, to prolong their safe use life expectancy and their future contribution to the site.
- To provide appropriate method statements for the implementation of the tree protection plan, acknowledging the need to co-ordinate and synchronise the timings with the development activities.

C. ASSESSMENT CRITERIA

The constraints imposed by trees, both above and below ground, will inform the site layout design and working methods. The following are the main criteria which have been taken into account in developing the Tree Protection Plan.

C.1 BELOW GROUND CONSTRAINTS

The main aim of this protection plan is to protect roots from excavation or similar activities during construction and landscaping activities. The level of impact on trees is based on:

- The proximity of proposed foundations to root systems of trees to determine whether trees can be retained.
- The extent of root plate areas around retained trees to ensure there are no or limited impacts to such features.
- Protection measures required to designate the root protection zones of retained trees.

C.2 GROUND LEVEL CONSTRAINTS

Within the root protection zone, adequate provision must be given for the protection of the trees during both construction and landscaping activities. Potential Impacts which need to be assessed and where necessary mitigated include:

- Root compaction.
- Surface level changes.
- Chemical spillages.
- Physical damage through excavation.

C.3 ABOVE GROUND CONSTRAINTS

Above ground impacts may be within or outside of the root protection zone, but generally involving tree canopies, crown spreads and anticipated growth. Impacts which will be taken into account include:

- The movements of high clearance vehicles within the proximity of trees.
- The proximity of new buildings to the trees and how the trees and buildings will affect one another in the short, medium and long term.

C.4 ADDITIONAL CONSIDERATIONS

The following factors are to be taken into consideration once development designs are available to provide adequate protection for the root system:

- The likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and presence of other trees;
- The morphology and disposition of the roots, when known to be influenced by past or existing site conditions (e.g. the presence of roads, structures and underground services);
- The soil type and structure;
- Topography and drainage;
- Where any significant part of a tree's crown overhangs the provisional position of tree protection barriers, these parts may sustain damage during the construction period. In such cases, it may be necessary to increase the extent of the tree protection barriers to contain and thereby protect the spread of the crown. This can be mitigated by facilitation (branch end) pruning (Appendix 4).

Values stated in Tables 1 & 2; 'Trees to be removed/ retained' (Appendix 2), are the absolute values as calculated for that tree and remain as minimum guidance as to the actual root protection zone.

D. RECOMMENDATIONS

D.1 WORKS TO TREES AND MITIGATION MEASURES

Trees to be removed and works to trees are fully illustrated and described in Appendix 1 (figure 3) and Appendix 3 (AIA – Table 2).
The tree protection plan for trees to be retained are illustrated and fully described in Appendix 2 (figure 4) and Appendix 3 (AIA – Table 1).

D.2 PROTECTED TREES

To mitigate for the loss of trees, Miller Homes will implement a high quality landscape strategy through the site which will include the creation of incidental public open space and good quality hedges to front gardens. There will be an ecological landscape buffer around the eastern, southern and western boundaries. The landscape proposals will be better suited to the proposed residential use and represents a sustainable green infrastructure with a long term management regime.
Tree planting using stock recruited from tree groups within the site will be planted within and around the margins to replicate contiguous wildlife corridors which will be lost during the remediation process.

Additional works to protected tree groups not previously specified include:

- Trees within group G17 will be retained and managed as specified below.
- Trees within group G1 will be retained and protected and enhanced as specified below.
- Trees within group G11 will be lost during the remediation process to facilitate construction of plots 18 – 20 and replaced as specified below.
- Retained tree groups (G13, 13.5 and G15) and wildlife buffers will be managed as proposed below.
- The roots of trees within group G26 (outside the western boundary will be protected as proposed below.

D.3 PROPOSED TREE WORK (APPENDIX 3)

33 individual trees and 21 tree groups will be removed from the site prior to the proposed remediation process.

Because of the size of areas of vegetation to be cleared from the site prior to the commencement of remediation work, **seasonality for the removal of scrub vegetation and trees will be key** to minimise the impacts on any wildlife that may be present. There is a high risk of impacting on tree and ground nesting birds during the breeding season.

All works to trees, hedgerows and scrub vegetation therefore will be conducted outside the bird breeding season (March to August inclusive) unless prior inspection is made by the project ecologist and active nests are confirmed to be absent. The project ecologist will be informed of any potential wildlife impacts as the vegetation removal works progress.

1. Designated trees and areas of scrub will be felled/removed, the branch wood and cordwood chipped where possible. Remaining cordwood too large to be chipped will be removed from the site. Arisings from the trees will be used as ground protection within high impact zones around trees and tree groups (G1, G13 and G15).

2. General management prescriptions for group G17 include the removal of ten existing early mature western balsam poplar *Populus trichocarpa* and eight early mature Leyland cypress *X Cupressocyparis leylandii* trees (see figure 2a below). The remainder of the group will be retained in its entirety, with only minimal clearance of scrub that may

be required to facilitate access to the trees to be lost and construction of the respective boundary fences. The existing boundary currently demarcated with a galvanised
3. palisade fence, will be retained

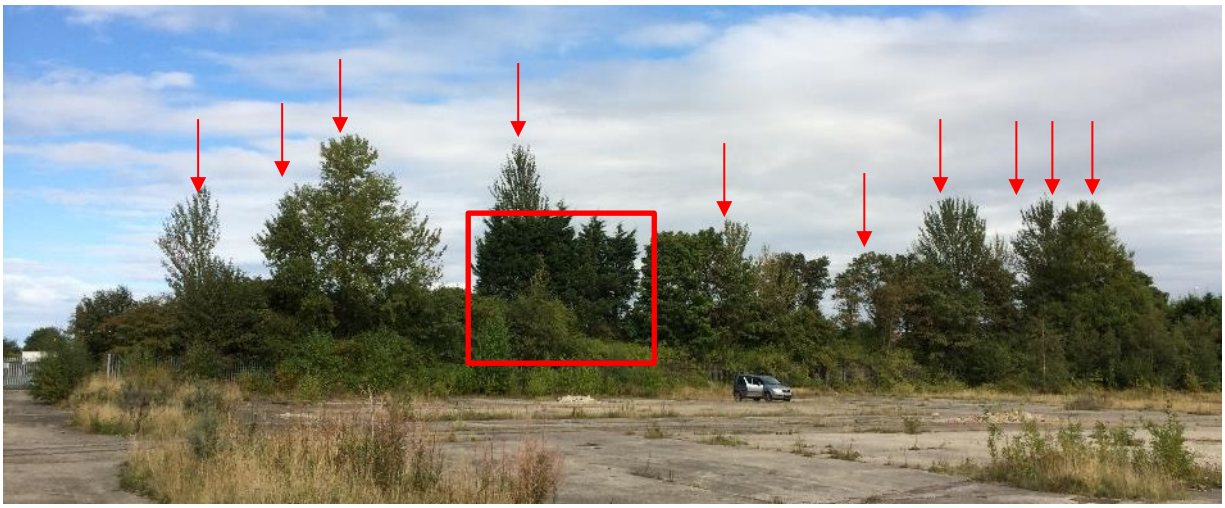


FIGURE 2A : GROUP G17 ILLUSTRATING PROPOSED TREES FOR REMOVAL

Existing scrub vegetation outside the fence (to the south) will be removed up to the fence line prior to commencement of the site remediation process.

4. Norway maple *Acer platanoides*, Swedish whitebeam *Sorbus x whitebeam* and sycamore *Acer pseudoplatanus* trees within group G1 (figure 2b below) will be retained. Two western balsam poplars *Populus trichocarpa,* T63 and T64 are in a fair condition but are leaning and have root plate heave on their western elevations. They are characteristically short lived trees and from a landscape perspective are in a poor condition. They will be felled to ground level and replaced.

FIGURE 2B: GROUP G1 ILLUSTRATING THE TWO WESTERN BALSAM POPLARS TO BE REMOVED

5. Group G1 will be accessible to the residents and as such, the crowns of the retained trees will be lifted to 2m. Trees to be planted within this section will include amenity tree species to bring seasonal colour to the estate entrance. Species such as sweet gum *Liquidambar styraciflua* and Pissard's purple plum *Prunus cerasifera 'Atropurpurea'* should be planted to provide autumn colour. A single extra heavy standard copper beech *Fagus sylvatica 'purpurea'* should be planted in the centre of this area to succeed the medium species trees (Norway maple and Sorbus) as they grow to maturity and begin to decline.

6. A triple line (1.5m) of load bearing cellular confinement cells (such as Stratacell produced by Greenblue Urban) with associated water management will be installed along the eastern edge of the access road to units 285 – 287, running adjacent to group G1, to maximise soil rooting volume for the existing trees as they develop.

7. 22 trees within group G11 and the existing bund will be removed during the remediation process to facilitate the construction of buildings and associated hardstanding, access roads and parking areas for units 18 -21. Figure 2c illustrates the constraints imposed by the change in levels during the remediation process and the proximity of the proposed units and parking areas within this section of the site.

FIGURE 2C: SECTION PLAN OF PROPOSED WORKS IN GROUP G11

8. The existing land footprint within this section will be retained and re-landscaped post development. 22 heavy nursery standard medium species amenity trees will be planted within this section to reflect plantings within the remainder of the site as illustrated within the landscape plan. Species will include *Prunus, Malus* and pyramid hornbeam

Carpinus betulus fastigiata which replicates the less hardy fastigiate bastard service trees *Sorbus x thuringiaca* 'Fastigiata' which are to be lost. Trees will be planted as specified below (9). Figure 2d illustrates the existing bund.

FIGURE 2E: GROUP G11

FIGURE 2F: GROUP G11

9. **General landscaping**: Naturally recruited trees or native deciduous trees of local provenance sourced locally will be transplanted around the site within landscaped areas to preserve the local genetic stock. Consideration will be given for seasonal colour, with the inclusion of flowering tree species (*Prunus* spp., *Pyrus spp*, *Malus* spp.) and winter fruiting species (e.g. blackthorn, rowan etc.).

10. **Planting methodology**: Each tree will be planted according to recommendations within BS8545:2014 'Trees: from nursery to independence in the landscape' by an experienced horticultural contractor.

11. To summarise, preparation of the ground will be a key consideration prior to planting. The size of the root-ball to be retained will be specific to the tree to be moved (specifications in BS4043:1989) and will influence the size of the tree pit (at least 500mm greater than that of the root ball and the same depth as the root-ball).

12. Each tree will be planted prior to the dormant season for the particular species growing in open ground (generally Mid- October) and during ideal weather conditions (overcast, wet weather, when the soil is moist and workable).

13. Sufficient backfilling (with as much of the indigenous soil as possible or sterile topsoil which has been mixed with a slow release fertiliser), anchoring of the root ball, mulching and protection from browsing animals, human and mechanical damage, are all operations which will be carried out by an experienced contractor.

