



Arboricultural Impact Assessment

Mill Meadows, Bexley

On behalf of

Cray Mill Leisure Ltd

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Executive summary

An arboricultural survey has been carried out, and this report prepared to support a planning application at Mill Meadows, Bexley.

1. Details of all trees forming the survey can be found in Appendix 3, including specific comments in relation to their condition and quality.
2. The area subject to survey includes 52 individual trees, 8 groups of trees and 1 woodland area of young willow and hawthorn.
3. The proposed layout will require the removal of 5 individual trees and 1 woodland area of young willow and hawthorn.
4. No Root Protection Areas (RPAs) of any retained trees will be incurred into by the design layout. All proposed buildings and hard standing areas to replace existing buildings and hardstanding, therefore existing theoretical RPAs under buildings and hardstanding will remain unaffected - all construction to adhere to correct methodology for working in proximity to trees - refer to Appendix 6: Methods of Work Close to Trees.
5. Provided precautions to protect the retained trees are specified and implemented through the measures included in this report, the development proposal will have minimal impact on the retained trees or their wider contribution to amenity and character.
6. If the recommendations made within this report are followed, the development will be achievable in arboricultural terms and should be acceptable to the Local Planning Authority.

<u>Tree Survey Summary</u>	A	B	C	U	TOTAL
Trees	0	18	30	4	52
Groups	0	1	7	0	8
Woodlands	0	0	1	0	1
Hedges	0	0	0	0	0
Scrub/Shrubs	0	0	0	0	0
TOTAL	0	19	38	4	61

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1.0 Introduction

1.1 Instruction

Southern Ecological Solutions Ltd. has been instructed to produce an Arboricultural Impact Assessment in support of a planning application at Mill Meadows, Bexley. It has been produced in accordance with the principles of British Standard *BS 5837:2012, Trees in relation to design, demolition and construction - Recommendations* and includes the following information to accompany a planning application:

- *details of significant trees including an assessment of condition using BS 5837 categorisation;*
- *a plan showing tree survey information, retention categorisation and root protection areas;*
- *an assessment of the impact of the proposal on trees, any wider impact on the local amenity and any impact trees may have on the proposed development;*
- *a preliminary arboricultural method statement dealing with the protection and management of the trees to be retained;*
- *a schedule of tree works to facilitate construction.*

1.2 Scope and purpose of this report

This report covers trees within the site boundary and its immediate proximity. It is concerned with the impact the development may have on trees, and the effect retained trees may have on the development. Its purpose is to allow the Local Planning Authority to assess the tree information as part of the planning submission.

2.0 Site Visit and Observations

2.1 Site visit

A site visit was undertaken on the 5th May 2021 by Phil Barwell of Southern Ecological Solutions. The weather conditions were clear and dry.

2.2 Site description

The site is located south of Bexley train station and east of Bexley Cricket and Hockey Club, with most of the site consisting of scrub and grassland, with a riverbank along the south eastern boundary and a series of buildings (known as the Old Livery Stables) to the north east of the site.

The trees on the site are generally situated on and around the boundaries and are predominantly of low to moderate amenity value. A number of (mostly early mature) Ash, Elder and Sycamore trees are located near and amongst the Old Livery Stables to the north east of the site.

The survey boundary is indicated by the redline boundary as per the map below.

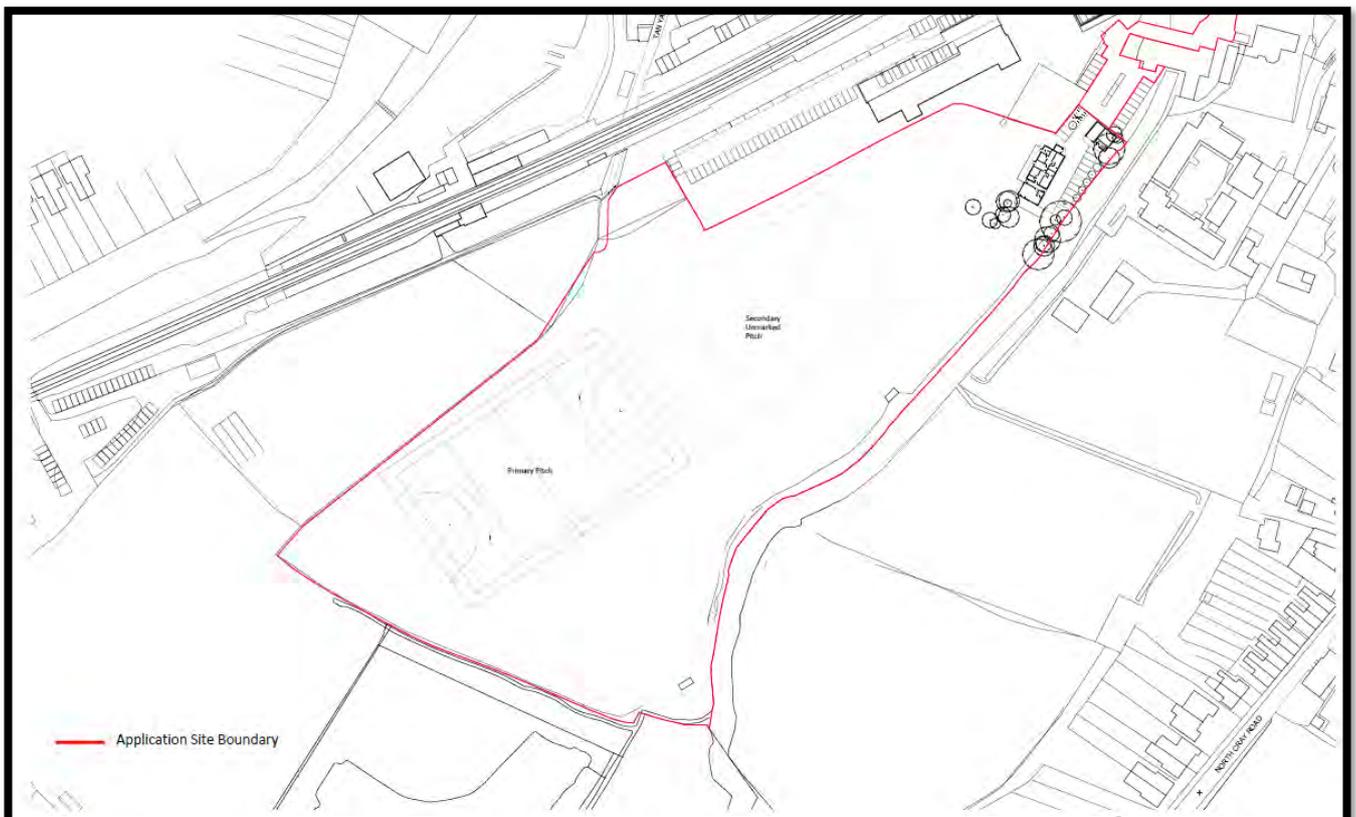


Figure 1 – Redline boundary of the survey area

2.3 The subject trees

The area relevant for Mill Meadows, Bexley, includes 52 individual trees of which 18 are 'B' category and 30 are 'C' category; 8 groups, of which 1 is 'B' category and 7 are 'C' category; and 1 woodland of 'C' category.

All trees were categorised in accordance with Section 4.5 and Table 1 of BS5837.

Table 1 BS5837 Categorisation Summary

	A	B	C	U	TOTAL
Trees	0	18	30	4	52
Groups	0	1	7	0	8
Woodlands	0	0	1	0	1
Hedges	0	0	0	0	0
Scrub/Shrubs	0	0	0	0	0
TOTAL	0	19	38	4	61

2.4 Tree Preservations Orders

Two Tree Preservation Orders with the London Borough of Bexley apply to the site:

TPO.No.1 1950 W4 covers trees along the southern boundary

TPO 76/1622 covers T14 and T15

Please note the following in relation to vegetation clearance: anyone wishing to undertake works to prune or remove a tree with a Tree Preservation Order or within a Conservation Area will require written authorisation from the Local Planning Authority before any works can proceed.

