



**Arboricultural Method Statement & Tree Protection Plan – In
Accordance with BS 5837:2012**

Proj. No 7938	Turing House School, Hospital Bridge Road, Twickenham, London TW2 6LH		
Client:		Bowmer and Kirkland	
Date of Report:	30/04/2020	Revision:	A

***Arboricultural Method Statement & Tree
Protection Plan – In Accordance with
BS 5837:2012***

**Turing House School, Hospital Bridge Road,
Twickenham TW2 6LH**

Contents

- 1.0 Introduction**
- 2.0 Specific Details**
- 3.0 Appendices**



1.0 Introduction

1.1 Terms of Reference

- 1.1.1 Hayden's Arboricultural Consultants Limited has been commissioned by Bowmer and Kirkland Ltd to prepare a bespoke Arboricultural Method Statement for the proposed development at Turing House School, Hospital Bridge Road, Twickenham TW2 6LH.
- 1.1.2 This report provides supplementary information to that submitted in the Tree Survey, Arboricultural Impact Assessment and Method Statement & Tree Protection Plan ref: 6924 rev. C, dated 28th June 2019.
- 1.1.3 In accordance with the requirements of London Borough of Richmond upon Thames Council, the following information is required to ensure the discharge of conditions 32 and 33:
- (i) Protective Fencing
 - (ii) Site Compound Location
 - (iii) Material and Plant Storage Area
 - (iv) Access Facilitation Pruning
 - (v) Tree Removal
 - (vi) Construction Phasing
 - (vii) Installation of Boundary Security Fencing
 - (viii) Services
 - (ix) Monitoring Schedule

2.0 Specific Details

2.1 Fencing

- 2.1.1 Prior to the commencement of development and immediately after the completion of the necessary tree work, protective fencing will be erected on site. In this instance it is proposed to install a combination of solid plywood hoarding and Heras fencing, as detailed within the Construction and Environmental Management Plan (CEMP) Rev. F, prepared by Bowmer and Kirkland Ltd.
- 2.1.2 The location where solid plywood hoarding and Heras fencing are to be installed in line with the CEMP is shown on the attached drawing no. 7938-D-AMS rev. A (Appendix G).
- 2.1.3 Additional protective fencing to that specified within the CEMP will also be erected prior to the commencement of development and immediately after the completion of the necessary tree work. This is to ensure maximum protection for
- 2.1.4 Details of protective fencing are supplied in Appendix F.
- 2.1.5 Original positioning and all subsequent re-alignments must be agreed on site by the Monitoring Arboricultural Consultant.



2.2 Site Compound Location

2.2.1 The locations of the site compound and accommodation are within the Construction and Environmental Management Plan Rev. F, prepared by Bowmer and Kirkland Ltd. For clarity these areas have also been superimposed onto the attached drawing no: 7938-D-AMS rev. A.

2.3 Material and Plant Storage Location

2.3.1 The locations identified for material and plant storage are identified within the Construction and Environmental Management Plan Rev. F, prepared by Bowmer and Kirkland Ltd. For clarity these areas have also been superimposed onto the attached drawing no: 7938-D-AMS rev. A.

2.4 Access Facilitation Pruning

2.4.1 Access facilitation pruning (AFP) is fully detailed in the Tree Survey, Arboricultural Impact Assessment and Method Statement & Tree Protection Plan dated 28th June 2019, ref: 6924 rev. C. The specification is reproduced in the table below, at Appendix C and shown on the attached drawing no. 7938-D-AMS rev. A.

2.4.2 In addition to the AFP detailed in report ref. 6924 rev. C, it is proposed to undertake root pruning to two additional trees (T021 & T031) and crown lift one further tree (T001). Two trees previously identified for retention and requiring AFP (T034 and T035) are now proposed for removal.

Tree no.	Specified work
T001	Lift crown to 2m above ground level on the tree's northern aspect.
T012	Undertake linear root pruning at the location identified on the attached drawing no. 7938-D-AMS rev. A.
T021	Undertake linear root pruning at the location identified on the attached drawing no. 7938-D-AMS rev. A.
T031	Lift crown to 2.75m above ground level on the tree's northern aspect and undertake linear root pruning at the location identified on the attached drawing no. 7938-D-AMS rev. A.
T032	Lift crown to 2.75m above ground level on the tree's northern aspect.
T033	Lift crown to 2.75m above ground level on the tree's northern aspect.

2.4.3 T012 requires root pruning to facilitate construction of the car park. Given this specimen has historically been topped and maintained at circa. 1m above ground level and the incursion into its root protection area (RPA) is 10%, it's considered the works will have a negligible impact on the tree's longevity.

2.4.4 T021 requires root pruning to facilitate construction of the MUGA and a footpath. It was initially proposed to install 'no-dig' surfacing within the affected sections of the tree's RPA. Having reviewed the proposal, given the works occur at the periphery of the tree's RPA and that only 6% of its RPA is affected by the works, it's also considered the pruning will have a negligible impact on the tree's longevity.



- 2.4.5 Where root pruning is proposed within the RPA of T012 and T021, the ground will be carefully excavated by hand to the depth of the proposed construction. Roots unearthed will be cleanly severed using secateurs or a handsaw and a non-permeable membrane will then be inserted between any roots severed and the adjacent surfacing. **This activity will take place under arboricultural supervision and photographic evidence forwarded to the Local Planning Authority (LPA).**
- 2.4.6 Following completion of the root pruning within the RPA of T021, a root barrier will be installed at the edge of the MUGA. This is required to prevent any direct damage occurring to the MUGA as a result of future root growth. **This activity will take place under arboricultural supervision and photographic evidence forwarded to the Local Planning Authority (LPA).**
- 2.4.7 T001, T031, T032 and T033 require crown lifting to 2m and 2.75m above ground level on their northern aspects to facilitate installation of 1.8m and 2.4m high site security fencing, as detailed on Ares Landscape Architects drawing no. FS0316-ALA-00-XX-DR-L-0024 rev. P03 (Appendix H).

2.5 Tree Removal

- 2.5.1 The trees listed in the table below have been identified for removal prior to commencement of development.
- 2.5.2 In addition to the tree removals to facilitate development detailed in report ref. 6924 rev. C, seven additional trees (T002, T015, T034, T035, T036, T037 and T038) have been identified for removal. This is required to facilitate installation of site security fencing.

Tree no.	T002, T004, T005, T006, T007, T008, T013, T015, T019, T020, T034, T035, T036, T037, T038, T039, T040, T045, A003 (section), G002 and H001 (section).
-----------------	--

- 2.5.3 These trees are identified on drawing no. 7938-D-AMS rev. A by red-cross hatching. A list of the trees to be removed is also included at Appendix C.
- 2.5.4 The below table, extracted from the Tree Survey, Arboricultural Impact Assessment and Method Statement & Tree Protection Plan ref: 6924 rev. C dated 28th June 2019 and updated to include T002, T015, T034, T035, T036, T037 and T038, provides the reason for each tree and landscape feature's removal.