14. Each tree planted will be supported by twin round stakes and a cross-tie and surrounded by a light mesh to prevent basal damage by browsing animals and to dissuade petty vandalism. These materials will be removed once the trees are fully established and the risk of animal/ human damage is assessed as being negligible).

15. **A management agreement for the aftercare of the trees will be required as a commitment**, following plantation. This will include compensating for soil settlement, weed removal, supplementary nutrition if necessary, maintenance pruning, watering and removal of stakes/ protection measures once the trees have established.

16. Nine trees (Trees T5 – T9 and trees T21 – T24) will be removed from alongside the eastern boundary (alongside Victoria Road West) to facilitate the creation of two general access routes with visibility splays into the site (figure 2G below). To compensate for the loss of these trees, nine extra-heavy standards will be planted to infill this characteristic line of trees where space is available, or within the landscaped plots within the site. Species chosen will complement existing trees and will be managed as proposed above.

17. Works to a single mature white willow tree within tree group G5 will be carried out to a bat/tree method statement as specified in E3 ecological report 4671 Victoria Road West R03. The remaining trees are assessed as having a negligible to low risk of supporting roosting bats.

18. Detailed information regarding the ecological buffer zones will be included within the site landscape plan.

FIGURE 2G: VISIBILITY SPLAYS

All remedial and terminal works to trees, as specified, are to be carried out in accordance with BS 3998:2010 (Tree work recommendations) (Appendix 5).

D.4 PROPOSALS FOR TREES TO BE RETAINED

1. All works will follow the method statement provided (Appendix 3).

2. Groups G13, G13.5 and G15 are growing on the edge of the southern boundary of the site and will be retained as part of the contiguous wildlife corridor being created around the periphery. Group G13 comprises early mature aspen *Populus tremula* natural regeneration and recruitment on both sides of the boundary fence. Other species present within the group are sycamore, wild cherry, silver birch and white poplar *Populus alba.*

3. Natural recruits less than a diameter of 150mm will be removed from the edge of the contiguous woodland belt formed by G13, G13.5 and G15 and a mandatory 2.5m wide fenced tree protection buffer will be imposed along the edge of the significant tree-line (appendix 2).

4. For the trees that are being retained, protection measures and barriers need to be installed prior to the development, either around the root protection areas of each of the trees or around each group of trees as illustrated in figure 3 (Appendix 1).

FIGURE 2H: GROUP G13, G13.5 ILLUSTRATING THE NATURAL RECRUITS AND THE SIGNIFICANT TREELINE

5. These barriers will need to be maintained for the duration of the development period, with the CEZ strictly enforced by the site manager.

6. The CEZ must be enclosed at the ends, to prevent incursion into the RPAs of the retained trees, to prevent root compaction and any other long term structural damage.

7. To prevent early damage to tree roots, following implementation of CEZs, a 6" layer of coarse chippings (mulch) should be spread over the root protection areas at the access/tree root conflict points around the site. This should be covered with an industrial geotextile layer which will need to be fixed in position with steel pegs. Steel sheets (preferably perforated to allow for drainage and for the roots to function normally) of a grade to be able to resist damage to the geotextile layer by heavy plant entering the site, should be fixed within these areas.

8. A 1m wide acoustic bund will be installed along the western boundary. This combined with clear rooting areas provided by the gardens to the rear of this section will provide sufficient rooting medium for the trees as they reach maturity. On commencement of the remediation process, the concrete adjoining the group G26 (see figure 2I below) will be stripped and backfilled with topsoil, as per the proposed remediation process. A construction exclusion zone will be installed as illustrated in figure 3 to prevent further damage to the existing root plates.

FIGURE 2I: GROUP G26 ON THE WESTERN BOUNDARY

- **Mitigation measures, such as root protection barriers are to be checked by the project Arborist prior to commencement of demolition or construction works.**

APPENDIX 1. TREE REMOVAL PLAN

The figure below illustrates the locations of surveyed trees and tree groups around the site with estimated root plate areas in relation to the proposed development including tree groups to be lost.

FIGURE 3 – TREE REMOVAL PLAN (FULL SCALE A1 PLAN AT THE END OF THE DOCUMENT)

APPENDIX 2. TREE PROTECTION PLAN.

FIGURE 4 – TREE PROTECTION PLAN (FULL SCALE A1 PLAN AT THE END OF THE DOCUMENT).

APPENDIX 3.ARBORICULTURAL IMPLICATIONS ASSESSMENT (AIA)

A3.iKey

Key to AIA schedule		
St dia. (mm)	Stem diameter, 1.5m from the adjacent ground level	
Cr Rad. (m)	Estimated crown radius (m) using the cardinal compass points (N, E, S, W)	
Cr. Clearance (m)	Crown clearance measured from the lowest point to the ground	
Est cont (years)	Estimated remaining contribution/ safe use life expectancy (SULE)	
Rad RPA (m²)	Radial root protection area measured from the centre of the tree	
RPA Radius (m)	An arbitrary calculation 12 x the stem diameter at 1.5m from the adjacent ground level	
RP (Months)	Reinspection period	
Time frame	Timing of proposed works (Nwr = No work required)	
Condition	**P**	Physiological: Poor – Significant weakness Fair – Symptoms of ill health can be remediated Good – no significant health problems
	S	Structural: Poor - Significant weakness Fair – Symptoms of weakness that can be remediated Good – 'Normal' Structure
BS Cat	**British Standard 5837:2012 tree quality category of retention.**	
	A1	High arboricultural quality and value with a SULE of >40 years
	A2	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features
	A3	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)
	B1	**Mainly arboricultural qualities**. Those of moderate arboricultural quality and value with a remaining life expectancy of >20 years
	B2	**Mainly landscape qualities**- Trees present in numbers, usually as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality.
	B3	**Mainly cultural values, including conservation** – Trees with material conservation or other cultural value
	C1	**Mainly arboricultural qualities**. Those of low arboricultural quality and value with a remaining life expectancy of >10years or young trees with a stem Ø below 150mm.
	C2	**Mainly landscape qualities**- Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and/or trees offering low or only temporary/ transient landscape benefits.
	C3	Trees with no material **conservation or cultural** value
	U	Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years
Phenological stage	**D**	Dormant
	B	Bud
	L	In leaf
	F	Flowering
	Fr	Fruiting
	LD	Leaf drop
Age class	**NP**	Newly planted
	Y	Young
	SM	Semi-mature (1st /3rd of life expectancy)
	EM	Early mature (2nd /3rd of life expectancy)
	M	Mature (final 3rd of life expectancy)
	OM	Over mature (beyond life expectancy / declining naturally
	V	Veteran (of great age and potential conservation value)

TABLE 1 – TREES TO BE RETAINED

Tree ref. No.	English Name	Scientific Name	Height (m)	St dia. at 1.5m (mm)	Stems (no.)	Cr Rad.(m) N	Cr Rad.(m)E	Cr Rad.(m) S	Cr Rad.(m) W	Cr. Clearance (m)	Age (yrs)	SULE	Condition	Comments	Management recommendations	Rad RPA (m2)	RPA Radius (m)	BS cat
T1	**Swedish Whitebeam**	***Sorbus x intermedia***	8	300	1	3	3	3	3	3	Mature	20+	Fair	Damage to surface roots. Leaning to the west.	No work required (outside the site boundary)	3.60	40.72	**B1**
T2	**Swedish Whitebeam**	***Sorbus x intermedia***	8	460	1	5	4	4	5	4	Mature	20+	Good	Within planting pit	Nwr (outside the site boundary)	5.52	95.74	**B1**
T3	**Swedish Whitebeam**	***Sorbus x intermedia***	8	390	1	5	5	5	4	4	Mature	20+	Good	Within planting pit	Nwr (outside the site boundary)	4.68	68.82	**B1**
T4	**Swedish Whitebeam**	***Sorbus x intermedia***	8.5	480	1	5	4	4	4	4	Mature	20+	Fair	Leaning to the east. Wound on main stem.	Nwr (outside the site boundary)	5.76	104.24	**B1**
T5	**Swedish Whitebeam**	***Sorbus x intermedia***	8	490	1	5	5	5	4	4	Mature	20+	Fair	Co-dominant stems at 2m	Nwr (outside the site boundary)	5.88	108.63	**B1**
T9	**Swedish Whitebeam**	***Sorbus x intermedia***	3.5	340	1	4	4	4	2	4	Mature	10+	Poor	Within planting pit. Bark necrosis,	Nwr (outside the site boundary)	4.08	52.30	**C1**

													poor crown growth possibly infected with a bacterial canker.				
T10	**Swedish Whitebeam**	***Sorbus x intermedia***	8	350	1	4	4	4	4	4	Mature	20+	Fair	Leaning to the east. Cavity developing at the base behind wound.	Nwr (outside the site boundary)	4.20	55.42	**B1**
T11	**Swedish Whitebeam**	***Sorbus x intermedia***	8	410	1	4	3	4	4	4	Mature	20+	Fair	Leaning to the east	Nwr (outside the site boundary)	4.92	76.06	**B1**
T12	**Swedish Whitebeam**	***Sorbus x intermedia***	8	400	1	5	4	4	4	4	Mature	20+	Fair	Leaning to the east. Wounds on the butt	Nwr (outside the site boundary)	4.80	72.39	**B1**
T13	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	400	1	4	4	4	4	4	Mature	20+	Good	Sweep in the main stem.	Nwr (outside the site boundary)	4.80	72.39	**B1**
T14	**Swedish Whitebeam**	***Sorbus x intermedia***	7	400	1	4	4	4	3	4	Mature	20+	Good		Nwr (outside the site boundary)	4.80	72.39	**B1**
T15	**Swedish Whitebeam**	***Sorbus x intermedia***	8	400	1	4	3	5	4	4	Mature	20+	Fair	Wound at the base.	Nwr (outside the site boundary)	4.80	72.39	**B1**

T16	**Swedish Whitebeam**	***Sorbus x intermedia***	8	420	1	4	4	5	3	4	Mature	20+	Good		Nwr (outside the site boundary)	5.04	79.81	**B1**
T17	**Swedish Whitebeam**	***Sorbus x intermedia***	8	400	1	4	4	4	4	4	Mature	20+	Fair	Wound on the main stem, partially occluded.	Nwr (outside the site boundary)	4.80	72.39	**B1**
T18	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	420	1	4	4	5	4	4	Mature	20+	Good		Nwr (outside the site boundary)	5.04	79.81	**B1**
T19	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	380	1	4	3	4	4	4	Mature	20+	Good	Within a planting pit	Nwr (outside the site boundary)	4.56	65.33	**B1**
T20	**Swedish Whitebeam**	***Sorbus x intermedia***	8.5	480	1	4	4	4	4	4	Mature	20+	Good	Within planting pit	Nwr (outside the site boundary)	5.76	104.24	**B1**
T22	**Swedish Whitebeam**	***Sorbus x intermedia***	8	470	1	4	4	4	4	4	Mature	20+	Fair	Wound on the main stem partially occluded.	Nwr (outside the site boundary)	5.64	99.95	**B1**
T23	**Swedish Whitebeam**	***Sorbus x intermedia***	8	430	1	4	4	4	3	4	Mature	20+	Good		Nwr (outside the site boundary)	5.16	83.66	**B1**
T24	**Swedish Whitebeam**	***Sorbus x intermedia***	7	360	1	3	4	4	2	4	Mature	20+	Fair	Leaning heavily to the east.	Nwr (outside the site boundary)	4.32	58.64	**B1**