However, works required as part of planning consent does not need additional consent.

3.0 Arboricultural Impact Assessment

3.1 Summary of the impact on trees

Development can adversely impact on trees by causing them to be removed to facilitate the development, or in the future, by adversely affecting their potential for retention through a disturbance in Root Protection Areas (RPAs)¹ or through post development pressures to prune or remove.

At the design stage, disturbance within the RPA should be avoided. If unavoidable, (which may need demonstrating), consideration must be given to any construction activity such as demolition, including removal of existing hard surfaces, changing soil levels and the provision of services where within RPAs, as well as new surfaces and structures.

Construction of hard surfaces and other construction may be acceptable within RPAs providing specialist methods of design and construction are used. This will often result in the use of minimal or no-dig methods which result in higher finished levels which must be allowed for during design due to the effect on access thresholds and structure heights etc.

The ability of trees to tolerate some disturbance depends on individual circumstances including prevailing site conditions, tree species, age and condition and this will be assessed by the project arboriculturist.

Protection measures, usually a combination of barriers and ground protection, must be in place before any works (including site clearance) begin, and stay in place for as long as a risk of damage remains (please refer to the Tree Protection Plan - TPP). The protection of trees must take account of the buildability of the proposal, including services, and ensure that all activities, such as storage of materials, parking and the use of plant and vehicles, can be accommodated outside of RPAs. Particular care and planning are necessary for the operation of excavators, lifting machinery and cranes to ensure all vehicle movement and lifting operations will not impact on retained trees.

¹ *Root Protection Area (RPA) - A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Assessed according to the recommendations set out in clause 4.6 of BS 5837. It is calculated by multiplying the radius squared by 3.142. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, considering local site factors, species tolerance, condition and root morphology.*

3.2 Tree protection plan (TPP)

Trees to be retained are coloured coded based on their tree category, whilst trees required for removal to facilitate the development have red hatch lines inside a red circle representing the tree crown spread. Tree protection is shown as barriers and/or ground protection defining the Construction Exclusion Zone (CEZ)², and any areas requiring non-standard methods of demolition or construction are shown.

3.3 Trees to be removed

The proposed layout will require the removal of 5 individual trees, and 1 woodland.

Table 2 Tree removal summary

Removal		TOTAL	Part removal	TOTAL
Trees	T1, T2, T45, T60 and T61	5	Trees	0
Woodlands	W52	1	Woodlands	0

3.4 Trees to be pruned

Minor crown lifting and lateral branch cutback may potentially be required to T3 to facilitate construction where the crown already extends over the existing building that is to be replaced. Opportunities for remedial pruning works to low crowns etc. can be identified at later stages in the development process where deemed appropriate. A full Arboricultural Method Statement (AMS) can be produced detailing any pruning works required to accommodate the proposed design layout and/or for access around the site from canopy obstruction. All tree pruning/felling work to facilitate the development can be found in Appendix 7.

3.5 Root protection area incursions

No Root Protection Areas (RPAs) of any retained trees will be incurred into by the design layout. All proposed buildings and hard standing areas to replace existing buildings and hardstanding, therefore existing theoretical RPAs under buildings and hardstanding will remain unaffected - all construction to adhere to correct methodology for working in proximity to trees - refer to Appendix 6: Methods of Work Close to Trees.

² Construction Exclusion Zone. An area based on the RPA in m² identified by an arboriculturist, to be protected during development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

4.0 Preliminary Arboricultural Method Statement

4.1 Introduction

This section is a preliminary arboricultural method statement specifying the methodology to be used for the protection of trees and works close to trees that have the potential to result in the loss of or damage to a tree. It includes details of site management and supervision required for successful tree retention.

4.2 Site clearance

Damage can easily be caused to trees to be retained during initial site clearance. Therefore, tree protection barriers must be in place before site clearance to protect retained trees identified in Appendix 3.

4.3 Site and fuel storage, cement mixing and washing points

All site storage areas, cement mixing and washing points for equipment and vehicles and fuel storage must be outside RPAs. No discharge of potential contaminants will occur within 10 m of a retained tree stem or where there is a risk of run-off into RPAs.

4.4 Tree protection barriers

Appendix 5 includes guidance for protective barriers based on BS 5837:2012. The approximate location of the barriers and the CEZs is shown on the TPP. The precise location of the barriers and other protective measures will be confirmed at the pre-commencement meeting before any demolition or construction activities (including site clearance) start.

4.5 Ground protection

In areas where it is not possible to erect protective barriers, ground protection must be used to protect the RPAs of retained trees. Where it has been agreed during the design stage that vehicular or pedestrian access for the construction operation may take place within the CEZ, the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be within the CEZ at the edge of the agreed working zone, but the soil structure beyond the barrier to the edge of the CEZ shall be protected with ground protection.

4.6 Precautions when working in CEZs

Only work agreed with the Local Planning Authority can be carried out within CEZs. Any works must be carried out in accordance with the details as set out in Appendix 6 which are summarised below.

4.7 Installation of new surfacing

Full details of the new surfacing proposed within the RPAs of trees to be retained is not known at the time of writing. However, if resurfacing is required within the RPAs of any trees it will be necessary to use non-standard methods of construction. Ideally, new substrates and finished surfaces should be of a porous design to allow water and an air passage in and out.

4.8 Installation of new services

The exact location of services is often difficult to establish until construction is in progress. Where existing services within RPAs require upgrading or new services have to be installed in RPAs, conventional excavation techniques are unacceptable, and great care must be taken to minimise any disturbance. Trenchless installation should be the preferred option, but if that is not feasible, any excavation must be carried out by hand or using a compressed air lance. The methodology must comply with *NJUG Volume 4: Guidelines for the Planning, installation and Maintenance of Utility Apparatus in Proximity to Trees*.

4.9 Tree works

Recommendations for tree works can be found in the tree works schedule in Appendix 7. All works shall be in accordance with *BS 3998:2010*, or in accordance with current best practice. The use of a competent tree surgery contractor is necessary to comply with this (follow the link for a list of Arboricultural Association approved contractors [Directory of Tree Surgeons - Arboricultural Association](#)). The main contractor and tree surgery contractor must ensure that any necessary consents have been received from the Local Planning Authority regarding planning constraints in regard to trees and that no protected species or habitats are harmed whilst carrying out site clearance or tree surgery works.

5.0 Conclusions

- 5.1** The proposed layout will require the removal of 5 individual trees and 1 woodland area of young willow and hawthorn.
- 5.2** No Root Protection Areas (RPAs) of any retained trees will be incurred into by the design layout. All proposed buildings and hard standing areas to replace existing buildings and hardstanding, therefore existing theoretical RPAs under buildings and hardstanding will remain unaffected - all construction to adhere to correct methodology for working in proximity to trees - refer to Appendix 6: Methods of Work Close to Trees.
- 5.3** Provided precautions to protect the retained trees are specified and implemented through the measures included in this report, the development proposal will have minimal impact on the retained trees or their wider contribution to amenity and character.
- 5.4** If the recommendations made within this report are followed, the development will be achievable in arboricultural terms and should be acceptable to the Local Planning Authority.

Appendix 1: Survey and Background Information

1.1 Limitations

A detailed topographical plan showing the locations of individual trees was provided by the client and used for the tree survey, so the positions of the trees were understood to be accurate, and SES Ltd accepts no liability for the accuracy of any tree survey drawings based on the topographical plan supplied by the client.