Feature / Tree No.	Reason for Removal
A003 (section)	To facilitate installation of security boundary fence.
G002	To facilitate construction of the parking area and teaching block.
H001 (section)	To facilitate installation of security boundary fence.
H004	To facilitate construction of the footpath.
T002	To facilitate installation of security boundary fence.
T004	To facilitate construction of the access and parking area.
T005	To facilitate construction of the access and parking area.
T006	To facilitate construction of the access and parking area.
T007	To facilitate construction of the access and parking area.
T008	To facilitate construction of the parking area.



T013	To facilitate construction of the parking area.
T015	To facilitate installation of security boundary fence.
T019	To facilitate construction of the teaching block.
T020	To facilitate construction of the teaching block.
T034	To facilitate installation of security boundary fence.
T035	To facilitate installation of security boundary fence.
T036	To facilitate landscaping.
T037	To facilitate landscaping.
T038	To facilitate landscaping.
T039	To facilitate installation of the sports pitches.
T040	To facilitate installation of the sports pitches.
T045	To facilitate construction of the access and parking area.

2.6 Construction Phasing

2.6.1 Construction phasing is shown within the Construction and Environmental Management Plan Rev. F, prepared by Bowmer and Kirkland Ltd.

2.7 Installation of Boundary Security Fencing

2.7.1 Permanent security boundary fencing is to be installed along each of the site's boundaries. The fencing will be positioned within the RPA of eleven trees, one hedge and one group of trees to be retained – T001, T010, T012, T018, T021, T022, T023, T024, T031, T032, T033, H001 and G001 respectively.

2.7.2 Where fencing is to be installed within the RPA of T010, T012, T018, T024 and H001 this occurs at the periphery of their RPAs. It's therefore considered its installation will have a negligible impact on their longevity. However, to prevent phytotoxic concrete adversely affecting the retained trees' roots, each foundation hole at the periphery of the retained trees' RPA will be lined with a non-permeable geotextile membrane. **This activity will take place under arboricultural supervision and photographic evidence forwarded to the LPA.**

2.7.3 Although the proposed incursion is not considered to be significant, where fencing is to be installed within the RPA of T001, T021, T022, T023, T031, T032, T033 and G001, the pad foundations for the fencing supports will be excavated by hand where located within their RPAs. Where roots >10mm in diameter are encountered, the position / size of the pad will be adjusted accordingly to ensure their retention. Roots <10mm in diameter will be cleanly severed using secateurs. Prior to being backfilled, each foundation hole within the RPA will be lined with a non-permeable geotextile membrane to prevent phytotoxic concrete adversely affecting the retained trees' roots. **This activity will take place under arboricultural supervision and photographic evidence forwarded to the LPA.**

2.8 Services

2.8.1 The proposed service routes for the HV cable duct, LV cable duct, Comms duct, incoming BT duct, Fire Alarms duct, Gas pipework and Water pipework are identified on TClarke Contracting drawing no. FS0316-TCL-XX-XX-DR-N9021 (Appendix I). All service routes are located outside of the retained trees' RPAs and no adverse arboricultural implications are therefore expected.



2.9.1 **Monitoring Schedule**

- 2.9.1 It is beneficial to identify the key arboricultural responsibilities associated with the progression of the development. Accordingly, a “Statement of Supervision (Arboriculture)” has been included at Appendix E. The purpose of this document is to identify a definite decision making and data recording structure in the monitoring process, together with providing a list of specific inspection trigger points.



3.0 Appendices

Appendix	A	Species List
Appendix	B	Schedule of Trees
Appendix	C	Schedule of Works to Allow Development
Appendix	D	Explanatory Notes
Appendix	E	Statement of Supervision (Arboriculture)
Appendix	F	Advisory Information & Sample Specifications
	1.	BS 5837:2012 Figure 1 - Flow Chart – Design and Construction & Tree Care
	2.	European Protected Species and Woodland Operations Checklist (v.4)
	3.	BS 5837:2012 Figure 2 - Default specification for protective barrier
	4.	BS 5837:2012 Figure 3 - Examples of above-ground stabilizing systems
	5.	Figure 4 Details of Protective Barrier
	6.	Air Spade Excavation Specification
Appendix	G	Drawing no: 7938-D-AMS rev. A
Appendix	H	Drawing no. FS0316-ALA-00-XX-DR-L-0024 rev. P03
Appendix	I	Drawing no. FS0316-TCL-XX-XX-DR-N9021



Appendix A - Species List & Tree Problems

Species List:

Amur Maple	<i>Acer sp.</i>
Ash	<i>Fraxinus sp</i>
Birch	<i>Betula sp</i>
Cherry	<i>Prunus sp</i>
Cypress	<i>Cupressus sp</i>
Elder	<i>Sambucus sp</i>
Eucalyptus	<i>Eucalyptus sp</i>
Field Maple	<i>Acer sp</i>
Hawthorn	<i>Crataegus sp</i>
Hazel	<i>Corylus sp</i>
Holm Oak	<i>Quercus sp</i>
Hornbeam	<i>Carpinus sp</i>
Horse Chestnut	<i>Aesculus sp</i>
Jaquemont's Birch	<i>Betula sp</i>
Lime	<i>Tilia sp</i>
Lombardy Poplar	<i>Populus sp</i>
Maidenhair tree	<i>Ginkgo sp</i>
Norway Maple	<i>Acer sp</i>
Oak	<i>Quercus sp</i>
Pear	<i>Pyrus sp</i>
Pine	<i>Pinus sp</i>
Plum	<i>Prunus sp</i>
Purple Norway Maple	<i>Acer sp</i>
Robinia	<i>Robinia sp</i>
Rowan	<i>Sorbus sp</i>
Sycamore	<i>Acer sp</i>
Turkish Hazel	<i>Corylus sp</i>
Viburnum	<i>Viburnum sp</i>
Weeping Beech	<i>Fagus sp</i>
Yew (English)	<i>Taxus sp</i>



Tree Problems:

This gives a brief description of the problems identified in the attached Tree Survey.

Name: Artist's Fungus (<i>Ganoderma applanatum</i> & <i>adspersum</i>):	
Alternative or common names: "Ganoderma"	
Symptoms/Damage Type:	It causes heart rot in the infected tree, turning the wood white and ultimately soft and spongy as the rot consumes the lignin.
Consequence:	This rot causes the weakening of the tree and may eventually cause the tree to fall / snap or branches to break off. Some trees may remain structurally sound for many years depending upon the health of the affected tree and the rate and distribution of decay.
Control Measures:	No control is available, severely affected trees should be felled where there is potential for harm to persons or property by a falling branch or tree.