T25	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	420	1	4	3	4	3	4	Mature	20+	Good		Nwr (outside the site boundary)	5.04	79.81	**B1**
T26	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	440	1	4	4	4	4	4	Mature	20+	Good	Within planting pit	Nwr (outside the site boundary)	5.28	87.59	**B1**
T27	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	400	1	5	1	5	4	4	Mature	20+	Fair	Wound at the base, partially occluded.	Nwr (outside the site boundary)	4.80	72.39	**B1**
T28	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	410	1	4	4	4	3	4	Mature	20+	Good		Nwr (outside the site boundary)	4.92	76.06	**B1**
T29	**Swedish Whitebeam**	***Sorbus x intermedia***	7	400	1	4	3	4	3	3	Mature	20+	Good		Nwr (outside the site boundary)	4.80	72.39	**B1**
T30	**Swedish Whitebeam**	***Sorbus x intermedia***	7	370	1	4	4	4	3	4	Mature	20+	Fair	Leaning to the east. Wound on the main stem partially occluded.	Nwr (outside the site boundary)	4.44	61.94	**B1**
T31	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	420	1	5	4	5	5	4	Mature	20+	Good		Nwr (outside the site boundary)	5.04	79.81	**B1**
T32	**Swedish Whitebeam**	***Sorbus x intermedia***	8	450	1	5	4	4	4	4	Mature	20+	Good	Within planting pit	Nwr (outside the site boundary)	5.40	91.62	**B1**

T55	**Sycamore**	***Acer pseudoplatanus***	7	130	1	2	2	2	2	1	Young	20+	Good		Nwr (on site boundary)	1.56	7.65	**C1**
T56	**Sycamore**	***Acer pseudoplatanus***	7	150	1	3	3	2	2	1	Young	20+	Good		Nwr (on site boundary)	1.80	10.18	**C1**
T57/ 397	**Norway Maple**	***Acer platanoides***	12	398	1	4	4	4	2	1	Semi Mature	20+	Crown lift to first union at three metres.	Good	N/A	4.78	71.79	**B1**
T58/ 398	**Norway Maple**	***Acer platanoides***	12	357	1	4	3	5	3	1	Semi Mature	20+	Crown lift to three metres.	Good	N/A	4.28	57.56	**B1**
T59/ 399	**Swedish Whitebeam**	***Sorbus intermedia***	11	316	1	5	3	4	3	2	Semi Mature	20+	N/A	Good	Nwr	3.79	45.13	**B1**
T60/ 400	**Swedish Whitebeam**	***Sorbus intermedia***	10	398	1		5	5	3	2	Semi Mature	20+	N/A	Good	Nwr	4.78	71.79	**B1**
T61/ 501	**Swedish Whitebeam**	***Sorbus intermedia***	10	318	1	2	2	4	4	2	Semi Mature	20+	N/A	Good	Nwr.	3.82	45.85	**B1**
T62/ 502	**Wild Cherry**	***Prunus avium***	7	270	1	5	3	4	4	2	Semi Mature	20+	N/A	Good	Nwr	3.24	32.98	**B1**

T65/ 505	**Sycamore**	***Acer pseudoplatanus***	12	288	1	5	7	2	2	3	Semi Mature	20+	N/A	Good	Nwr.	3.46	37.61	**B1**
T66/ 506	**Sycamore**	***Acer pseudoplatanus***	12	323	1	5	5	1	4	3	Semi Mature	20+	N/A	Good	Nwr.	3.88	47.30	**B1**
T67/ 507	**Sycamore**	***Acer pseudoplatanus***	13	325	1	3	7	4	3	3	Semi Mature	20+	N/A	Good	Nwr.	3.90	47.79	**B1**
T68/ 508	**Sycamore**	***Acer pseudoplatanus***	13	324	1	4	2	4	3	5	Semi Mature	20+	N/A	Good	Nwr.	3.89	47.55	**B1**
T69/ 509	**Sycamore**	***Acer pseudoplatanus***	13	395	1	1	3	4	5	3	Semi Mature	20+	N/A	Good	Nwr.	4.74	70.59	**B1**
T70/ 510	**Sycamore**	***Acer pseudoplatanus***	14	400	1	2	5	6	5	3	Semi Mature	20+	N/A	Good	Nwr.	4.80	72.39	**B1**

TABLE 2– TREES TO BE REMOVED

Tree ref. No.	English Name	Scientific Name	Height (m)	St dia. at 1.5m (mm)	Stems (no.)	Cr Rad.(m) N	Cr Rad.(m)E	Cr Rad.(m) S	Cr Rad.(m) W	Cr. Clearance (m)	Age (yrs)	SULE	Condition	Comments	Management recommendations	Rad RPA (m2)	RPA Radius (m)	BS cat
T5	**Swedish Whitebeam**	***Sorbus x intermedia***	8	490	1	5	5	5	4	4	Mature	20+	Fair	Co-dominant stems at 2m	Fell to ground level and remove to facilitate visibility splays	5.88	108.63	**U**
T6	**Sweet Chestnut**	***Castanea sativa***	3.5	80	1	2	2	1	1	1	Young	40+	Good		Fell to ground level and remove to facilitate visibility splays	0.96	2.90	**U**
T7	**Swedish Whitebeam**	***Sorbus x intermedia***	7.5	420	1	4	4	4	4	4	Mature	20+	Good	Within planting pit	Fell to ground level and remove to facilitate visibility splays	5.04	79.81	**U**
T8	**Swedish Whitebeam**	***Sorbus x intermedia***	8	420	1	5	4	4	4	4	Mature	10+	Fair	Sweep in stem. Cavity developing at the base on the road side.	Fell to ground level and remove to facilitate visibility splays	5.04	79.81	**U**
T9	**Swedish Whitebeam**	***Sorbus x intermedia***	3.5	340	1	4	4	4	2	4	Mature	10+	Poor	Within planting pit. Bark necrosis, poor crown growth possibly infected with	Fell to ground level and remove to facilitate visibility splays	4.08	52.30	**U**

													a bacterial canker.				
T21	**Swedish Whitebeam**	***Sorbus x intermedia***	8	460	1	4	4	5	4	4	Mature	20+	Fair	Wound at the base partially occluded.	Fell to ground level and remove to facilitate visibility splays	5.52	95.74	**U**
T22	**Swedish Whitebeam**	***Sorbus x intermedia***	8	470	1	4	4	4	4	4	Mature	20+	Fair	Wound on the main stem partially occluded	Fell to ground level and remove to facilitate visibility splays	5.64	99.95	**U**
T23	**Swedish Whitebeam**	***Sorbus x intermedia***	8	430	1	4	4	4	3	4	Mature	20+	Good		Fell to ground level and remove to facilitate visibility splays	5.16	83.66	**U**
T24	**Swedish Whitebeam**	***Sorbus x intermedia***	7	360	1	3	4	4	2	4	Mature	20+	Fair	Leaning heavily to the east.	Fell to ground level and remove to facilitate visibility splays	4.32	58.64	**U**
T33	**Sycamore**	***Acer pseudoplatanus***	8	170	1	5	2	3	5	2	Young	40+	Fair	Within TPO group 13. Leaning growth.	Fell to ground level and remove	2.04	13.08	**U**
T34	**Wild Cherry**	***Prunus avium***	6.5	110	1	1	1	1	1	3	Young	40+	Good	Within TPO group 13.	Fell to ground level and remove	1.32	5.47	**U**
T35	**Swedish Whitebeam**	***Sorbus x intermedia***	6.5	350	5	5	3	4	5	1	Mature	20+	Fair	Within TPO group 13.	Fell to ground level and remove	9.40	277.63	**U**

T36	**Swedish Whitebeam**	***Sorbus x intermedia***	6.5	270	5	4	3	4	3	1	Early Mature	40+	Good	Within TPO group 13.	Fell to ground level and remove	7.25	165.15	**U**
T37	**Swedish Whitebeam**	***Sorbus x intermedia***	7	240	1	3	1	3	3	2	Early Mature	40+	Good	Within TPO group 13.	Fell to ground level and remove	2.88	26.06	**U**
T38	**Swedish Whitebeam**	***Sorbus x intermedia***	7	300	5	3	4	3	3	1	Early Mature	40+	Good	Within TPO group 13. Co-dominant stems from the base.	Fell to ground level and remove	8.05	203.61	**U**
T39	**Swedish Whitebeam**	***Sorbus x intermedia***	7	430	5	4	4	4	4	2	Early Mature	40+	Good	Within TPO group 13. Co-dominant stems at the base.	Fell to ground level and remove	11.54	418.43	**U**
T40	**Green alder**	***Alnus viridis***	7	210	1	4	4	4	3	1	Mature	40+	Good	Within TPO group 13.	Fell to ground level and remove	2.52	19.95	**U**
T41	**Swedish Whitebeam**	***Sorbus x intermedia***	7	560	5	5	5	5	3	1	Mature	40+	Good	Within TPO group 13. Multi-stemmed	Fell to ground level and remove	15.00	706.95	**U**
T42	**Birch sp.**	***Betula sp.***	6	90	1	2	1	1	1	1	Young	20+	Good	Within TPO group 13.	Fell to ground level and remove	1.08	3.66	**U**
T43	**Birch sp.**	***Betula sp.***	4.5	70	1	2	1	1	1	1	Young	20+	Good	Within TPO group 13.	Fell to ground level and remove	0.84	2.22	**U**