Trees are living organisms whose health and the condition can change rapidly and all trees, even healthy ones, are at risk from unpredictable climatic and manmade events. The assessment of risk for any tree is based upon factors evident at the time of the inspection and the interpretation of those factors by suitably qualified inspectors. The health, condition and safety of trees should be checked on a basis commensurate with the level of risk and preferably on an annual basis.

1.2 Methods

The trees were surveyed from ground level without detailed investigations. All trees with a trunk diameter of 75 mm or above³ were surveyed. All dimensions were estimated unless otherwise indicated. Obvious hedges and shrub masses were identified where appropriate. Information collected is in accordance with recommendations in *Subsection 4.4.2.5 of BS 5837:2012* and includes species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree was then allocated one of four categories (U, A, B or C) to reflect its suitability as a material constraint on development.

1.3 Documents and information received

- *Topographical plan*
- *Proposed plan*

1.4 Contact

Name	Company/organisation	Tel. no.
Geoff Clack	SES Arboriculture Ltd	+44 (0)1268 711021

³ *BS 5837 recommends that in most circumstances all trees over 75mm stem diameter should be included in a pre-planning land and tree survey*

1.5 Reference documents

- *British Standards Institution (2012) BS 5837: Trees in relation to design, demolition and construction – Recommendations;*
- *British Standards Institute (2010) BS 3998: Tree work – Recommendations;*
- *DETR Tree Preservation Orders – A Guide to the Law and Good Practice;*
- *National Joint Utilities Group (2007) Volume 4, Issue 2: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees;*
- *DTLR (2001) Principles of Tree Hazard Assessment and Management - David Lonsdale.*

1.6 Legal Constraints and Liabilities

1.6.1 Occupiers Liability 1957 and 1984

The Occupiers Liability Act places a duty of care to ensure that no reasonably foreseeable harm takes place due to tree defects. Therefore, this report includes recommendations within the tree tables for work required for safety reasons. 'Common sense risk management of trees (National Tree Safety Group 2012)' states that *'the owner of the land on which a tree stands, together with any party who has control over the tree's management, owes a duty of care at common law to all people who might be injured by the tree. The duty of care is to take reasonable care to avoid acts or omissions that cause a reasonably foreseeable risk of injury to persons or property.'*

1.6.2 Common Law

This enables pruning back of the crown and roots of trees on adjacent land where they overhang neighbouring property, providing the work is reasonable and does not cause harm. This right does not override TPO and CA legislation.

1.6.3 Ecological Constraints

The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2010 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees. These could impose significant constraints on the use and timing of access to the site. It is the responsibility of the main contractor and tree surgery contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works. Unless competent to do so, the advice of an ecologist must be sought.

Appendix 2: Key to Tree Survey Sheet and Summary

Measurements	Life Stage	Structural and physiological condition	Root Protection Area (RPA)
Height - Measured using a digital laser clinometer (m)	Young trees up to ten years of age	Good: Trees with only a few minor defects and in good overall health needing little, if any attention	<ul style="list-style-type: none"> • The RPA Radius column provides the extent of an equivalent circle from the center of the stem (m). • The RPA is calculated using the formulae described in paragraph 4.6.1 of British Standard 5837: 2012 and is indicative of the rooting area required for a tree to be successfully retained. Tree roots extend beyond the calculated RPA in many cases and where possible a greater distance should be protected.
Stem diameter – DBH. Diameter measured (mm) in accordance with Annex C of the BS5837	Semi-mature trees less than 1/3 life expectancy	Fair: Trees with minor rectifiable defects or in the early stages of stress from which it may recover	
Crown Spread - Measured using a digital laser clinometer radially from the main stem (m)	Early mature trees 1/3 – 2/3 life expectancy	Poor: Trees with major structural and/or physiological defects such that it is unlikely the tree will recover in the long term	
	Mature trees over 2/3 life expectancy	Dead: This could also apply to trees in an advanced state of decline and unlikely to recover	
	Over mature declining or moribund trees of low vigor Veteran tree possessing certain attributes relating to veteran trees	The BS category particular consideration has been given to the following <ul style="list-style-type: none"> • The health, vigor and condition of each tree • The presence of any structural defects in each tree/group and its future life expectancy • The size and form of each tree/group and its suitability within the context of a proposed development • The location of each tree relative to existing site features e.g. its screening value or landscape features • Age class and life expectancy 	

Abbreviations		BS cat: Category in accordance with Table 1 and section 4.5 of BS 5837.	
T – Tree	Feature surveyed as individual tree. Included multi stem trees	Category A	High quality and value (non-fiscal) with at least 40 years remaining life expectancy.
G – Group of trees	Land under a stand of trees with a maximum size of 0.25 hectare.	Category B	Moderate quality and value with at least 20 years remaining life expectancy.
W – Woodland	Land under a stand of trees with, or the potential to achieve, tree canopy cover of 20% or more. The minimum size of woodland Forestry Commission Scotland can grant-aid is 0.25 hectare.	Category C	Low quality and value with at least 10 years remaining life expectancy, or young trees with a stem diameter below 150 mm
H - Hedge	A hedgerow is a boundary line of bushes which can include trees and is protected if it's: more than 20m long with gaps of 20m or less in its length.	Category U	Unsuitable for retention. Existing condition is such that they cannot be realistically retained as living trees in the context of the current land use for longer than 10 years. Note, category U trees can have existing or potential conservation value which it might be desirable to preserve.
# - Estimated value.	See observation for further information	Subcategories	(1) - Mainly arboricultural values (2) - Mainly landscape values (3) - Mainly cultural values including conservation.
VTA – Visual Tree Assessment	Non-invasive method of examining the health and structural condition of individual trees.		

2.1 Appendix Summary

Table 3 BS5837 category summary with tree numbers

SUMMARY	Individual Trees	Total	Group of Trees	Total
Category U - Unsuitable	T8, T21, T23, T34	4		0
Category A (High Quality / Value)		0		0
Category B (Moderate Quality / Value)	T5, T14, T15, T17, T19, T26, T27, T28, T29, T30, T31, T32, T33, T36, T38, T39, T40, T41	18	G44	1
Category C (Low Quality / Value)	T1, T2, T3, T4, T6, T7, T9, T10, T11, T12, T16, T18, T22, T24, T25, T35, T37, T45, T46, T49, T50, T53, T54, T55, T56, T57, T58, T59, T60, T61	30	G13, G20, G42, G43, G47, G48, G51, W52	8

Table 4 Life stage and BS5837 category summary

SUMMARY	A	B	C	U	TOTAL
Young	0	0	5	0	5
Early Mature	0	0	3	0	3
Semi Mature	0	0	5	0	5
Mature	0	19	25	4	48
Post Mature	0	0	0	0	0
Late Mature	0	0	0	0	0
Ancient / Veteran	0	0	0	0	0
Dead	0	0	0	0	0
TOTAL	0	19	38	4	61

Appendix 3: Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

Abbreviations	
# - Estimated value.	See observation for further information
com - Combined stem diameter	In accordance with BS5837:2012

Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m ²)
						N	NE	E	SE	S	SW	W	NW							
T1	Acer pseudoplatanus (Sycamore)	Mature	1	300	15.5	1.2		1.0		2.0		1.5		Fair	Fair	Minor deadwood, self seeded Supressed	20+	C2	3.6	40.7
T2	Acer pseudoplatanus (Sycamore)	Semi Mature	1	150	10	1.2		1.0		2.0		1.5		Fair	Fair	Minor deadwood, self seeded Supressed	20+	C2	1.8	10.2
T3	Acer pseudoplatanus (Sycamore)	Mature	1	550	16	5.0		8.0		6.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem.	20+	C2	6.6	136.8
T4	Fraxinus excelsior (Ash)	Mature	1	450	14.4	5.0		5.0		3.0		4.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem.	20+	C2	5.4	91.6
T5	Fraxinus excelsior (Ash)	Mature	1	280	14	3.0		4.0		2.0		3.0		Good	Fair	n/a	20+	B2	3.4	35.5
T6	Fraxinus excelsior (Ash)	Mature	2	320 com	14	3.0		5.0		2.0		5.0		Good	Fair	Ivy on stem. Minor deadwood throughout the crown of the tree	20+	C2	3.9	47.2
T7	Fraxinus excelsior (Ash)	Mature	2	420 com	14	4.0		5.0		5.0		5.0		Good	Fair	Ivy on stem. Minor deadwood throughout the crown of the tree Ivy encroaching crown of tree.	20+	C2	5.1	81.4
T8	Sambucus nigra (Elder)	Mature	1	550	5	2.0		2.0		1.0		2.0		Poor	Poor	Major crown die back Failed central leader	<10	U	6.6	136.8
T9	Fraxinus excelsior (Ash)	Mature	1	300	9	5.0		5.0		3.0		5.0		Fair	Fair	Ivy on stem. Minor deadwood throughout the crown of the tree Ivy encroaching crown of tree.	20+	C2	3.6	40.7
T10	Sambucus nigra (Elder)	Mature	1	250	4	2.0		2.0		2.0		2.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem.	20+	C2	3.0	28.3
T11	Sambucus nigra (Elder)	Mature	1	250	4	2.0		2.0		2.0		2.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem.	20+	C2	3.0	28.3
T12	Fraxinus excelsior (Ash)	Mature	1	300	10	4.0		5.0		5.0		5.0		Fair	Fair	Ivy on stem. Minor deadwood throughout the crown of the tree Ivy encroaching into and competing with crown of tree.	20+	C2	3.6	40.7
G13	Fraxinus excelsior (Ash)	Semi Mature		See Observations	8	See Tree Survey Plan								Fair	Fair	Group of 5 ivy clad ash 100 mm diameter Height 8m	20+	C2	See Tree Survey Plan	See Tree Survey Plan

Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

Abbreviations	
# - Estimated value.	See observation for further information
VTA – Visual Tree Assessment	Non-invasive method of examining the health and structural condition of individual trees.
com – Combined stem diameter	In accordance with BS5837:2012

Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m2)
						N	NE	E	SE	S	SW	W	NW							
T14	Aesculus hippocastanum (Horse Chestnut)	Mature	1	750	20.7	8.0		8.0		5.0		7.0		Good	Fair	Ivy encroaching into crown of tree. Ivy on stem. Giant hogweed at base	20+	B2	9.0	254.5
T15	Aesculus hippocastanum (Horse Chestnut)	Mature	1	750	20.7	5.0		8.0		8.0		7.0		Good	Fair	Ivy encroaching into crown of tree. Ivy on stem. Giant hogweed at base Wound on southern side of stem - possible internal decay decay detection required if being retained in close proximity to housing	20+	B2	9.0	254.5
T16	Fraxinus excelsior (Ash)	Mature	1	400	14	4.0		5.0		5.0		5.0		Fair	Fair	Ivy on stem. Minor deadwood throughout the crown of the tree Ivy encroaching crown of tree.	20+	C2	4.8	72.4
T17	Fraxinus excelsior (Ash)	Mature	1	350	10	6.0		4.0		3.0		6.0		Good	Good	Suppressed by adjacent trees	40+	B2	4.2	55.4
T18	Fraxinus excelsior (Ash)	Mature	1	250	10	3.0		6.0		3.0		3.0		Fair	Good	Suppressed by adjacent trees Leaning	40+	C2	3.0	28.3
T19	Fraxinus excelsior (Ash)	Mature	1	450	10	3.0		6.0		6.0		6.0		Good	Good	Suppressed by adjacent trees	40+	B2	5.4	91.6
G20	Salix fragilis (Crack Willow), Crataegus monogyna (Common Hawthorn/Quick/May)	Mature		See Observations	4	See Tree Survey Plan								Good	Good	Riverside willow and Hawthorn with low level bramble Average height 4m Average stem 50mm	40+	C2	See Tree Survey Plan	See Tree Survey Plan
T21	Salix fragilis (Crack Willow)	Mature	1	800	16	7.0		7.0		7.0		7.0		Poor	Poor	Secondary stem split out from 2 metres Extensive decay present Tearout in crown	40+	U	9.6	289.5
T22	Alnus glutinosa (Common Alder)	Mature	1	650	16	6.0		6.0		6.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem.	20+	C2	7.8	191.1
T23	Aesculus hippocastanum (Horse Chestnut)	Mature	1	550	10	8.0		3.0		3.0		3.0		Poor	Poor	Ivy encroaching into and competing with crown of tree. Ivy on stem. Partially failed at rootplate and hung up on shed and river bank	40+	U	6.6	136.8
T24	Aesculus hippocastanum (Horse Chestnut)	Mature	1	550 #	10	8.0		3.0		3.0		3.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. Tree located south of culvert	40+	C2	6.6	136.8
T25	Alnus glutinosa (Common Alder)	Mature	3	530 com	14	6.0		4.0		3.0		5.0		Fair	Fair	Wounding to stems Basal decay present	40+	C2	6.4	128.5

Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

Abbreviations	
# - Estimated value.	See observation for further information
VTA – Visual Tree Assessment	Non-invasive method of examining the health and structural condition of individual trees.
com – Combined stem diameter	In accordance with BS5837:2012

Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m2)
						N	NE	E	SE	S	SW	W	NW							
T26	Platanus x hispanica (London Plane)	Mature	1	950	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert Deadwood in crown	40+	B2	11.4	408.3
T27	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T28	Platanus x hispanica (London Plane)	Mature	1	1020	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	12.2	470.7
T29	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T30	Platanus x hispanica (London Plane)	Mature	1	950	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T31	Platanus x hispanica (London Plane)	Mature	1	1020	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	12.2	470.7
T32	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T33	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T34	Platanus x hispanica (London Plane)	Mature	1	850	15	8.0		8.0		4.0		6.0		Poor	Poor	Central column of decay from 4m dye to historic loss of central leader South of culvert	<10	U	10.2	326.9
T35	Platanus x hispanica (London Plane)	Mature	1	1020	10	8.0		4.0		4.0		2.0		Fair	Fair	Tree has been coppiced at at 1.2 and is regrowing Ivy on stem. South of culvert	40+	C2	12.2	470.7
T36	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy on stem. South of culvert	40+	B2	11.4	408.3
T37	Platanus x hispanica (London Plane)	Mature	1	1020	10	8.0		4.0		4.0		2.0		Fair	Fair	Tree has been coppiced at at 1.2 and is regrowing Ivy on stem. South of culvert	40+	C2	12.2	470.7

Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

Abbreviations	
# - Estimated value.	See observation for further information
VTA – Visual Tree Assessment	Non-invasive method of examining the health and structural condition of individual trees.
com – Combined stem diameter	In accordance with BS5837:2012

Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m2)
						N	NE	E	SE	S	SW	W	NW							
T38	Platanus x hispanica (London Plane)	Mature	1	950	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T39	Platanus x hispanica (London Plane)	Mature	1	950	15	8.0		8.0		4.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T40	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
T41	Platanus x hispanica (London Plane)	Mature	1	950	15	4.0		8.0		8.0		6.0		Fair	Fair	Ivy encroaching into and competing with crown of tree. Ivy on stem. South of culvert	40+	B2	11.4	408.3
G42	Crataegus monogyna (Common Hawthorn/Quick/May), Ligustrum vulgare (Privet)	Mature		See Observations	3	See Tree Survey Plan								Good	Good	Scrubby Hawthorn and privet understorey Average height 3m Average stem 75mm	40+	C2	See Tree Survey Plan	See Tree Survey Plan
G43	Sambucus nigra (Elder)	Mature		See Observations	3.5	See Tree Survey Plan								Fair	Fair	Group of 2 elder 1 ivy clad Height 3.5 Stem diameter 140mm	20+	C2	See Tree Survey Plan	See Tree Survey Plan
G44	Betula pendula (Siver Birch), Quercus robur (Pedunculate Oak), Sambucus nigra (Elder), Acer pseudoplatanus (Scamore)	Mature		See Observations	12	See Tree Survey Plan								Good	Good	Offsite tree group Consisting of birch oak ,elder ,sycamore Average height 13m Average stem diameter 450mm	40+	B2	See Tree Survey Plan	See Tree Survey Plan
T45	Crataegus monogyna (Common Hawthorn/Quick/May)	Young	1	70	4	1.5		1.5		1.5		1.5		Good	Good	n/a	40+	C2	0.8	2.2
T46	Crataegus monogyna (Common Hawthorn/Quick/May)	Semi Mature	1	85	4	2.0		2.0		2.0		2.0		Good	Good	n/a	40+	C2	1.2	4.5

Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

Abbreviations	
# - Estimated value.	See observation for further information
VTA - Visual Tree Assessment	Non-invasive method of examining the health and structural condition of individual trees.
com - Combined stem diameter	In accordance with BS5837:2012

Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m2)
						N	NE	E	SE	S	SW	W	NW							
G47	Crataegus monogyna (Common Hawthorn/Quick/May), Betula pendula (Silver Birch), Prunus spinosa (Blackthorn), Quercus robur (Pedunculate Oak), Sambucus nigra (Elder), Acer pseudoplatanus (Scamore)	Semi Mature		See Observations	7	See Tree Survey Plan								Fair	Fair	Offsite group Consisting of Hawthorn, Birch, Oak elder, prunus spinosa Average height 7m Average stem 160mm	20+	C2	See Tree Survey Plan	See Tree Survey Plan
G48	Acer pseudoplatanus (Sycamore)	Early Mature		See Observations	9	See Tree Survey Plan								Good	Good	Group of 5 no sycamore Height 9m Average stem diameter 230mm	40+	C2	See Tree Survey Plan	See Tree Survey Plan
T49	Quercus robur (English Oak)	Young	1	80 com	4	1.5		1.5		1.5		1.5		Good	Good	n/a	40+	C2	1.0	2.9
T50	Fraxinus excelsior (Ash)	Mature	3	330	6	3.0		3.0		3.0		3.0		Fair	Fair	Congested stems at base	40+	C2	4.0	50.8
G51	Crataegus monogyna (Common Hawthorn/Quick/May), Acer platanoides (Norway Maple)	Early Mature		See Observations	5	See Tree Survey Plan								Good	Good	Offsite group Hawthorn and Norway maple Height 5m Stem diameter 180mm	40+	C2	See Tree Survey Plan	See Tree Survey Plan
W52	Salix sp. (Willow sp.), Crataegus monogyna (Common Hawthorn/Quick/May)	Young		See Observations	6	See Tree Survey Plan								Good	Good	Young woodland group Predominantly willow Occasional Hawthorn Height 6m stem diameter 80mm	40+	C2	See Tree Survey Plan	See Tree Survey Plan
T53	Sambucus nigra (Elder)	Early Mature		See Observations	4	See Tree Survey Plan								Fair	Fair	Scrappy elder Height 4m Average stem 140mm 1 fallen dead stem	40+	C2	See Tree Survey Plan	See Tree Survey Plan
T54	Sambucus nigra (Elder)	Mature	1	140	4	2.0		2.0		2.0		2.0		Good	Good	n/a	40+	C2	1.7	8.9
T55	Fraxinus excelsior (Ash)	Mature	1	350	8	5.0		5.0		5.0		5.0		Fair	Fair	n/a	40+	C2	4.2	55.4

Tree Survey Schedule

Client: Cray Mill Leisure Ltd

Surveyed by: Phil Barwell

Weather: clear and dry

Site: Mill Meadows, Bexley

Survey Date: 5th May 2021

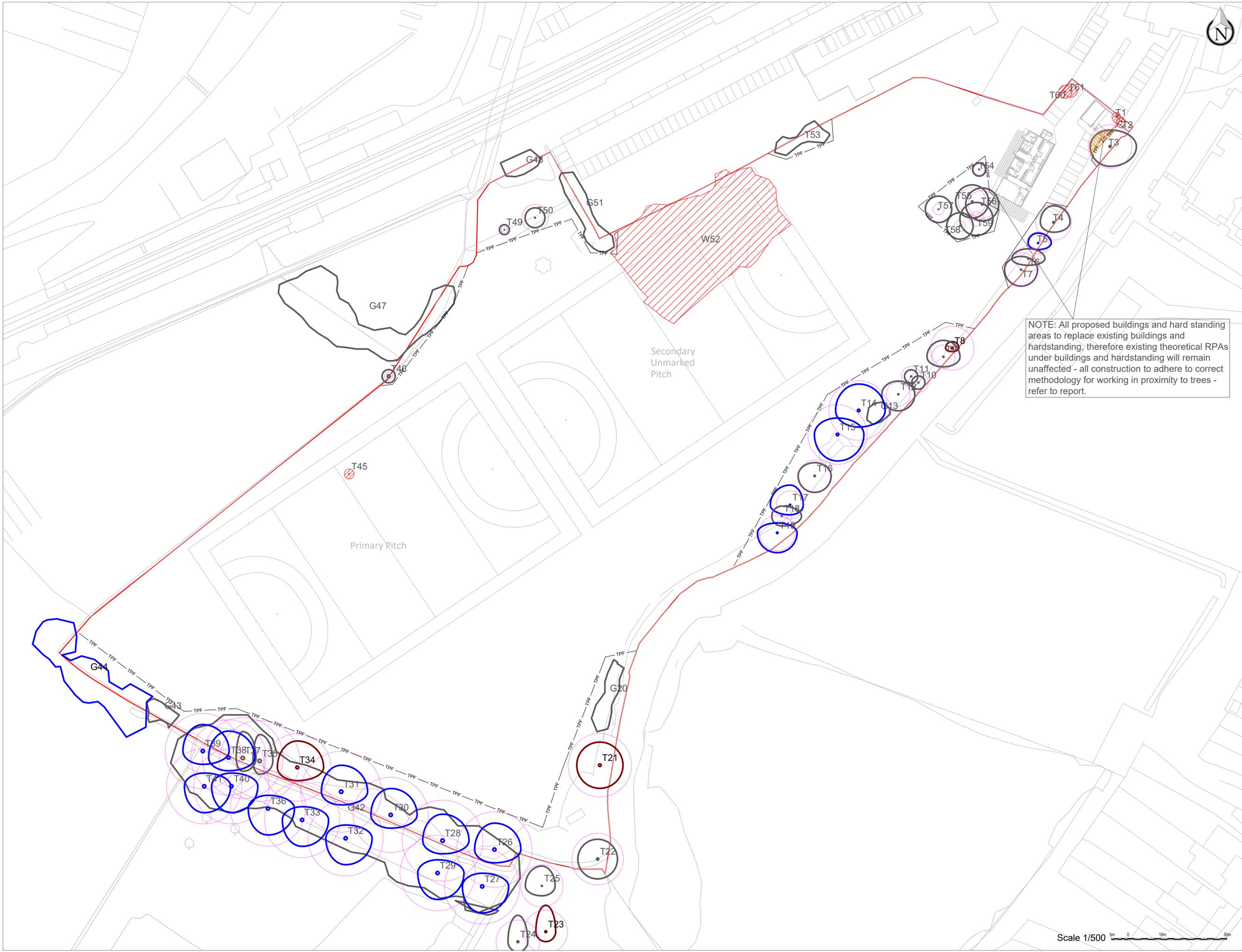
Abbreviations	
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Tree No.	Species	Life Stage	No of Stems	Stem Diameter - DBH (mm)	Height (m)	Crown Spread (m)								Structural Condition	Physiological Condition	Observations	Life Expectancy	BS5837 Category	RPA Radius (m)	RPA Area (m2)
						N	NE	E	SE	S	SW	W	NW							
T56	Fraxinus excelsior (Ash)	Mature	1	350	8	5.0		5.0		5.0		5.0		Fair	Fair	n/a	40+	C2	4.2	55.4
T57	Sambucus nigra (Elder)	Mature	1	140	4	4.0		4.0		4.0		4.0		Good	Good	n/a	40+	C2	1.7	8.9
T58	Sambucus nigra (Elder)	Mature	1	140	4	4.0		4.0		4.0		4.0		Good	Good	n/a	40+	C2	1.7	8.9
T59	Fraxinus excelsior (Ash)	Semi Mature	1	180	8	5.0		5.0		5.0		5.0		Fair	Fair	n/a	40+	C2	2.2	14.7
T60	Fraxinus excelsior (Ash)	Young	1	80	8	2.0		2.0		2.0		2.0		Fair	Fair	n/a	40+	C2	1.0	2.9
T61	Fraxinus excelsior (Ash)	Young	1	80	8	2.0		2.0		2.0		2.0		Fair	Fair	n/a	40+	C2	1.0	2.9