Name: Deadwood	
Symptoms/Damage Type:	This relates to dead branches in the crown of the tree. In the majority of cases, this is caused by the natural ageing process of the tree or shading due to its close proximity to neighbouring trees. However, in some situations, it may be related to fungal, bacterial or viral infection.
Consequence:	Depending upon the location and mass of dead wood removal of the affected tissue may be necessary to prevent harm to persons or property as the wood will become unstable as it decays and in some circumstances is likely to fall from the tree with little or no warning.
Control Measures:	Detailed monitoring should be undertaken on those trees showing signs of excessive deadwood production to identify the underlying cause.

Name: Epicormic growth	
Symptoms/Damage Type:	This is the production of numerous shoots on the main stem and branches of the tree. They are produced by the bursting into life of otherwise dormant buds. It is commonly associated with elevated levels of stress on the tree.
Consequence:	Whilst epicormic growth is usually symptomatic of an issue elsewhere within the tree heavy proliferation can cause the trees resources to become depleted or may mask significant structural weaknesses within the framework of the tree.
Control Measures:	Pruning off epicormic growth may be necessary to improve the visual amenity of the tree or prevent the development of a hazard or obstruction. No direct means of prevention are available other than therapeutic measures to alleviate stresses on the tree.



Name: Ivy (<i>Hedera helix</i>)	
Symptoms/Damage Type:	Ivy may grow to varying degrees on all areas of a tree from the base to the upper crown. It is possible that in doing so it will out-compete the host tree for available light thereby suppressing the host.
Consequence:	This is generally only harmful to the tree on already unhealthy specimens which may be constricted by large ivy stems around the trunk or may have their top growth suppressed by a mass of flowering shoots in the crown.
Control Measures:	Ivy should only be removed if absolutely necessary because it provides abundant cover to wildlife and then by severing twice close to the ground and removing a length of stem thereby causing the gradual dying away of the aerial parts of the plant providing extended benefit to wildlife whilst relieving the pressure on the tree.

Name: Oak Powdery Mildew (<i>Microspheara alphitoides</i>)	
Symptoms/Damage Type:	Very common disease in Europe on most species of Oak. It appears around mid May onwards as a powdery white coat on the leaves and shoots.
Consequence:	It often cripples young plants. However on mature trees, although often prolific on young shoots and Lammas shoots in late summer, the effects are rarely serious unless attacked persistently for a large number of years.
Control Measures:	None required.

Name: Tar Spot (<i>Rhytisma acerinum</i>)	
Symptoms/Damage Type:	This is very common and widespread on Sycamore but can also affect numerous Acer species. The fungus causes large black bituminous blotches with yellow halos on the upper surfaces of the leaves from mid-summer onwards, preceded, but rarely noticed by yellowish patches in spring.
Consequence:	Fortunately whilst rather unsightly the blotches do little to damage the health of the tree unless an immature specimen is persistently infected.
Control Measures:	Unfortunately these blotches are not easily controlled. However it is recommended that all the leaf litter is collected and burnt in the autumn to prevent the spread of the spores.



Appendix B

Schedule of Trees

SCHEDULE OF TREES (AIA) Turing House School, Hospital Bridge Road, Twickenham, London

Surveyed By: Nick Hayden
Managed By: Nick Hayden

Date:

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)	
			Min Dist	Crown Base									Lowest Branch
			On site	RPA (m ²)	Aspect	Aspect							SULE
A001	Oak, Holm Oak and Hawthorn	200	4		Moderate	N2.0, E2.0, S2.0, W2.0	Small area comprising of Holm Oak, Oak and Hawthorn at the apex of a bank adjacent to road. All dimensions are estimated due to restricted access. At current dimensions trees are considered to pose little risk.	C2	No work required.	4			
		2.4	0-2m		SM	High							
		18.1			10 + years	Grass, Dense undergrowth							
A002	Ash, Hawthorn, Holm Oak, Pine and Robinia	250	12		Moderate	N3.0, E3.0, S3.0, W3.0	Area consisting predominantly of Hawthorn with Ash, Robinia, Pine and Holm Oak.	C2	No work required.	4			
		3	0-2m		SM	High							
		28.3			10 + years	Ivy, Dense undergrowth							
A003	Hawthorn and Plum	250	6		Low	N3.0, E3.0, S3.0, W3.0	Area of neglected Hawthorn and Plum. Dense bramble.	C2	No work required.	4	Fell northern section shown on drawing no. 7938-D-AMS rev. A to facilitate installation of security boundary fencing.	0	
		3	0-2m		SM	Moderate							
		28.3			10 + years	Dense undergrowth							
A004	Cypress	450	19		High	N99.0, E6.0, S99.0, W5.0	Prominent linear belt of Cypress separating site and cemetery. Off-site trees. Average height and estimated DBH provided. No stems plotted on TOPO. Dead stems within group. Many stems display evidence of notable dieback in their upper canopy and the remainder all show reduced vigour and impaired health. Within 1m of their stems, circa. 2/3rds of the northern most section of the belt, a new road has been constructed. Significant root severance evident where concrete haunching installed. Trees structural integrity and safe retention most likely severely compromised due to this. Detailed inspection to be undertaken by landowner. Stems within southern section of belt display, poor multi-stemmed form with tight unions.	U	Detailed inspection to be undertaken by landowner (root damage and declining health).	1			
		5.4	0-2m		M	High							
		91.6			<10 Years	Mixed soft/hard surface							