T44	**Goat Willow**	***Salix caprea***	10	650	5	6	6	3	6	1	Mature	20+	Good	Within TPO group 13. Multiple stems with included bark unions.	Fell to ground level and remove	15.00	706.95	**U**
T45	**Goat Willow**	***Salix caprea***	10	540	5	2	6	6	6	1	Mature	20+	Good	Within TPO group 13. Multiple stems include included bark unions.	Fell to ground level and remove	14.48	658.78	**U**
T46	**Swedish Whitebeam**	***Sorbus x intermedia***	4.5	150	1	3	2	2	2	1	Early Mature	20+	Good	Within TPO group 13. Supressed form possibly due to damage caused during the site demolition.	Fell to ground level and remove	1.80	10.18	**U**
T47	**Swedish Whitebeam**	***Sorbus x intermedia***	5.5	270	1	4	4	4	4	2	Early Mature	20+	Good	Within TPO group 13. Multi-stemmed.	Fell to ground level and remove	3.24	32.98	**U**
T48	**Swedish Whitebeam**	***Sorbus x intermedia***	5	200	5	3	3	1	3	2	Early Mature	10+	Poor	Within TPO group 13. Damage to root bole due to surrounding demolition.	Fell to ground level and remove	5.36	90.27	**U**
T49	**Swedish Whitebeam**	***Sorbus x intermedia***	5.5	240	1	4	4	1	4	2	Early Mature	10+	Poor	Within TPO group 13. Damage to base of main stem.	Fell to ground level and remove	2.88	26.06	**U**

T50	**Swedish Whitebeam**	***Sorbus x intermedia***	5.5	270	5	1	4	4	3	2	Early Mature	20+	Good	Within TPO group 13.	Fell to ground level and remove	7.25	165.15	**U**
T51	**Swedish Whitebeam**	***Sorbus x intermedia***	5.5	260	5	4	4	4	3	1	Early Mature	20+	Good		Fell to ground level and remove	6.97	152.64	**U**
T52	**Swedish Whitebeam**	***Sorbus x intermedia***	4.5	240	5	4	2	3	2	1	Semi Mature	20+	Good	Multi-stemmed at the base.	Fell to ground level and remove	6.44	130.31	**U**
T53	**Birch sp.**	***Betula sp.***	14	280	1	4	4	4	4	1	Mature	20+	Good		Fell to ground level and remove	3.36	35.47	**U**
T54	**Swedish Whitebeam**	***Sorbus x intermedia***	5	180	1	4	2	3	2	2	Semi Mature	20+	Good		Fell to ground level and remove	2.16	14.66	**U**
T63/ 503	**Western Balsam Poplar**	***Populus trichocarpa***	18	500	1	5	5	5	3	4	Early Mature	<10	Evidence of root heave with a lean to the south.	Fair	Fell to ground level and replace. Low quality trees with a short use life expectancy. 3 months.	6.00	113.11	**U**
T64/ 504	**Western Balsam Poplar**	***Populus trichocarpa***	18	420	1	3	3	5	3	2	Early Mature	<10	Root heave on Northern side.	Fair	Fell to ground level and replace. Low quality trees with a short use life expectancy. 3 months.	5.04	79.81	**U**

TABLE 3– TREE GROUPS TO BE RETAINED	
GROUP REFERENCE (TPO GROUP REF) AND BS CATEGORY	**DESCRIPTION AND SULE (YEARS)**
1(2) A2	Original landscape feature planted upon an earthen bund with contiguous crowns. Individual early mature trees have minor defects, but generally are all in good condition. Species present: Norway maple *Acer platanoides,* Swedish whitebeam *Sorbus x intermedia,* wild cherry *Prunus avium,* balsam poplar *Populus balsamifera,* sycamore *Acer pseudoplatanus* and rowan *Sorbus acuparia.* Overall SULE: 20+ .
13/B2	Early mature Aspen natural regeneration and recruitment on both sides of the boundary fence. Other species present within the group are sycamore, wild cherry, silver birch and white poplar *Populus alba.* There is a small cotoneaster hedge associated with this group. Overall SULE 20+
15/B2	Linear belt of semi-mature trees mainly outside the site boundary. Species present include: silver birch, sycamore, field maple *Acer campestre,* hazel *Corylus avellana,* green alder *Alnus viridis,* Swedish whitebeam and European larch *Larix x europaea.* Overall SULE 20+.
17(1)U	Linear belt of young to mature trees located alongside and outside the boundary fence. Species present include: sycamore, balsam poplar, silver birch, goat willow, Swedish whitebeam, common willow, hawthorn, cypress spp. and rowan. Overall SULE 20+
26/B2	Linear group of trees growing to the west of the boundary fence, lining the railway. Dominant species is balsam poplar in a variable condition. Other species present include sycamore, elder, Scots pine *Pinus sylvestris,* black pine *Pinus nigra,* Norway maple, English oak, hybrid black poplar *Populus nigra var.* and white poplar. Overall SULE 20+.

TABLE 4 – TREE GROUPS TO BE REMOVED	
GROUP REFERENCE (TPO GROUP REF) AND BS CATEGORY	PROPOSED WORKS
2(3)U	Remove group to facilitate the construction of the proposed development
3(5)U	Remove group to facilitate the construction of the proposed development
4/U	Remove group to facilitate the construction of the proposed development
5(4)U	Remove group to facilitate the construction of the proposed development
6(4)U	Remove group to facilitate the construction of the proposed development
7(5)U	Remove group to facilitate the construction of the proposed development
8(6)U	Remove group to facilitate the construction of the proposed development
9(7)U	Remove group to facilitate the construction of the proposed development
10U	Remove group to facilitate the construction of the proposed development
11(9)U	Remove group to facilitate the construction of the proposed development
12(8)U	Remove group to facilitate the construction of the proposed development
14/U	Remove group to facilitate the construction of the proposed development
16(10)U	Remove group to facilitate the construction of the proposed development
18(13)U	Remove group to facilitate the construction of the proposed development
19(12)U	Remove group to facilitate the construction of the proposed development
20/U	Remove group to facilitate the construction of the proposed development
21/U	Remove group to facilitate the construction of the proposed development
22/U	Remove group to facilitate the construction of the proposed development
23(11)U	Remove group to facilitate the construction of the proposed development
24(11)U	Remove group to facilitate the construction of the proposed development
25(11)U	Remove group to facilitate the construction of the proposed development

APPENDIX 4.ARBORICULTURAL METHOD STATEMENT: 2017

This Arboricultural Method Statement (AMS) explains how and when protection measures for retained trees should be maintained and how they should be maintained for the duration of the development period.

A hard copy of this report must be permanently available on the site during the development period to:

- Illustrate to site staff the active advisory and supervisory role of the consultant arboriculturalist within the development process.
- Correctly identify protection measures for specific trees as numbered on site and as detailed within this plan.
- Ensure that any works prescribed within this plan are carried out correctly, systematically and within the timeframe specified.
- Allow the site team to use the document as a practical guide on how to effectively protect and minimise impacts on trees and site soft landscaping.

Tree protection and phased tree management programme

The following systematic process will ensure that trees are adequately protected for the full duration of the development period and continue to contribute to the site long after the development has been completed.

1. Pre-commencement consultation and if necessary site meeting with the planning team.
2. Tree works (felling/ pruning) as prescribed within this plan are carried out to specified trees.
3. Installation of construction exclusion zones and root protection barriers.
4. Inspection of the positioning of barriers by project arboriculturalist.
5. If required, installation of cellular confinement systems or root protection measures in high impact zones.
6. Installation of new services/ upgrading of existing services within the existing root structure using conventional soil displacement, Ground Penetrating Radar (GPR) or directional thrust-boring.
7. Mid-term inspection by the project arboriculturalist to ensure that protective measures are still in place.
8. On completion of the development removal of temporary protective measures.
9. Tree planting and landscaping mitigation.
10. Post development monitoring if required.

Phased tree management and impact mitigation programme.
This is a dynamic document which should be signed off on completion of each phase, as evidence that the work was completed to the correct standard, to minimise residual impacts on trees.

Phase	Action	Input of Arboricultural consultant	Date completed
1 Pre-commencement of any works that would impact on trees	• Pre-commencement meeting between site planning team and project arboriculturalist. • There may be a requirement for a further meeting with the LPA tree officer to discuss site mitigation and tree loss due to the presence of protected trees within the site.	• Liaise with LPA tree officer. Discuss whether a site meeting is necessary. • Discuss the design and locations of site tree protection measures. • Discuss details of and the extent of tree management (pruning, crown lifting, bracing etc.). • Ensure correct tree protection measures will be put in place and agree a time frame. • Identify construction exclusion zones, and specific treatments which may be required for tree impact zones (cellular confinement, no-dig areas, thrust-bored services, GPR etc.).	
2 During works to trees; prior to construction site setup.	• Remedial tree management works by an experienced contractor. • Erection of CEZ fencing • Installation of root protection measures in high impact zones • Establish access routes for plant machinery and equipment/ plant holding areas.	• Liaise with site manager prior to commencement of works. • Liaise if necessary on site with arboricultural contractor to review tree works. • Liaise with demolition contractor regarding protected trees. • Check and photograph CEZ fencing and root impact zones	
3 Post demolition and during hard	• Installation of root protection measures/ cellular confinement/ Cellweb if required. • Installation of new services	• Pre-works meeting with relevant contactors • Supervise soil displacement measures if necessary	

and soft landscaping phase		for new subterranean construction. • Photograph various stages.	
4 Following completion of development	• Removal of CEZ protective fencing • Tree planting	• Ensure fences are removed only once site operations have completely ceased • Check condition and tree species being planted • Liaise with contractor regarding planting methodology, protection measures and post planting monitoring/ management.	

The precise order and timing of some of these operations may change due to site operating requirements, but all operations that can affect trees will remain under arboricultural supervision.

Construction Exclusion Zones

General

- All trees which are being retained on site should be protected by barriers and or ground protection as specified within this report (Figure 4). Correct dimensions for the positioning of root protection fencing are included within the AIA (Appendix 2) and stated in metres as the RPA radius (as approximately 12 times the diameter of the tree measured at 1.5m from ground level).
- Vertical barriers should be erected and ground protection installed before any materials or machinery are brought onto the site and before any demolition, development or stripping of soil commences.
- Areas of new or retained structure planting should be similarly protected, based on the extent of the soft landscaping as shown on the approved drawings. Once erected, barriers and ground protection should be regarded as sacrosanct, and should not be removed or altered without prior recommendation by an arboriculturalist and approval of the local planning authority.
- In the case of particularly vulnerable trees or trees sited close to the construction access, the owner or developer should make arrangements for an arboriculturist to supervise necessary works and the erection of protection before the handover of land to the contractor. Pre-development tree work may be undertaken before the installation of tree protection, where required, with the agreement of the local planning authority.