Appendix 4: Tree Protection Plan (TPP)

See attached plan on the following page



NOTE: All proposed buildings and hard standing areas to replace existing buildings and hardstanding will remain unaffected - all construction to adhere to correct methodology for working in proximity to trees - refer to report.

Legend

- Category A - Trees of high quality** with an estimated remaining life expectancy of at least 40 years
- Category B - Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years
- Category C - Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm
- Category U - Trees unsuitable for retention**
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
- Group of trees (G) / hedgerows (H) / woodlands (W) / shrub (S) - Colour coded according to categories above
- Root Protection Area (RPA)
- Survey boundary line
- Trees to be removed.
- Facilitation crown pruning potentially required.
- TPF - Tree Protective Fencing (TPF)

Example Tree Representation

- Tree reference number
- Location of the stem (colour coded)
- Crown spread (colour coded)

This drawing was produced in colour - a monochrome copy should not be relied upon. Contractors must check all dimensions on site. Any discrepancies must be reported to the arboricultural consultant before proceeding.

Southern Ecological Solutions,
Sudbury Stables Downham,
Essex CM11 1LB
Phone: 01268 711021
Website: www.ses-eco.co.uk

Rev	Update	Date

Site	Mill Meadows, Bexley
Client	Cray Mill Leisure Ltd
Drawing title	Tree Protection Plan
Drawing no.	TPP/Mill Meadows Bexley/14-06-21
Scale	1/X500@A1
Date	14/06/21
Revision	A
Drawn by	GC
Checked by	GM



Appendix 5: Tree Protection Barriers & Ground Protection Design

Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place. The default specification will be in accordance with *Section 6.2.2.2 of BS 5837:2012*, as set out below.

5.1 Specifications

Barrier shall be a minimum 2 m high. It shall consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated below. The vertical tubes should be spaced at a minimum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. See Figure 2 overleaf.

Where site circumstances and the associated risk of damaging incursions into the RPA do not necessitate the default level of protection, an alternative specification may be used if agreed with the local authority. An example would be 'Heras' type welded mesh panels on rubber or concrete feet. The panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabiliser struts. See Figure 3 overleaf. All-weather notices should be attached to the barrier with words such as 'TREE PROTECTION ZONE - NO ACCESS'.

5.2 Location

Barriers shall be positioned on the perimeter of the Root Protection Area to define the Construction Exclusion Zone or as specified in the Tree Protection Plan.

The Tree Protective Fencing is represented on the Tree Protection Plan by a black linetype containing the letters 'TPF'.

Figure 2 Example of welded mesh barriers in use



Figure 4 Default specification or protective barrier

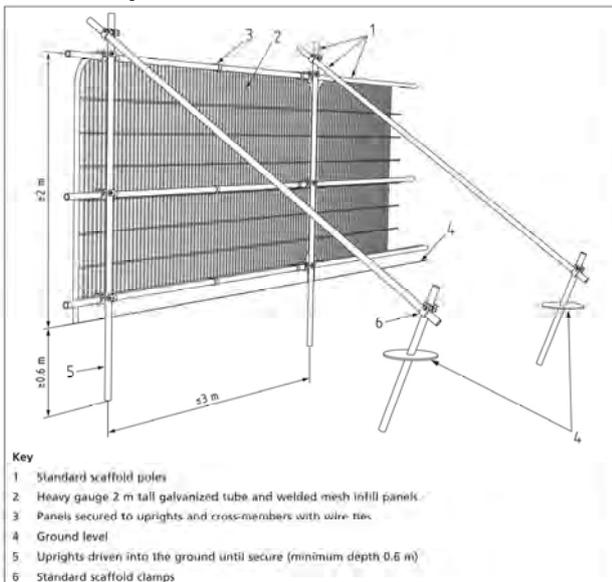
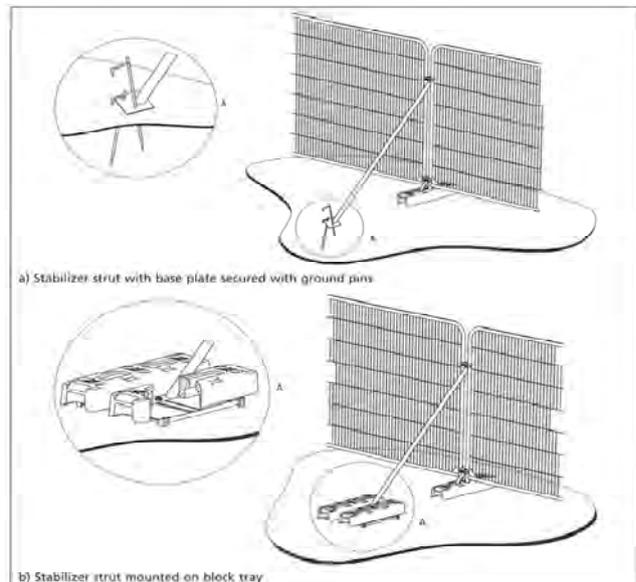


Figure 3 Examples of above-ground stabilizing system



Figures above are reproduced with the permission of the British Standards Institute.

5.3 Ground protection

In areas where it is not possible to erect protective fencing, ground protection must be used to protect the CEZ of trees. Where it has been agreed during the design stage, and as shown on the tree protection plan, that vehicular or pedestrian access for the construction operation may take place within the CEZ, the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be within the CEZ at the edge of the agreed working zone, but the soil structure beyond the barrier to the edge of the CEZ should be protected with ground protection. This must be installed before any site activity takes place to protect soil structure and tree roots.