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		On site	RPA (m ²)	Aspect	Aspect	SULE						
G001	Oak	610	12		High	N5.0, E5.0, S5.0, W5.0	Group of 3x Oak, 2 of which are multi-stemmed. Located towards the apex of a bank adjacent to the highway and railway. All trees have asymmetrical crowns but have matured to form one homogenous crown. Southern and central specimen have been heavily lifted and tipped back on their eastern aspect over the adjacent highway. Epicormic stem growth. Minor deadwood. No obvious indicators of disease or decay.	B2	Remove major deadwood.	3		
		7.32	0-2m		EM	High						
Yes		168.3			20+ years	Grass, Ivy, Light undergrowth						
G002	Birch, Hornbeam, Lime, Pear and Rowan	150	6		Low	N2.0, E2.0, S2.0, W2.0	Group of 28x Lime, Rowan, Birch, Pear, Hornbeam. Most likely nursery planting. Two dead trees within the group and remainder are of varied condition and health.	C2	No work required.	4	Fell to facilitate construction of parking area and teaching block.	0
		1.8	0-2m		Y	Moderate						
Yes		10.2			10 + years	Grass						
G003	Hawthorn	100	2.5		Low	N1.5, E1.5, S1.5, W1.5	Group of 10x young Hawthorn. Not plotted on Topo.	C2	No work required.	4		
		1.2	0-2m		Y	High						
Yes		4.5			10 + years	Grass						
H001	Hawthorn and Cherry	300	5		Moderate	N2.5, E2.5, S2.5, W2.5	Neglected Hawthorn hedge. 2x Ivy clad Cherries at western aspect of hedge.	C2	No work required.	4	Fell western section shown on drawing no. 7938-D-AMS rev. A to facilitate installation of security boundary fencing.	0
		3.6	0-2m		EM	High						
Yes		40.7			10 + years	Grass, Ivy, Light undergrowth						
H002	Hawthorn and Elder	250	6		Moderate	N3.0, E3.0, S3.0, W3.0	Possibly off-site. Located between barbed wire fence and private rear boundaries. Neglected Hawthorn hedge with multiple dead stems. Ivy clad. Elder interspersed throughout.	C2	No work required.	4		
		3	0-2m		EM	High						
No		28.3			10 + years	Dense undergrowth						
H003	Hawthorn and Elder	300	6		Moderate	N3.0, E3.0, S3.0, W3.0	Mainly off-site. Neglected Hawthorn hedge. Ivy clad and interspersed with Elder.	C2	No work required.	4		
		3.6	0-2m		EM	High						
No		40.7			10 + years	Dense undergrowth						
H004	Hazel and Viburnum	80	1.5		Moderate	N10.0, E1.0, S10.0, W1.0	Well maintained Hazel and Viburnum hedge.	C2	No work required.	4	Fell to facilitate construction of footpath subject to landowner consent).	0
		0.96	0-2m		SM	Moderate						
No		2.9			10 + years	Grass, Tarmac						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m²)	Aspect	Aspect	SULE	Ground Cover						
T001	Field Maple	380	8.5		Low	N4.0, E4.5, S4.0, W4.0	Multi-stemmed from ground level. Circa. 10x stems with average DBH of 120mm. Tight unions. Crossing, rubbing stems and branches. Canopy displays normal, healthy vigour. Whilst tree has impaired form, at its current dimensions it is considered to pose little risk.	C1	No work required.	4	Crown lift to 2m on northern aspect of facilitate installation of security boundary fencing.	0
		4.56	0-2m		EM	Moderate						
Yes		65.3			10 + years	Grass						
T002	Lime	140	6		Low	N2.0, E2.0, S2.0, W2.0	No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C2	No work required.	4	Fell to facilitate installation of security boundary fencing.	0
		1.68	0-2m		Y	Moderate						
Yes		8.9			10 + years	Grass						
T003	Turkish Hazel	130	4		Low	N1.5, E1.5, S1.5, W1.5	Topped at circa. 4m. Crown displays reduced vigour. At current dimensions tree is considered to pose little risk.	C2	No work required.	4		
		1.56	0-2m		Y	Low						
Yes		7.6			10 + years	Grass						
T004	Horse Chestnut	160	5.5		Low	N3.5, E4.0, S3.0, W3.0	Tight unions. Branch wounds. Minor deadwood. Crown displays reasonable vigour. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate construction of access and parking area.	0
		1.92	0-2m		SM	Moderate						
Yes		11.6			10 + years	Grass						
T005	Norway Maple	170	8.5		Low	N2.0, E2.0, S2.0, W2.0	Fastigate canopy. Recently crown lifted. Tight unions. Crossing, rubbing branches. Crown displays normal, healthy vigour. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate construction of access and parking area.	0
		2.04	2.1-4m		SM	Moderate						
Yes		13.1			10 + years	Grass						
T006	Norway Maple	150	7		Low	N2.0, E2.0, S2.0, W2.0	Fastigate canopy. Recently crown lifted. Tight unions. Crossing, rubbing branches. Crown displays normal, healthy vigour. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate construction of access and parking area.	0
		1.8	2.1-4m		SM	Moderate						
Yes		10.2			10 + years	Grass						
T007	Norway Maple	160	7		Low	N2.0, E2.0, S2.0, W2.0	Fastigate canopy. Recently crown lifted. Poor pruning. Tight unions. Crossing, rubbing branches. Crown displays normal, healthy vigour. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate construction of access and parking area.	0
		1.92	0-2m		SM	Moderate						
Yes		11.6			10 + years	Grass						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T008	Jacquemont's Birch	60	3.5		Low	N1.5, E1.5, S1.5, W1.5	Twin-stemmed from ground level. DBH of stems is 2x 40mm. Poor union. Extensive strimmer damage at base. Stem decay. Crown displays poor vigour. At current dimensions tree is considered to pose little risk. Not plotted on TOPO.	U	No work required.	4	Fell to facilitate construction of proposed parking area.	0
		0.72	0-2m		Y	Low						
Yes		1.6			<10 Years	Grass						
T009	Cherry	160	5		Low	N1.5, E1.5, S1.5, W1.5	Significant stem decay from base to circa. 2m above ground level. Failed leader. Poor form and condition.	U	Fell to ground level.	3		
		1.92	0-2m		SM	Moderate						
Yes		11.6			<10 Years	Grass, Light undergrowth						
T010	Hawthorn	400	3		Moderate	N2.0, E2.0, S2.0, W2.0	Located at the apex of a bank adjacent to highway. Multi-stemmed from ground level and topped / maintained at circa. 1m above ground level. DBH estimated. At current dimensions tree is considered to pose little risk. An unremarkable specimen. Not plotted on TOPO.	C1	No work required.	4		
		4.8	0-2m		M	Moderate						
Yes		72.4			10 + years	Grass						
T011	Oak	210	7		Moderate	N2.5, E1.0, S4.0, W4.0	Located on the apex of a bank adjacent to the highway. Canopy heavily reduced on eastern aspect to ensure clearance of adjacent lamp column. Crown displays reasonable vigour. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk.	C2	No work required.	4		
		2.52	0-2m		SM	High						
Yes		20			10 + years	Grass, Ivy						
T012	Hawthorn	450	6.5		Moderate	N3.5, E1.0, S4.0, W4.0	Located on the apex of a bank adjacent to the highway. Dense Ivy and vegetation impeded a detailed inspection of its base and stem. Multi-stemmed from circa. 1m above ground level. Historically topped. Canopy heavily reduced on eastern aspect to ensure clearance from adjacent highway. Crown displays reasonable vigour.	C2	No work required.	4	Undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction of parking area.	0
		5.4	0-2m		EM	High						
Yes		91.6			10 + years	Grass, Ivy						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		On site	RPA (m ²)	Aspect	Aspect	SULE						
T013	Cherry	250	10		Low	N4.5, E5.0, S4.5, W4.0	Foreign object encased in stem on northern aspect at circa. 0.3m above ground level. Resin bleeding from stem. Tight unions. Crown displays reduced vigour. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate construction of parking area.	0
		3	0-2m		EM	Moderate						
Yes		28.3			10 + years	Grass						
T014	Ash	140	5		Low	N2.0, E2.0, S2.0, W2.0	Off-site. Located at the apex of railway line bank and directly adjacent to site boundary. Ash dieback throughout crown. At current dimensions tree is considered to pose little risk. Not plotted on TOPO.	U	Fell to ground level (subject to landowner consent).	3		
		1.68	0-2m		Y	Moderate						
No		8.9			<10 Years	Grass, Gravel						
T015	Cypress	270	7.5		Low	N2.5, E3.0, S3.0, W3.0	Contorted stem growth. Tight unions. No obvious indicators of disease or decay. At current dimensions tree is considered to pose little risk. An unremarkable specimen.	C1	No work required.	4	Fell to facilitate installation of security boundary fencing.	0
		3.24	0-2m		EM	High						
Yes		33			10 + years	Grass						
T016	Norway Maple	320	9		Moderate	N3.5, E4.5, S3.5, W3.5	Stem lean to north, towards railway line. Dense Ivy impeded a detailed inspection of base and stem. Minor deadwood. Canopy displays reasonable vigour. Tar spot.	C2	Remove Ivy from ground level to 3m. Re-inspect.	2		
		3.84	0-2m		EM	Moderate						
Yes		46.3			10 + years	Ivy, Light undergrowth						