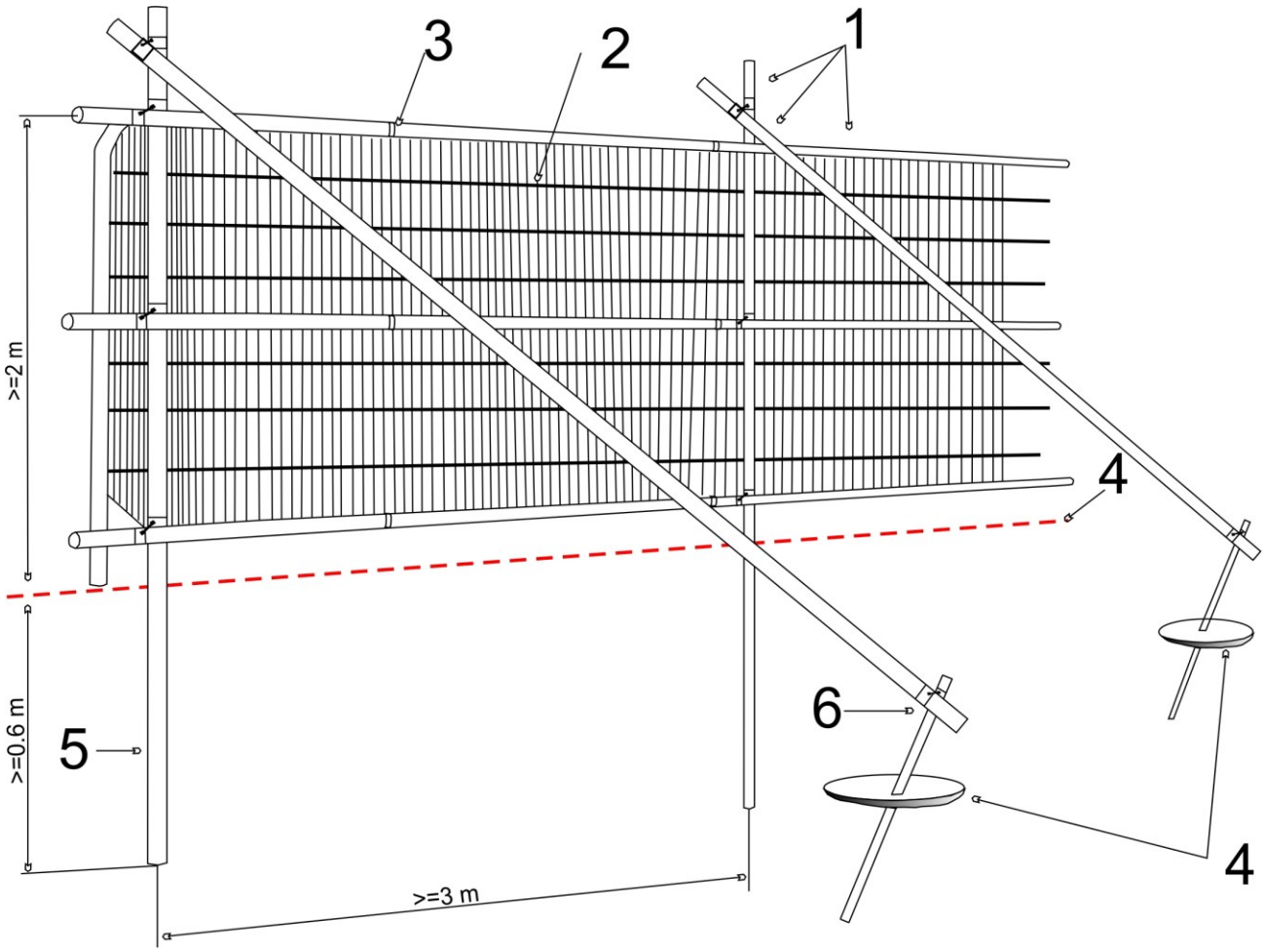
Barriers

- Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). On all sites, special attention should be paid to ensuring that barriers remain rigid and complete.
- In most cases, barriers should consist of a scaffold framework in accordance with Figure 4 and 5 (below) comprising a vertical and horizontal framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3m. Onto this, Weldmesh panels should be securely fixed with wire or scaffold clamps. Weldmesh panels on rubber or concrete feet are not resistant to impact and should not be used.
- NOTE: The above is preferred because it is readily available, resistant to impact, can be re-used and enables inspection of the protected area.

Ground protection

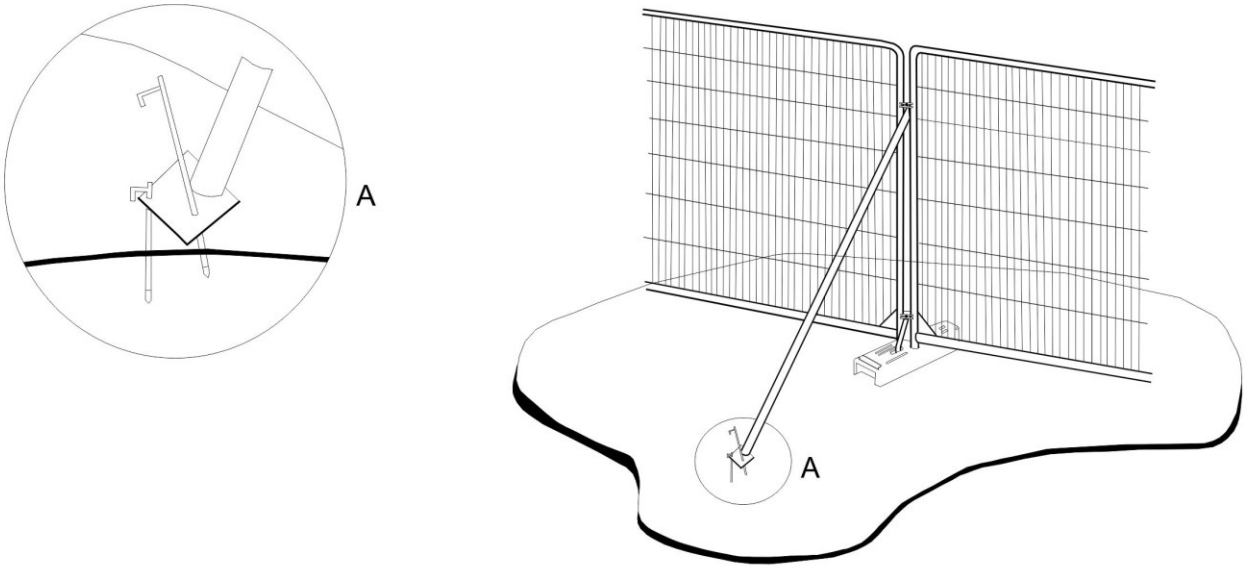
- The position of the barrier may be shown within the RPA at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the RPA should be protected with ground protection. For pedestrian movements within the RPA the installation of ground protection in the form of a single thickness of scaffold boards on top of a compressible layer laid onto a geotextile, or supported by scaffold, may be acceptable (Figure 8).

Figure 4 - Default specification for protective barrier. 'Heras' fencing bolted/ wired to a supporting structure as illustrated is the most effective and robust method.

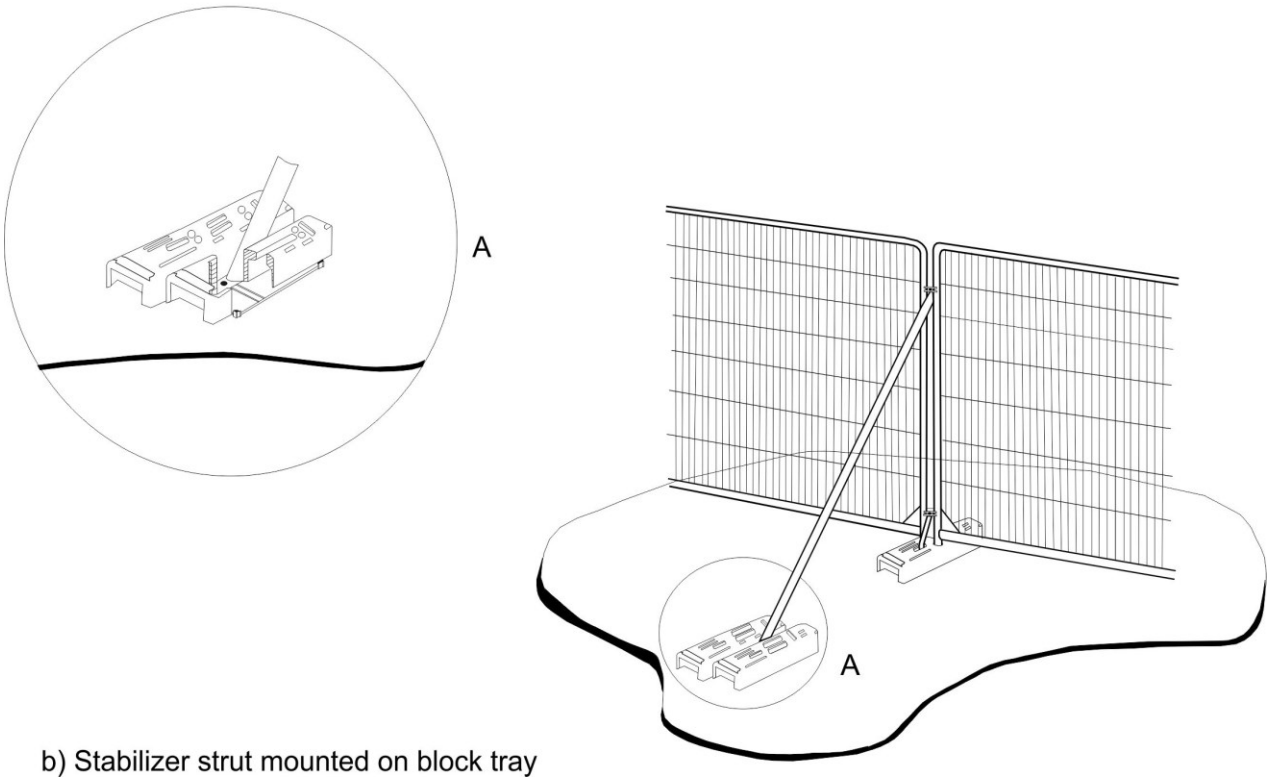


Key
1 Standard scaffold poles
2 Heavy gauge 2m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire tires
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 metres)
6 Standard scaffold clamps

Figure 5 - Examples of above ground stabilising systems.



a) Stabilizer strut with base plate secured with ground pins



b) Stabilizer strut mounted on block tray

Figures 6 & 7: Examples of tree protection signage to be permanently attached to the root protection fence.