Ground protection must be fit for the purpose of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil. It might comprise one of the following:

- *“for pedestrian movements or the erection of scaffolding within the RPA the installation of ground protection in the form of a single thickness of scaffold boards either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip laid onto a geotextile;*
- *for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards or panels placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane; or for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.*

The following is a list of suppliers of temporary ground protection including polymer, metal or wooden panels. Other companies supply similar products, and the following are given only as an example:

- www.ground-guards.co.uk
- www.trakmatseurope.com
- www.centriforce.com
- www.marwoodgroup.co.uk
- www.groundtrax.com

Cellular confinement no-dig systems can also be used.

Figure 5 Examples of proprietary ground protection panels



Appendix 6: Methods of Work Close to Trees

6.1.1 Guidance for working within RPAs

(This chapter sets out the general principles that must be followed when working in RPAs).

6.1.2 Removal of hard surfaces within RPAs

All structures including hard surfaces, walls and fences within CEZs must be removed following the methods detailed below to minimise damage to tree roots.

The use of conventional tracked and wheeled machinery causes damage to soil structure from compaction and damage to roots from excavation and must not be used within the CEZ. All areas of hard surfacing requiring removal within a CEZ will be broken up using a hand-held pneumatic drill or mounted hydraulic breaker attached to a digger located outside the CEZ. The broken rubble will then be removed by hand.

The only exception to this is where the hard surface is of such a size as not to be reachable from outside the CEZ. In this situation, a rubber tracked mini digger will be used. The maximum working height of the machine must be less than the lowest branch of any overhanging trees.

The mini digger will work from the existing hard surface pulling the debris away from the tree/s.

No excavation of existing soil beneath the hard surface will take place.

Immediately after removal of the hard surface, topsoil or sharp sand must be used to cover the soil surface and any roots to prevent drying out.

Upon completion, the protective fencing must be moved out to the edge of the CEZ or ground protection used if access is required.

6.1.3 Services

The location and direction of new services should be designed to allow for services to be routed away from the RPAs of retained trees.

If any services need to run through a CEZ, the main contractor must contact the project arboriculturist before any works are undertaken. The agreement will then be sought from the LPA tree officer on methodology. Works will only begin with the agreement of the LPA. The methodology used must comply with *NJUG Volume 4: Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*, which can be summarised as:

- *hand excavate only;*
- *work carefully around roots only cutting as a last resort;*
- *do not cut roots over 25 mm in diameter without referring to the project arboriculturist, and*
- *for roots, less than 25 mm in diameter use a sharp tool to make a clean cut leaving as small a wound as possible.” (BS5837:2012)*

6.1.4 New hard surfaces within RPAs

Where it has been agreed with the LPA that hard surfaces are acceptable within RPAs of retained trees, these will require designing to be of above ground, no-dig construction to minimise the impact on tree roots and soil structure. In addition, finished surfaces of the car parking and paved areas will need to be of a porous design to allow water and an air passage in and out.

An illustrative example of a cellular confinement no-dig system can be found below. The actual system will need to be designed by a structural engineer to accommodate the loadings anticipated

The principles to follow are:

- *“no excavation other than the removal of existing hard surfaces if required, or the removal of surface vegetation and no more than 50 mm of leaf litter, vegetation debris etc.;*
- *a method to spread and support the load of the hard surface and anticipated usage without causing compaction of the soil structure beneath;*
- *the use of a porous sub-base and finishing layer to allow water and air diffusion in and out of the soil;*
- *porosity must be designed to be long-term and not to block with fine particles in the short-term; therefore irregular, no-fines aggregate must be used; and*
- *the pH of the aggregate must be considered as many conventional road stones have very high pH values which can damage susceptible trees and therefore aggregates with a near neutral pH should be preferred.” (BS5837:2012)*

6.2 Examples of a Cellular Confinement System

Figure 6 Cellular Confinement System - Transition detail (Ramp)

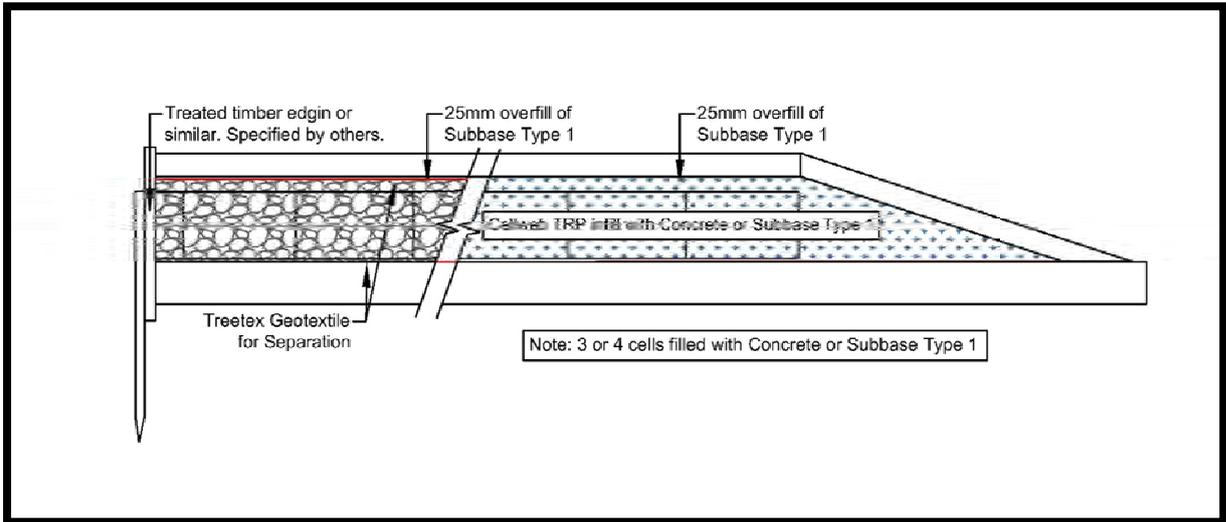


Figure 7 Cellular Confinement System - Transition detail (Flat)