T017	Lombardy Poplar	580	24		High	N3.0, E3.0, S3.0, W1.0	Located adjacent to railway line. Dense Ivy impeded a detailed inspection of base and stem. However, tapping stem with a sounding mallet revealed presence of notable decay in stem. Given this species is poor at compartmentalising decay and its location adjacent to the railway, its removal is recommended. Crown chlorotic with notable dieback on its western aspect. June 2019 - Tree has failed at circa. 6m.	U	Fell and poison stump.	2		
		6.96	2.1-4m		M	High						
Yes		152.2			<10 Years	Ivy, Dense undergrowth						
T018	Lombardy Poplar	700	25		High	N3.0, E3.0, S3.0, W3.0	Off-site. Restricted access impeded a detailed inspection. Crown displays reasonable vigour. Ditch to south is likely to have impeded root development within the site.	C2	No work required.	4		
		8.4	2.1-4m		M	High						
No		221.7			10 + years	Ivy						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T019	Oak	450	10		Moderate	N5.0, E5.0, S6.5, W6.0	Slight stem lean to south. Truncated branches. Moderate deadwood. Epicormic branch growth. Crown displays reasonable vigour. No obvious indicators of disease or decay.	B1	Remove major deadwood.	3	Fell to facilitate construction of teaching block.	0
		5.4	2.1-4m		EM	High						
Yes		91.6			20+ years	Grass, Light undergrowth						
T020	Oak	260	9		Moderate	N4.5, E4.0, S4.0, W4.5	Detailed inspection impeded by dense undergrowth and Ivy. Canopy displays normal, healthy vigour. Not plotted on TOPO.	B1	Remove Ivy from ground level to 2m. Re-inspect.	3	Fell to facilitate construction of teaching block.	0
		3.12	2.1-4m		SM	High						
Yes		30.6			20+ years	Ivy, Dense undergrowth						
T021	Oak	790	13		Moderate	N7.0, E6.0, S7.5, W6.5	Lapsed field boundary coppice. DBH of stems is 270, 280, 380, 390 and 410mm. Minor bark wounds at base of stems, however no active decay evident. Detailed inspection of base, unions and stems impeded by Ivy. Crossing, rubbing branches. Moderate deadwood. Epicormic growth in canopy. No obvious indicators of disease or decay. Crown displays normal, healthy vigour.	B1	Remove major deadwood. Remove Ivy from ground level to 4m. Re-inspect.	2	Undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction of MUGA and footpath.	0
		9.48	0-2m		M	High						
Yes		282.3			20+ years	Grass, Light undergrowth						
T022	Oak	590	12		Moderate	N6.0, E5.5, S6.5, W6.5	Detailed inspection of base and stem impeded by Ivy. Crossing, rubbing branches. Moderate deadwood. No obvious indicators of disease or decay. Crown displays normal, healthy vigour.	B1	Remove major deadwood. Remove Ivy from ground level to 4m. Re-inspect.	2		
		7.08	0-2m		M	High						
Yes		157.5			20+ years	Grass, Light undergrowth						
T023	Oak	750	17		High	N8.0, E8.5, S9.0, W8.0	Specimen potentially located off-site (behind barbed wire fence). Dense Ivy impeded a detailed inspection of base, stem and canopy. DBH therefore estimated. Multi-stemmed from circa. 3.5m above ground level, unions obscured by Ivy. Moderate deadwood. Crown displays normal, healthy vigour. Oak Processionary Moth (OPM) nest in northern aspect of crown.	B1	Remove major deadwood and OPM nest. Remove Ivy from ground level to 5m. Re-inspect.	2		
		9	0-2m		M	High						
No		254.5			20+ years	Ivy, Light undergrowth						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T024	Oak	950	17		High	N8.0, E7.5, S8.5, W10.0	Specimen potentially located off-site (behind fence). Rubbish and dense Ivy impeded a detailed inspection of base, stem and canopy. DBH therefore estimated. Multi-stemmed form, unions obscured by Ivy. Moderate deadwood. Crown displays normal, healthy vigour. OPM nest in western aspect of crown at circa. 4.5m above ground level.	B1	Remove major deadwood. Remove rubbish deposited around base. Remove OPM nest. Remove Ivy from ground level to 5m. Re-inspect.	2		
		11.4	0-2m		M	High						
No		408.3			20+ years	Ivy, Light undergrowth, Detritus						
T025	Purple Norway Maple	370	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4		
		4.44	2.1-4m		EM	Moderate						
No		61.9			20+ years	Grass						
T026	Purple Norway Maple	390	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4		
		4.68	2.1-4m		EM	Moderate						
No		68.8			20+ years	Grass						
T027	Purple Norway Maple	380	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4		
		4.56	2.1-4m		EM	Moderate						
No		65.3			20+ years	Grass						
T028	Purple Norway Maple	340	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4		
		4.08	2.1-4m		EM	Moderate						
No		52.3			20+ years	Grass						
T029	Purple Norway Maple	520	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	C2	No work required.	4		
		6.24	2.1-4m		EM	Moderate						
No		122.3			10 + years	Grass						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T030	Purple Norway Maple	430	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4		
		5.16	2.1-4m		EM	Moderate						
No		83.6			20+ years	Grass						
T031	Purple Norway Maple	410	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4	Crown lift on northern aspect to 2.75m and undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction installation of security boundary fencing.	0
		4.92	2.1-4m		EM	Moderate						
No		76			20+ years	Grass						
T032	Purple Norway Maple	410	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4	Crown lift to 2.75m to facilitate installation of security boundary fencing.	0
		4.92	2.1-4m		EM	Moderate						
No		76			20+ years	Grass						
T033	Purple Norway Maple	380	8.5		High	N4.0, E4.0, S4.0, W4.0	Off-site. Average crown spread and height taken and applied to all in the linear belt. DBH measured. Detailed inspection not undertaken. Plotted for constraint purposes. Not plotted on TOPO.	B2	No work required.	4	Crown lift to 2.75m to facilitate installation of security boundary fencing.	0
		4.56	2.1-4m		EM	Moderate						
No		65.3			20+ years	Grass						
T034	Norway Maple	200	6.5		Low	N3.0, E3.0, S3.0, W3.0	Self-set specimen. Twin-stemmed. DBH of stems is 2x140mm. Tight union. At current dimensions tree is considered to pose little risk.	C1	No work required.	4	Fell to facilitate installation of security boundary fencing.	0
		2.4	0-2m		Y	Moderate						
No		18.1			10 + years	Dense undergrowth						
T035	Sycamore	220	8.5		Low	N3.0, E1.0, S3.0, W2.5	Self-set specimen. Dense undergrowth impeded a detailed inspection. Asymmetrical canopy. At current dimensions tree is considered to pose little risk. An unremarkable specimen.	C1	No work required.	4	Fell to facilitate installation of security boundary fencing.	0
		2.64	0-2m		SM	Moderate						
Yes		21.9			10 + years	Dense undergrowth						
T036	Norway Maple	120	7		Low	N1.5, E1.5, S1.5, W1.5	Nursery planting. Unremarkable specimen.	C2	No work required.	4	Fell to facilitate landscaping.	0
		1.44	2.1-4m		Y	Moderate						
Yes		6.5			10 + years	Light undergrowth						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T037	Norway Maple	120	7		Low	N1.5, E1.5, S1.5, W1.5	Nursery planting. Unremarkable specimen.	C2	No work required.	4	Fell to facilitate landscaping.	0
		1.44	2.1-4m		Y	Moderate						
Yes		6.5			10 + years	Light undergrowth						
T038	Norway Maple	120	7		Low	N1.5, E1.5, S1.5, W1.5	Nursery planting. Unremarkable specimen.	C2	No work required.	4	Fell to facilitate landscaping.	0
		1.44	2.1-4m		Y	Moderate						
Yes		6.5			10 + years	Light undergrowth						
T039	Oak	70	4		Low	N1.0, E1.0, S1.0, W1.0	Young Oak. Not plotted on TOPO.	C1	No work required.	4	Fell to facilitate construction of proposed sports pitches.	0
		0.84	0-2m		Y	High						
Yes		2.2			10 + years	Grass						
T040	Hawthorn	70	3.5		Low	N1.5, E1.5, S1.5, W1.5	Young Hawthorn.	C1	No work required.	4	Fell to facilitate construction of sports pitches.	0
		0.84	0-2m		Y	High						
Yes		2.2			10 + years	Grass						
T041	Gum Tree	770	14		Moderate	N6.0, E7.5, S6.5, W6.0	Swept stem, however static imbalance has corrected itself. Possibly historic windblown specimen. Nevertheless, dieback throughout canopy and reduced vigour evident. Ganoderma sp. brackets at base on eastern aspect. Removal recommended given proximity to adjacent highway.	U	Fell to ground level.	1		
		9.24	2.1-4m		M	Moderate						
No		268.2			<10 Years	Shrub bed						
T042	Cypress	190	6.5		Low	N2.0, E2.0, S1.0, W1.5	No obvious indicators of disease or decay.	C2	No work required.	4		
		2.28	0-2m		SM	High						
No		16.3			10 + years	Shrub bed						
T043	Common Yew	170	3		Low	N1.5, E1.5, S1.5, W1.5	Topped and clipped specimen. No obvious indicators of disease or decay.	C2	No work required.	4		
		2.04	0-2m		SM	Moderate						
No		13.1			10 + years	Flower bed						