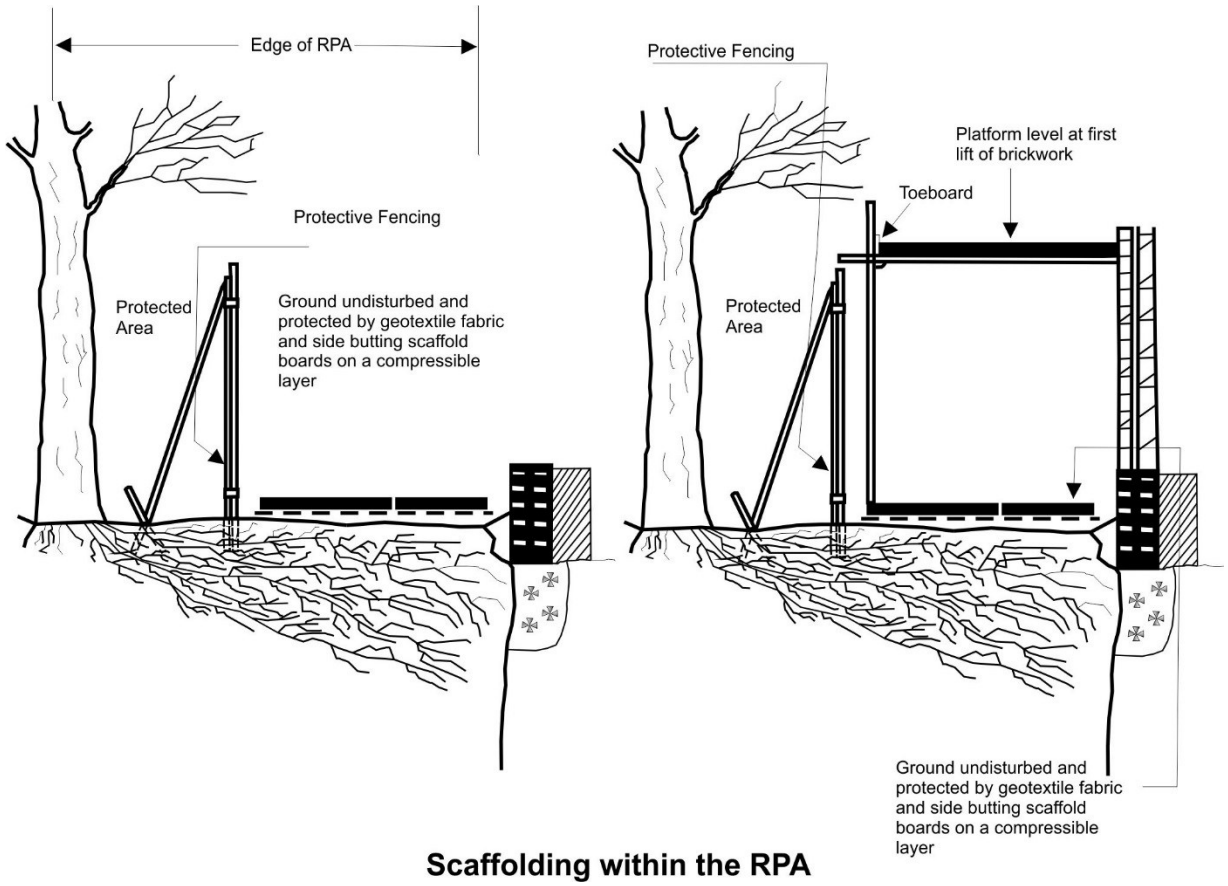


Figure 8- Use of scaffolding within the RPA

Additional precautions outside the exclusion zone

- Once the exclusion zone has been protected by barriers and/or ground protection, construction work can commence. All-weather notices should be erected on the barrier with words such as (see figures+ 6 & 7):

"Construction exclusion zone — Keep out".

In addition the following should be addressed or avoided:

- Care should be taken when planning site operations to ensure that wide or tall loads, or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to them and might make their safe retention impossible.
- Consequently, any transit or traverse of plant in close proximity to trees should be conducted under the supervision of a banksman to ensure that adequate clearance from trees is maintained at all times. In some circumstances it may be impossible to maintain adequate clearance thus necessitating access facilitation pruning.
- Material which will contaminate the soil, e.g. concrete mixings, diesel oil and vehicle washings, should not be discharged within 10m of the tree stem.
- Fires should not be lit in a position where their flames can extend to within 5m of foliage, branches of trunk. This will depend on the size of the fire and the wind direction.
- Notice boards, telephone cables or other services should not be attached to any part of the tree.

- It is essential that allowance should be made for the slope of the ground so that damaging materials such as concrete washings, mortar or diesel oil cannot run towards trees.

Avoiding the damage of structures by trees

General

- Buildings should be constructed to allow for future growth of planted or self-sown trees.
- In some situations, trees and vegetation can adversely affect structures either by direct action, or by indirect action causing shrinkage or swelling of a clay subsoil.
- Even if no trees exist at the time of construction, they may be planted in the future or self-seeded. Consideration should be given to this possibility by having foundations in accordance with Table 5, which will allow for reasonable future vegetation, or to an engineered design.

Direct damage by trees to structures

Trees can cause direct damage to structures by:

a. The disruption of underground services and pipelines;
b. Displacement, lifting or distorting;
c. The impact of branches with the superstructure;
d. Structural failure of the tree.

The potential for direct damage should be taken into consideration throughout the design and construction process, as detailed below:

- The growth of the base of the stem or of roots near the surface exerts relatively small forces. Whilst paving slabs or low boundary walls can be lifted or pushed aside easily, heavier or stronger structures are more likely to withstand these forces without damage, as the root distorts around the obstruction before damage occurs. The greatest risk of direct damage occurs close to the tree from the incremental growth of the main stem and secondary thickening of the roots, and diminishes rapidly with distance.
- New tree planting should be kept at distances from structures of at least those in Table 3.
- In the case of established trees where construction work is to take place near to the main stem and roots, the following precautions should be taken to allow for future tree growth in order to protect the structure:

  a. Foundations should be reinforced to resist lateral thrust; or
  b. Walls or structural slabs should bridge over roots allowing sufficient clearance for secondary thickening or be designed to distort without cracking; or
  c. Pavings and other surfaces should be laid on a flexible base to allow movement and to facilitate relaying if distortion becomes excessive.

- Water leaking from damaged drains, sewers or water mains encourages localized root growth. Roots are then likely to enter a drain or sewer through the defect and proliferate, causing blockage and an enlarging of the initial defect. Provided they are further from trees than distances stipulated in Table 5, intact drains are not likely to suffer direct damage and will not attract roots. Damage to drains and sewers can be avoided by the following:

  a. Re-routing services to conform to Table 5;
  b. Ensuring watertight joints;

c. In clay soils, use of flexible materials and/or joints to accommodate movement;
d. Not using perforated land drains near trees.

- Allowance should be made for the swaying of stems and branches during storm conditions. Branches which are liable to strike the structure should be pruned back to a suitable branching point. Trees in a condition that renders them liable to collapse should not be retained near structures.

Type of structure	**Diameter of stem at 1.5m above ground level at maturity**		
	<30cm	**(30 – 60) cm**	**>60cm**
Buildings and heavily loaded structures		**0.5**	**1.2**
Lightly loaded structures such as garages, porches etc.		**0.7**	**1.5**
Drains and underground services **< 1m deep** **> 1m deep**	**0.5**	**1.5** **1.0**	**3.0** **2.0**
Masonry boundary walls*		**0.5** **(1.0)**	**1.0** **(2.0)**
In situ concrete paths and drives*	**-** **(0.5)**	**0.5** **(1.0)**	**1.5** **(2.5)**
Paths and drives with flexible surfaces or paving slabs*	**-** **(0.7)**	**0.5** **(1.5)**	**1.0** **(3.0)**
***These distances assume that some movement and minor damage might occur. Guidance on distances which will generally avoid all damage is given in brackets.**			

Table 5. Minimum distance (m) between young trees or new planting and structure to avoid direct damage to a structure from future tree growth.

Principles for avoiding tree root damage during construction

- Prior to the installation of a new ground surface, existing ground cover vegetation (e.g. grass sward) should be killed using an appropriate herbicide. Herbicides that can leach through the soil, e.g. products containing sodium chlorate, should not be used. Specialist advice should be sought in order to determine the most suitable herbicide treatment.
- The soil surface should not be skimmed to establish new paving or other surfaces at the former ground level. Loose organic matter and/or turf should be removed carefully using hand tools. The new surface should then be established above the former ground level, using a granular fill, where required.
- If ground levels are to be raised within the RPA this should be achieved by use of a granular material which does not inhibit vertical gaseous diffusion. Examples of suitable granular materials include, no-fines gravel, washed aggregate, or cobbles. Depending on the California Bearing Ratio (CBR) of the soil, it may be necessary to install a load suspension layer such as a cellular confinement system.
- In concentration carbon dioxide is detrimental to tree root function. Because this gas principally diffuses vertically through the soil, new impermeable surfacing within the RPA should be restricted to a maximum width of 3m and situated tangentially to one side of a tree only, or confined to an area no greater than 20% of the root protection area, whichever is the smaller.
- Any excavations which have to be undertaken within the root protection area should be carried out carefully by hand, avoiding damage to the protective bark covering larger roots. Roots, whilst exposed, should be wrapped in dry, clean hessian sacking to

prevent desiccation and to protect from rapid temperature changes. Roots smaller than 25mm diameter may be pruned back, preferably to a side branch, using a proprietary cutting tool such as bypass secateurs or handsaws. Roots larger than 25mm should only be severed following consultation with an arboriculturist, as they may be essential to the tree's health and stability. Prior to backfilling, any hessian wrapping should be removed and retained roots should be surrounded with sharp sand (builders' sand should not be used because of its high salt content which is toxic to tree roots), or other loose granular fill, before soil or other material is replaced. This material should be free of contaminants and other foreign objects potentially injurious to tree roots.

Provision for water and oxygen

- It is essential to maintain adequate supplies of water and oxygen for trees through the soil. Porosity is important particularly where the new hard surface covers an area of previously unmade ground, under which tree roots may have developed preferentially. New impermeable surfacing should not cover more than 20 % of the root protection area.
- No-fines granular materials should be used wherever fill or a sub-base is required to help to ensure adequate gaseous diffusion. Due to the need to avoid excavation, and thereby root severance, within the RPA such sub-bases should be formed using a cellular confinement system such as a load suspension layer laid at ground level.
- Excess water in the root protection area should be avoided, particularly on clay soils where water-logging can occur. In these cases, the hard surface should slope away from the tree to avoid ponding. Provided surface water is not liable to be contaminated by salt or toxic run-off from oil or petrol, a permeable surface should be employed. If contamination is likely to be a problem, an impermeable surface may be used to prevent entry of toxic material.
- If excess water is likely to be a problem, consideration should be given to the provision of suitable land drainage. Such drains should not be located within root protection areas.

Allowance for future growth

- Future growth can lift paths or distort light structures such as walls. Where such structures, including surfaces, are unavoidable near to trees, design and construction specification should take account of future growth.
- If it is necessary to build a wall or similar structure over a root greater than 50mm diameter, provision should be made for future diameter growth by surrounding the root with un-compacted sharp sand, void-formers, or other flexible fill materials, and by laying an adequately reinforced lintel or raft over the surface.