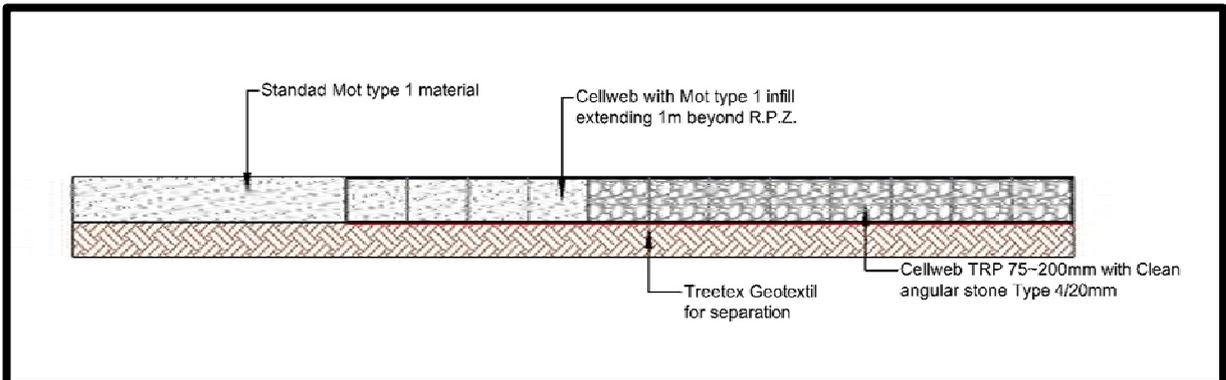


Figure 8 Cellular Confinement System - Kerb Edging

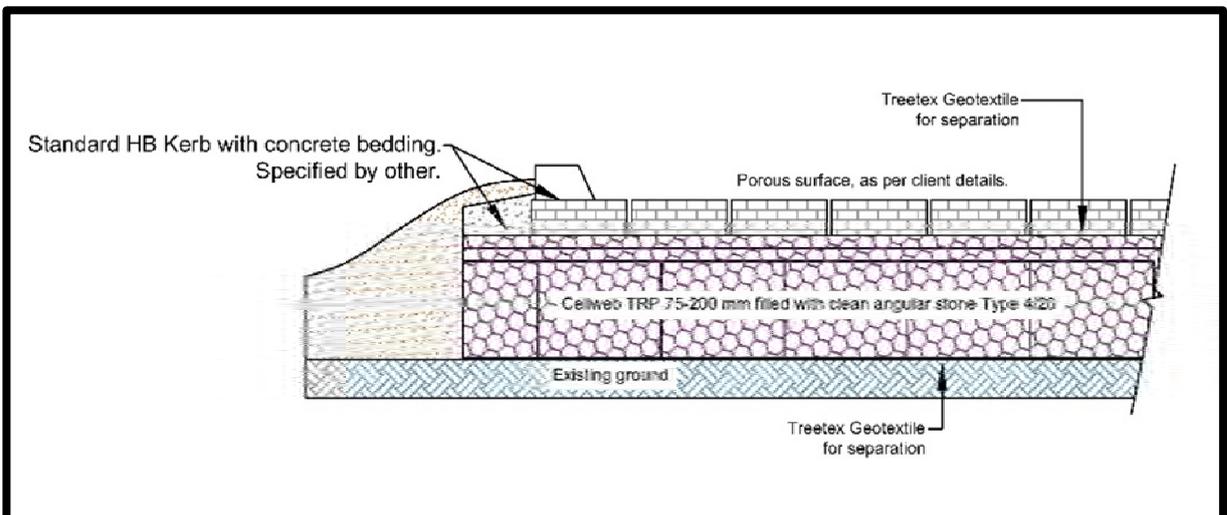


Figure 9 Cellular Confinement System - Timber Edging

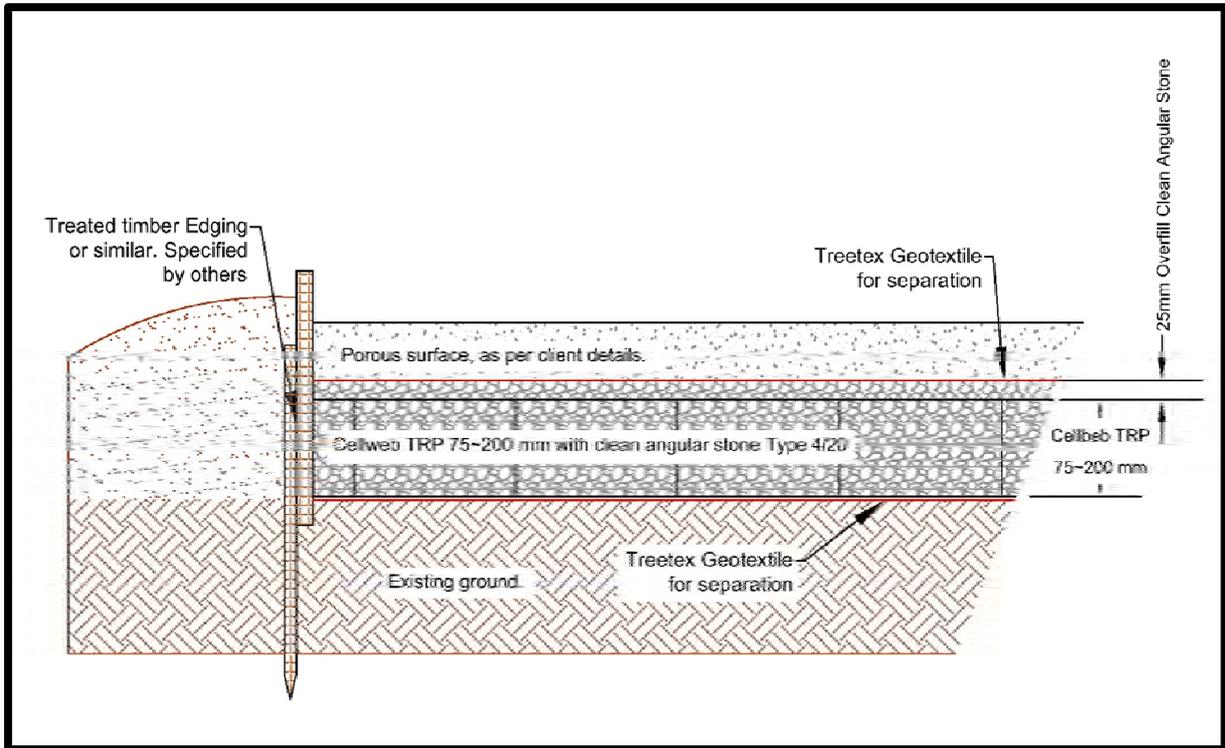


Figure 10 Examples of Cellweb filling with angular stone



6.3 Fencing within RPAs

Where posts are to be installed within RPAs, the holes must be dug carefully by hand. If roots with a diameter of 25 mm or greater are found, the position of the post must be moved. Roots smaller than 25 mm diameter can be cut with sharp tools leaving as small a wound as possible. The sides of the hole should be lined with an impermeable membrane such as plastic sheeting to prevent the caustic and toxic effects of wet cement in the concrete from damaging tree roots. In the event the of finding roots greater than 25 mm whereby the posts cannot be relocated, special construction methods will need to be used with onsite supervision. The detail of which will form part of the Arboricultural Method Statement.

6.4 Landscaping works within RPAs

Landscape operations within tree protection zones have the potential to damage trees if not carried out with care; in addition, the removal of protective fencing to carry out landscape operations may allow other contractors in previously protected areas.

If protective fencing is taken down to facilitate landscaping operations, the area of the CEZ must be delineated by pins and marker tape, spray paint, or some other method to clearly show the extent of the CEZ.

The preparation of soil for planting and turfing must be carried out by hand where within CEZs. Cultivation should be kept to a minimum and new topsoil added must not exceed 100mm in depth within 1m of the stem of any tree.

Topsoil and other materials must be transported by wheelbarrow on running boards when working within CEZs.

Appendix 7: Tree Work Schedule

Tree No.	Species	Proposed Works	Reason	BS5837 Category
T1	Acer pseudoplatanus (Sycamore)	Removal	To accommodate the layout	C2
T2	Acer pseudoplatanus (Sycamore)	Removal	To accommodate the layout	C2
T3	Acer pseudoplatanus (Sycamore)	Potential Crown Pruning	To facilitate construction	C2
T34	Platanus x hispanica (London Plane)	Removal	Due to poor condition	U
T45	Crataegus monogyna (Common Hawthorn/Quick/May)	Removal	To accommodate the layout	C2
W52	Salix sp. (Willow sp.), Crataegus monogyna (Common Hawthorn/Quick/May)	Removal	To accommodate the layout	C2
T60	Fraxinus excelsior (Ash)	Removal	To accommodate the layout	C2
T61	Fraxinus excelsior (Ash)	Removal	To accommodate the layout	C2

Appendix 8: Specific Report Caveat and References

8.1 Specific report caveats

The survey was based on drawings provided by the client, a topographical plan identifying accurate tree locations was used for the survey.

No internal diagnostic equipment was used other than a sounding mallet and probe.

The survey is concerned solely with arboricultural issues.

Any work with trees will discharge the due diligence requirements of all relevant wildlife and countryside legislation.

Trees are dynamic living organisms whose health and the condition can change rapidly. Any changes to the tree or conditions close to the tree may change the stability and condition of the tree and a further examination would be required and may affect the validity of this report.

This report is valid for 12 months.

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