TreeNo	Species	DBH	Height		Visual	Crown Spread	Problems / Comments	BS Cat	Work Required (TS)	Priority (TS)	Work Required (AIA)	Priority (AIA)
		Min Dist	Crown Base	Lowest Branch	Age	Water Demand						
		RPA (m ²)	Aspect	Aspect	SULE	Ground Cover						
T044	Amur Maple	250	6		Moderate	N4.0, E4.6, S3.0, W4.0	Located in container constructed of sleepers, circa. 2.5 x 2.5m wide and 0.7m deep. Lamp column in canopy to east.	C2	No work required.	4		
		3	2.1-4m		Moderate							
No		28.3			10 + years	Flower bed						
T045	Weeping Beech	250	9		Low	N2.5, E2.6, S2.5, W2.0	Located in container, circa. 2.5 x 2m wide and 0.7m deep.	C2	No work required.	4	Fell to facilitate construction of access and parking area.	0
		3	2.1-4m		Moderate							
No		28.3			10 + years	Flower bed						
T046	Maidenhair Tree	180	11		Low	N2.0, E2.0, S2.0, W2.0	No obvious indicators of disease or decay	B2	No work required.	4		
		2.16	2.1-4m		SM	Low						
No		14.7			20+ years	Gravel						
T047	Maidenhair Tree	180	11		Low	N2.0, E2.0, S2.0, W2.0	No obvious indicators of disease or decay.	B2	No work required.	4		
		2.16	2.1-4m		SM	Low						
No		14.7			20+ years	Gravel						
T048	Maidenhair Tree	180	11		Low	N2.0, E2.0, S2.0, W2.0	No obvious indicators of disease or decay.	B2	No work required.	4		
		2.16	2.1-4m		SM	Low						
No		14.7			20+ years	Gravel						
T049	Maidenhair Tree	180	11		Low	N2.0, E2.0, S2.0, W2.0	No obvious indicators of disease or decay.	B2	No work required.	4		
		2.16	2.1-4m		SM	Low						
No		14.7			20+ years	Gravel						