Foundations within the RPA

The insertion of structures within root protection areas may be justified if this allows the retention of a good quality tree (category A or B). However, it is essential that careful consideration is given to foundation design. In such cases, the use of traditional strip footings, in particular those constructed tangentially across the root zone, can result in severe damage to tree roots and should be avoided.

Root damage can be minimised by using a combination of the following:

- Piles or radial strip footings both of which should be located to avoid major tree roots;
- Beams, slabs, suspended floors, where all should be laid at or above ground level, and cantilevered as necessary to avoid tree roots.

In order to arrive at a suitable solution, site specific and specialist advice regarding foundation design should be sought from an arboriculturist and an engineer.

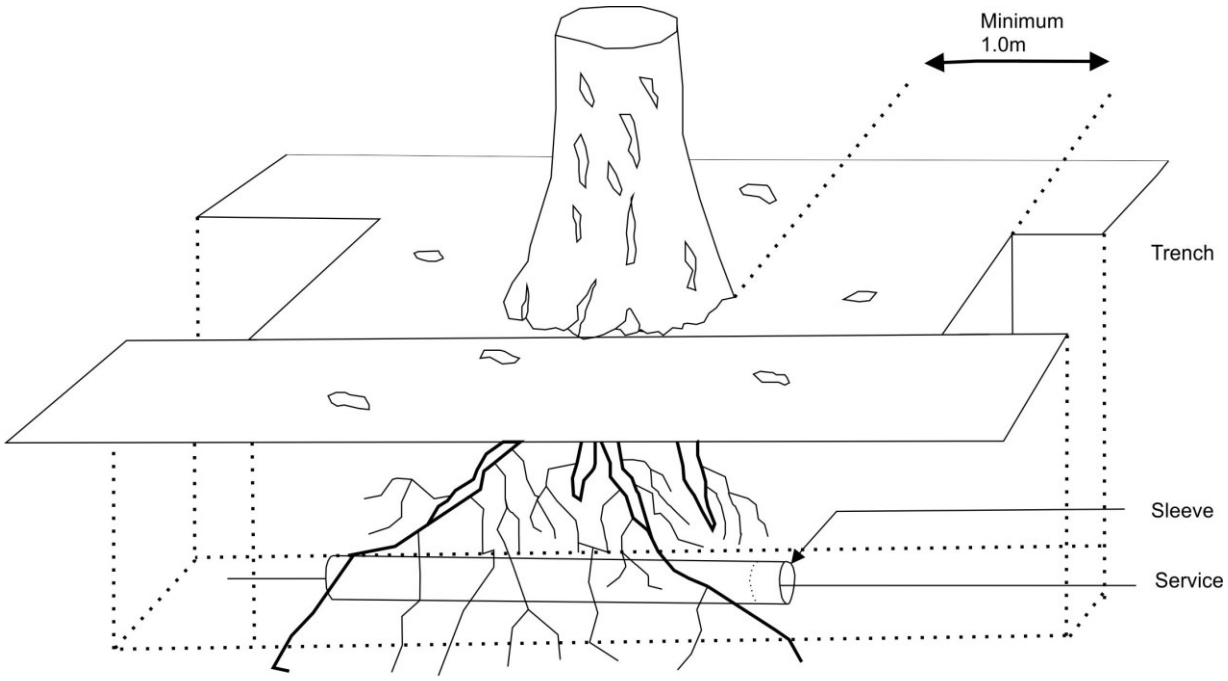
Where piling is to be installed near to trees, the smallest practical pile diameter should be used as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. The latter is particularly important where piling within the branch spread is proposed, as mini-rigs reduce the need for access facilitation pruning. Sheathed piles protect the soil and adjacent roots from the potential toxic effects of concrete.

Underground and above ground services

Trenching for the installation of underground services severs any roots present and may change the local soil hydrology in a way that adversely affects the health of the tree. For this reason particular care should be taken in the routing and methods of installation of all underground services. Wherever possible, they should be kept together and trenchless techniques used. At all times where services are to pass within the RPA, detailed plans showing the proposed routing should be drawn up in conjunction with an arboriculturist. Such plans should also show the levels and access space needed for installing the services and be accompanied by arboricultural method statements (AMS).

As an alternative to trenchless techniques, a possible solution is to hand excavate a narrow trench passing directly towards a tree along a radius to not closer than 1m from the trunk, tunnel straight beneath the tree, preferably not less than 750mm deep, and exit on the opposite side along another radius (see Figure 9). Provided the trench is kept as narrow as possible, the amount of root severance will be minimal, and will be far less than if a trench passes close beside the tree. It may be necessary to make provision to facilitate future servicing and repair without further damage to the tree roots.

Consideration should be given to the routing of above ground services in order to avoid the need for detrimental and repetitive pruning. In this regard the current and future crown size of the tree should be assessed. Tree branches can be pruned back with care to provide space.



Trenching along radii to minimise damage

Figure 9 Trenching in proximity to roots.

Low-invasive vehicular access in proximity to trees

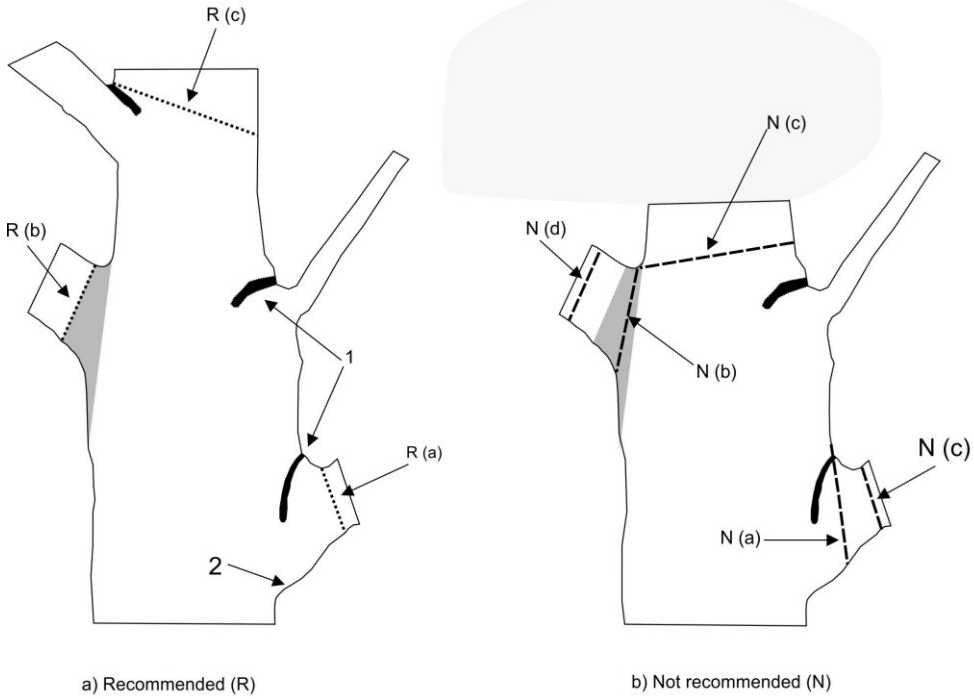
Where the construction of hard surface access cannot be avoided within the root protection area, a no-dig design should be used to avoid root loss due to excavation. In addition the structure of the hard surface should be designed to avoid localized compaction, by evenly distributing the carried weight over the track width and wheelbase of any vehicles that will use the access. Such designs might include the use of a three dimensional cellular confinement system as an integral component of the sub-base, to act as a load suspension layer. Driveways and roadways constructed according to this principle can be designed to be suitable for most types of traffic. Where this type of access is proposed, site-specific and specialist advice should be sought from an engineer and an arboriculturalist in order to ensure that it is fit for purpose.

APPENDIX 5.RECOMMENDATIONS FOR TREE WORK

(The following extracts are taken from the BS3998:2010: Tree work recommendations).

Pruning

- Pruning cuts should be made to trees being retained as specified above. Removal of sections of limbs before the final target cut at the branch bark ridge will prevent harmful 'tear-offs' down the stem, especially when pruning heavy branches back to the stem.



a) Recommended (R)

b) Not recommended (N)

Key

1	Branch bark ridges
2	Branch collar
R (a)	Cut where branch collar and branch bark ridge are apparent
R (b)	Cut where neither branch bark ridge nor branch collar are apparent
R (c)	Position for end-cut in crown reduction-maximum size of cut in relation to size of lateral branch
N (a)	Cut too close (removing the branch collar and cutting into the bark branch ridge)
N (b)	Cut too close (injuring parent stem in the crotch and too steeply angled)
N (c/d)	Cut too far out, leaving a stub (but see C.2, Note 2 for exceptions)
N (e)	Incorrect end cut (made beyond a branch that is too small, but see 7.2.4 regarding groups of branches, rather than one branch of a required size)

····· Recommended cut

– – – – Not recommended cut

Basal flare of the branch that does not show a distinct collar or ridge

NOTE The optimum position and angle of the end-cut cannot be exactly prescribed, as branch unions vary considerably in their formation

Figure 10 - Branch and target pruning.

- Figure 10. Indicates the correct methodology for branch and target pruning, where the degree of wounding should be controlled according to the ability of the species to react

defensively against wounding. Therefore in order to ensure that the potentially adverse effects of pruning are avoided as far as possible, the cross-sectional area of the cuts individually and in total should be minimized.

- Ideally the diameter of the final cut should generally not exceed one-third of that of the parent stem or branch. The maximum diameter of cuts should decline as the age of the tree increases to allow or a slower rate of wound occlusion.
- If a stem or branch union is to be shortened, the cut should be made distal to a union or group of unions where one or more healthy lateral branches bear enough foliage to sustain the parent stem or branch. If there is only one such union near the intended cut, the lateral branch should have as large a diameter as possible (i.e. at least one-third and preferable more than half that of the removed portion).

Table 6. Maximum recommended number of cuts, according to size, on a tree of stem-diameter 600mm.

Size of cut (Ømm).	Maximum recommended approximate number of cuts, for each size in the left hand column (on this basis, no cuts of any other size could be created)
50	48
100	12
150	5
200	3

Tree felling

Trees should only be felled if their removal or coppicing is assessed as providing the best solution in the circumstances. In making this assessment, account should be taken of:

1) The potential impact of exposing retained trees
2) The potential for indirect damage, e.g. to underground services or to built structures including archaeological features
3) The destabilization of slopes due to removal of support from the roots
4) The potential for direct damage caused by either tree felling or stump removal
5) The potential for tree failure

Consents might be required from the relevant authority before trees are felled; particularly for protected trees.

A tree should be felled in one piece only when there is no significant risk of damage to people, property or protected species. Where restrictions (e.g. lack of space, buildings, other features, land ownership or use, or other trees which are to be retained) cannot be overcome, trees should be dismantled in sections.