Appendix C

Schedule of Works to Allow Development

SCHEDULE OF WORKS (AIA)

Turing House School, Hospital Bridge Road, Twickenham, London

Surveyed By: Nick Hayden

Surveyed:

Managed By: Nick Hayden

Tree No.	Species	Work required	Priority
A003	Hawthorn and Plum	Fell northern section shown on drawing no. 7938-D-AMS rev. A to facilitate installation of security boundary fencing.	0
G002	Birch, Hornbeam, Lime, Pear and Rowan	Fell to facilitate construction of parking area and teaching block.	0
H001	Hawthorn and Cherry	Fell western section shown on drawing no. 7938-D-AMS rev. A to facilitate installation of security boundary fencing.	0
H004	Hazel and Viburnum	Fell to facilitate construction of footpath subject to landowner consent).	0
T001	Field Maple	Crown lift to 2m on northern aspect of facilitate installation of security boundary fencing.	0
T002	Lime	Fell to facilitate installation of security boundary fencing.	0
T004	Horse Chestnut	Fell to facilitate construction of access and parking area.	0
T005	Norway Maple	Fell to facilitate construction of access and parking area.	0
T006	Norway Maple	Fell to facilitate construction of access and parking area.	0
T007	Norway Maple	Fell to facilitate construction of access and parking area.	0
T008	Jacquemont's Birch	Fell to facilitate construction of proposed parking area.	0
T012	Hawthorn	Undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction of parking area.	0
T013	Cherry	Fell to facilitate construction of parking area.	0
T015	Cypress	Fell to facilitate installation of security boundary fencing.	0
T019	Oak	Fell to facilitate construction of teaching block.	0
T020	Oak	Fell to facilitate construction of teaching block.	0
T021	Oak	Undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction of MUGA and footpath.	0
T031	Purple Norway Maple	Crown lift on northern aspect to 2.75m and undertake linear root pruning at the location shown on the attached drawing no. 7938-D-AMS rev. A to permit construction installation of security boundary fencing.	0
T032	Purple Norway Maple	Crown lift to 2.75m to facilitate installation of security boundary fencing.	0
T033	Purple Norway Maple	Crown lift to 2.75m to facilitate installation of security boundary fencing.	0
T034	Norway Maple	Fell to facilitate installation of security boundary fencing.	0
T035	Sycamore	Fell to facilitate installation of security boundary fencing.	0
T036	Norway Maple	Fell to facilitate landscaping.	0
T037	Norway Maple	Fell to facilitate landscaping.	0
T038	Norway Maple	Fell to facilitate landscaping.	0
T039	Oak	Fell to facilitate construction of proposed sports pitches.	0
T040	Hawthorn	Fell to facilitate construction of sports pitches.	0
T045	Weeping Beech	Fell to facilitate construction of access and parking area.	0

Tree No.	Species	Work required	Priority
----------	---------	---------------	----------

Appendix D

Explanatory Notes

Explanatory Notes



Categories

Below is an explanation of the categories used in the attached Tree Survey.

No Identifies the tree on the drawing.

Species Common names are given to aid understanding for the wider audience.

BS 5837 Main Category Using this assessment (BS 5837:2012, Table 1), trees can be divided into one of the following simplified categories, and are differentiated by cross-hatching and by colour on the attached drawing:

Category A - Those of high quality with an estimated remaining life expectancy of at least 40 years;

Category B - Those of moderate quality with an estimated remaining life expectancy of at least 20 years;

Category C - Those of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm;

Category U - Those trees in such condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

BS 5837 Sub Category Table 1 of BS 5837:2012 also requires a sub category to be applied to the A, B, C, and U assessments. This allows for a further understanding of the determining classification as follows:

Sub Category 1 - Mainly arboricultural qualities;

Sub Category 2 - Mainly landscape qualities;

Sub Category 3 - Mainly cultural values, including conservation .

Please note that a specimen or landscape feature may fulfil the requirements of more than one Sub Category.

DBH (mm) Diameter of main stem in millimetres at 1.5 metres from ground level. Where the tree is a multi-stem, the diameter is calculated in accordance with item 4.6.1 of BS 5837:2012.

Age Recorded as one of seven categories:

Y Young. Recently planted or establishing tree that could be transplanted without specialist equipment, i.e. less than 150 mm DBH.

S/M Semi-mature. An established tree, but one which has not reached its prospective ultimate height.

E/M Early-mature. A tree that is reaching its ultimate potential height, whose growth rate is slowing down but if healthy, will still increase in stem diameter and crown spread.

M Mature. A mature specimen with limited potential for any significant increase in size, even if healthy.

O/M Over-mature. A senescent or moribund specimen with a limited safe useful life expectancy. Possibly also containing sufficient structural defects with attendant safety and/or duty of care implications.



D Dead.

Height	Recorded in metres, measured from the base of the tree.
Crown Base	Recorded in metres, the distance from ground and aspect of the lowest branch material.
Lowest Branch	Recorded in metres, the distance from ground and aspect of the emergence point of the lowest significant branch.
Life Expectancy	Relates to the prospective life expectancy of the tree and is given as 4 categories: 1 = 40 years+; 2 = 20 years+; 3 = 10 years+; 4 = less than 10 years.
Crown Spread	Indicates the radius of the crown from the base of the tree in each of the northern, eastern, southern and western aspects.
Minimum Distance	This is a distance equal to 12 times the diameter of the tree measured at 1.5 metres above ground level for single stemmed trees and 12 times the average diameter of the tree measured at 1.5 metres above ground level tree for multi stemmed specimens. (BS 5837:2012, section 4.6).
RPA	This is the Root Protection Area, measured in square metres and defined in BS5837:2012 as “a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree’s viability, and where the protection of the roots and soil structure is treated as a priority”. The RPA is shown on the drawing.. Ideally this is an area around the tree that must be kept clear of construction, level changes of construction operations. Some methods of construction can be carried out within the RPA of a retained tree but only if approved by the Local Planning Authority’s tree officer.
Water Demand	This gives the water demand of the species of tree when mature, as given in the NHBC Standards Chapter 4.2 “Building Near Trees”.
Visual Amenity	Concerns the planning and landscape contribution to the development site made by the tree, hedge or tree group, in terms of its amenity value and prominence on the skyline along with functional criteria such as the screening value, shelter provision and wildlife significance. The usual definitions are as follows: Low An inconsequential landscape feature. Moderate Of some note within the immediate vicinity, but not significant in the wider context. High Item of high visual importance.
Problems/ Comments	May include general comments about growth characteristic, how it is affected by other trees and any previous surgery work; also, specific problems such as deadwood, pests, diseases, broken limbs, etc.
Work Required (TS)	Identifies the necessary tree work to mitigate anticipated problems and deal with existing problems identified in the “Problems/comments” category.



Work Required (AIA)

Identifies the tree work specifically necessary to allow a proposed development to proceed.

Priority

This gives a priority rating to each tree allowing the client to prioritise necessary tree works identified within the Tree Survey.

- 1 Urgent – works required immediately;
- 2 Works required within 6 months;
- 3 Works required within 1 year;
- 4 Re-inspect in 12 months,
- 0 Remedial works as part of implementation of planning consent.