Stumps

If owing to its location, a stump is considered to be a significant trip hazard or source of a pathogen that could affect retained trees, it should be either removed or destroyed. If there is a delay between felling and stump removal, the stump should meanwhile be left in a condition that leaves the site safe. Destruction of the stump by burning is not recommended.
The reason for grinding the stump should be ascertained and the appropriate depth of operation agreed. Stump grinding should normally extend through the base of the stump leaving the major roots disconnected if the intention is to reduce the potential for the spread of honey fungus.
The grinding residue should be treated as arisings.

Note: mechanical destruction of the stump is less disruptive to the site than digging out

APPENDIX 6. GENERAL LEGISLATION

Trees and the law

General
Trees in any location may be protected by legislation. Where development is proposed, additional legal protection may be appropriate and can be enforced by the local authority. Attention is drawn to legal controls and liabilities under common law for consideration at the earliest stages of potential site development.

Legal protection for trees
The Town and Country Planning Act 1990 (as amended) and the Town and Country (Tree Preservation) (England) Regulations 2012 requires that, except in certain circumstances, "no work shall be carried out which will affect trees over a certain size which are situated in **conservation areas**". Six weeks' notice of intent has to be given to the local authority before the work is carried out. This provides an opportunity for the local authority to make a tree preservation order (TPO), under this Act, to protect the trees.

Under section 211 of the Act, anyone proposing to cut down or carry out work on a tree in a Conservation Area is required to give the Local Authority, six weeks prior notice (a section 211 notice). These can be completed online at:
www.planningportal.gov.uk/planning/applications/howtoapply/permissiontypes#Notificationofproposedworkstotreesinconservationareas

The Section 211 notice must set out clearly what work is proposed. A proposal just to 'top' or 'lop' a tree would not be acceptable because there are many different ways to 'top' or 'lop' a tree. If there are many trees on the site, it is usual to provide a scaled plan of the site including the extent of any proposed development constraints (if applicable).
Further guidance is available at:
http://planningguidance.planningportal.gov.uk/blog/guidance/tree-preservation-orders/how-are-trees-protected-in-conservation-areas/what-is-the-decision-making-process-for-tree-protection-in-conservation-areas/what-form-should-a-section-211-notice-take/

People are not required to submit a section 211 notice to the local planning authority for:

- The cutting down, topping, lopping of a tree whose diameter does not exceed 75mm; or
- The cutting down or uprooting of a tree, whose diameter does not exceed 100mm, for the sole purpose of improving the growth of other tree.

Tree preservation orders allow for trees to be protected either as individuals, groups, areas or woodlands. The orders have the effect of preventing the cutting down, topping, lopping, uprooting, willful damage or willful destruction of trees, except in certain circumstances, other than with consent of the local authority.

Even when no specific legal protection exists, it may be necessary to obtain a felling licence. These apply if the volume of timber exceeds specified amounts; site clearance, even of small areas, before detailed planning permission has been granted could exceed the felling licence quota. The Forestry Commission, under the Forestry Act 1967 (as amended) administers felling licenses.

Legal protection for trees on development sites

Section 197 of the Town and Country Planning Act 1990 states "it shall be the duty of the local planning authority to ensure, whenever it is appropriate, that in granting planning permission for any development adequate provision is made, by the imposition of conditions, for the preservation or planting of trees". It also states that "it shall be the duty of the local planning authority to make such orders under section 198 [of the Act] as appear to the authority to be necessary in connection with the grant of such permission."

It is usually appropriate for a tree preservation order to be placed on trees that are in amenity situation and structurally sound. The effect of proposed development on trees protected by tree preservation order ranks as a material consideration, which should be considered by the local authority, when determining a planning application under section 70 of the Town and Country Planning Act 1990.

Where a tree preservation order exists prior to planning permission being granted it should not normally be a block to effective use of a site. It serves to deter damage to or clearance of trees prior to planning permission being granted and provides a means of enforcing their protection during development work.

When planning permission is granted, planning conditions may be imposed to provide for the erection of protective fencing and other measures for ensuring the well-being of trees during development.

NOTE It is considered inappropriate for planning conditions to be used to provide long-term protection to trees when tree preservation orders are available as a specific provision for this purpose.

Where circumstances require it, local authorities should apply a planning condition requiring the developer to appoint an arboriculturist to oversee the project. This person has a duty to monitor and confirm the implementation and maintenance of tree protection measures, as agreed with the local authority. Planning conditions may be imposed requiring tree planting to be undertaken as part of a project, and a tree preservation order can be made to apply to such trees once they have been planted so as to achieve their long term protection.

The consent of the local authority is not needed to carry out work on trees required to enable a person to implement a planning permission. Felling and further works cannot be said to be required when planning permission has been given on an outline application only, nor when development is exempt from planning control.

<u>Enforcement of protection during development</u>

- The effectiveness of measures to protect trees and ensure their healthy survival through development depends on co-operation between site owners, developers, contractors, arboriculturists and local authorities.
- If the local authority considers that there has been a breach of planning conditions that provide for the protection of trees, it can serve an "enforcement notice"; if necessary this can be followed by a "stop notice" (Town and Country Planning Act 1990, sections 172, 183, 184);
- *Planning policy guidance note 18*
- *Enforcing planning control* [19]; *DoE Circular 10/97— enforcing planning control: Legislative provisions and procedural requirements*). When considering the need for such enforcement, local authorities should consider that trees can be damaged very easily and that survival of trees is most likely to be achieved by maintenance of protection at all times.

Common law claims and litigation concerning trees

General

Problems caused by trees on development sites can result in disputes giving rise to common law claims and litigation. Such problems are particularly likely where trees grow across boundaries between properties and cause damage to the property of a third party. For instance, root activity can affect structures other than those on the development site. The crowns, stems and roots of trees may have structural weaknesses, which if they fail, could result in damage to property or injury to people. Leaves and fruit falling from trees, obstruction of light and problems of poisonous plants have all been considered by the courts. Legal advice should be sought where trees may become a problem.

Careful planning and design should minimize the possibility of litigation after completion of the development.

Planting adjacent to boundaries

Problems with trees on or close to boundaries have resulted in litigation on many occasions, and the rights and responsibilities of tree owners and their neighbors are, in this respect, well documented in law. The government has published guidance on high hedges (*Hedge height and light loss* — ODPM, 2002) which advises on reasonable standards for evergreen hedges in domestic gardens. Careful consideration of new planting to anticipate both the likely encroachment of roots or overhang of branches of the fully grown tree relative to the site boundary can prevent potential future conflict, while the possibility of direct mechanical damage to boundary fences and walls can be avoided by allowing room for growth and movement.

APPENDIX 7.PROTECTED SPECIES AND TREES

Wildlife and Habitat Considerations
Paragraph 47 of Planning Policy Guidance Note 9: Nature Conservation [18] states that "the presence of a protected species is a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in harm to the species or its habitat".

Where bats are found to be present consultation needs to be carried out with the Statutory Nature Conservation Organization i.e. Natural England.

Bats in trees
Trees provide habitat for bats in the form of roost sites, maternity roost sites and hibernacula. As a habitat, trees provide foraging for bats, being a medium for invertebrates, and provide three dimensional feeding corridors to and from roosting sites.

The following should be considered when carrying out any works to the trees.

All bat species are specially protected under the Conservation of Habitats and Species Regulations (2010) and under Schedule 5 of the Wildlife and Countryside Act of (1981) (as amended).

As a result it is illegal to:

- Deliberately kill, injure or capture bats.
- Deliberately or recklessly disturb bats.
- Deliberately or recklessly obstruct access to a bat roost.
- Damage or destroy a bat roost.

Fines of up to £5000 *per bat* affected and confiscation of vehicles used can be imposed for deliberate or reckless disturbance of bats or damage to a roost site.
If works risk recklessly harming bats then the police can order all construction/renovation work to cease until the issue is properly addressed.

If bats are found at any time during the work E3 Ecology (01434 230982) should be contacted immediately.

Nesting/ Breeding Birds
Habitats on site are likely to provide a suitable nesting and foraging resource for birds.

- The early mature to mature trees on site are almost all suitable as nest sites.
- Ornamental planting in conjunction with the trees may provide foraging opportunities in the form of berries and invertebrates.

Under the provisions of the Wildlife and Countryside Act of (1981) (as amended) it is illegal to knowingly disturb any nesting bird during the breeding season.

Nesting/ breeding mammals
Trees provide vital nesting sites for native arboreal mammals (such as red squirrel and wood mouse), with a contiguous canopy providing an aerial highway to and from foraging sites, providing cover from predators. These factors need to be considered in any landscape design.
Red squirrel are protected under the provisions of the Wildlife and Countryside Act of (1981) (as amended.

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Project Name:

Tree Protection Plan -Victoria Road West

Sheet Title:
ECO3-TPP-4671-V10

Scale:
A1 @ 1:800

Date Drawn:
17.05.17

Drawn By:
HN

KEY

- Root Protection Area
- Crown Spread
- Category U
- Category A
- Category B
- Category C
- Tree Tag and Category (T148-C1)
- Tree Group C1
- Tree Group B1
- Tree Group A1
- Construction Exclusion Fencing
- Tree Buffer Area
- Retained Tree Groups
- Cellular Confinement

Existing bund will be retained in its entirety. 10 low value Western Balsam Poplars and 8 Leyland Cypress will be removed as general management prescriptions for the group. The line of the existing palisade fence will be retained.

The acoustic bund and rear gardens alongside the western boundary will provide sufficient rooting area for trees within group G26 (outside of the site boundary) following the remediation process. The ground alongside this boundary will be stripped according to prescriptions within the TPP. Trees within group G26 will be monitored for defects every 24 months following the remediation process.

The early mature trees within this group will be retained and protected by fencing as specified in section D.4 of the tree protection plan report. Two western balsam poplars (T63+T64) are of low value with a short SULE and will be removed and replaced. Trees will be planted within this section according to section D.4 of the tree protection plan report.

A triple line of load bearing cellular confinement cells will be installed along the eastern edge of the access road to units 257-259 to maximize available soil rooting volume.

Natural regeneration (below diameter 150mm) around the edges of groups G13 & G13.5 will be removed and a mandatory 2.5m protected buffer will be implemented around the edges of the groups

22 of the existing trees and bund will be removed during the remediation process and replaced following completion of the development. As specified in section D.3 of the tree protection plan report.

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Project Name:

Tree Constraints Assessment
- Victoria Road West

Sheet Title:
ECO3-TRP-4671-V05

Scale:
A1 @ 1:800

Date Drawn:
24.04.17

Drawn By:
HN

KEY

Root Protection Area

Crown Spread

Category U
Category A
Category B
Category C

Tree Tag and Category
T148-C1

Tree Group C1

Tree Group B1

Tree Group A1

Retained Tree Groups

Trees/tree greoups Groups To Be Lost

Construction Exclusion Zone