BS 5837:2012 Terms and Definitions

Access Facilitation Pruning	One-off tree pruning operation, the nature and effects of which are without significant adverse impact on tree physiology or amenity value, which is directly necessary to provide access for operations on site.
Arboricultural Method Statement	Methodology for the implementation of any aspect of development that is within the root protection area, or has the potential to result in loss of or damage to a tree to be retained.
Arboriculturist	Person who has, through relevant education, training and experience, gained expertise in the field of trees in relation to construction.
Competent Person	Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached. <i>NOTE - a competent person is expected to be able to advise on the best means by which the recommendations of this British Standard may be implemented.</i>
Construction	Site-based operations with the potential to affect existing trees.
Construction Exclusion Zone	Area based on the root protection area from which access is prohibited for the duration of a project.
Root Protection Area (RPA)	Layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority.
Service	Any above or below ground structure or apparatus required for utility provision. NOTE - examples include drainage, gas supplies, ground source heat pumps, CCTV and satellite communications.
Stem	Principal above ground structural component(s) of a tree that supports its branches.
Structure	Manufactured object, such as a building, carriageway, path, wall, service run, and built or excavated earthwork.
Tree Protection Plan	Scale drawing, informed by descriptive text where necessary, based upon the finalized proposals, showing trees for retention and illustrating the tree and landscape protection measures.
Veteran Tree	Tree that, by recognized criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. NOTE - these characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem.



Appendix E

Statement of Supervision

Statement of Supervision (Arboriculture)

Introduction

In accordance with Planning Permission ref: 18/3561/FUL, Bowmer and Kirkland Ltd are undertaking the development of the above site.

The purpose of this document is to ensure that all works that have an impact on retained trees are undertaken in accordance with the approved Method Statement and Tree Protection Plan. As such, the purpose of the Statement is to identify the following arboricultural issues:

- Approved documents;
- Key staff and contacts;
- Critical phases of pre-commencement, induction and construction.

Approved Documents

The following documents must be available to all those with responsibility for arboricultural matters during construction:

- BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations.
- Notice of Planning Decision ref: 18/3561/FUL
- Preliminary Arboricultural Method Statement & Tree Protection Plan for Turing House School, Hospital Bridge Road, Twickenham – produced by Hayden's Arboricultural Consultants, ref: 6924 rev. C dated 28/06/2019.
- Arboricultural Method Statement & Tree Protection Plan for Turing House School, Hospital Bridge Road, Twickenham – produced by Hayden's Arboricultural Consultants, ref: 7938 rev. A dated 30/04/2020.

Key Staff

The following have or are to be appointed responsible for arboricultural matters at the site:

- Developer: Bowmer and Kirkland Ltd
- Arboricultural Consultant: Hayden's Arboricultural Consultants Ltd. Contact Mr Nick Hayden (Arboricultural Manager) – 01722 657423, nick@treesurveys.co.uk
- Site Manager – TBC


Critical phases of pre-commencement, induction, construction & completion

	ACTIVITY	ONE OFF /REPEAT	ATTENDEES	ACTION
1	Pre-commencement meeting (to discuss and confirm working methods, monitoring timescales and tree protection scheme)	One off	Developer, Arboricultural Consultant, Site Manager/Agent, Ground Works Contractor, LPA Tree Officer	Arboricultural Consultant to record minutes – copies to be submitted to attendees within 2 working days of site visit.
2	Inspection of completed tree surgery & erection of fencing	One off	Arboricultural Consultant, Site Manager/Agent	Arboricultural Consultant to record minutes – copies to be submitted to Developer and LPA Tree Officer within 2 working days of site visit.
3	Inspection of specific tasks during construction (e.g. root pruning in RPA of T012 and T021, installation of a root barrier in RPA of T021, installation of security boundary fencing in RPA of T001, T010, T012, T018, T021-T023, T031-T033 and G001, realignment of fencing).	One off (for each identified item)	Arboricultural Consultant, Site Manager/Agent, Contractors (as required)	Arboricultural Consultant to record minutes – copies to be submitted to Developer and LPA Tree Officer within 2 working days of site visit.
4	Completion of construction – prior to removal of fencing	One off	Arboricultural Consultant, Site Manager/Agent	Arboricultural Consultant to record minutes – copies to be submitted to Developer and LPA Tree Officer within 2 working days of site visit.
5	Final tree assessment – after fencing removal	One off	Developer, Arboricultural Consultant, Site Manager/Agent, Ground Works Contractor, LPA Tree Officer	Arboricultural Consultant to record minutes – copies to be submitted to Developer and LPA Arboricultural Officer within 2 working days of site visit.
6	Additional inspections (if necessary) to ensure periods not greater than one month elapse between any of above listed monitoring events	Monthly	Arboricultural Consultant, Site Manager/Agent	Arboricultural Consultant to record minutes – copies to be submitted to Developer and LPA Tree Officer within 2 working days of site visit.

Variations and Incidents

Any proposed variations to the proposed working method (relating to arboricultural matters) will be referred by the on-Site Manger/Agent to the Developer who will seek advice from the Arboricultural Consultant. The Arboricultural Consultant shall advise on minor amendments (e.g. realignment of fencing etc) and will subsequently report these to the LPA Arboricultural Officer by email or minutes. Issues directly relating to tree surgery or tree retention will be forwarded by the LPA Arboricultural Consultant (with recommendations) to the Arboricultural Officer for approval. Except in an emergency situation **and** when the LPA Arboricultural Officer is unavailable, no such actions will occur without the written approval of the LPA Arboricultural Officer.

Nick Hayden

A handwritten signature in black ink, appearing to read 'Nick Hayden', written over a horizontal line.

Arboricultural Manager (Southern Office)
Hayden's Arboricultural Consultants Ltd

30/04/2020

Reasons for a Qualified Monitoring Arboriculturalist

It is essential that the works are monitored by a qualified and experienced Arboriculturalist for the following reasons.

1. An Arboriculturalist has the skill and expertise to identify if the approved tree surgery specification has been complied with and the knowledge to provide appropriate remedial advice.
2. It is necessary for informed decisions to be made regarding the impact of tree surgery, particularly root pruning. The location of roots is assessed via a calculation, but in reality, roots may grow in a more unpredictable fashion dependent on topographic and historic features. Under CDM it is essential that expert individual knowledge is available and can advise on the inevitable unforeseen circumstances that arise.
3. An Arboriculturalist provides the point of liaison and information exchange with the Local Planning Authority's Tree Officer who is also normally a qualified Arboriculturalist. This allows fellow professionals to discuss the technical matters that inevitably arise and agree appropriate and balanced solutions. Having an Arboriculturalist engaged on the supervision of a project provides comfort to the Local Planning Authority that tree protection measures are complied with and hence it is much more likely that there will be less direct scrutiny from the Local Planning Authority (regarding tree matters) during the build of the project than would otherwise be the case.
4. Arboricultural input is essential to confirm that tree protection measures are adequate and fit for purpose. This can often save the client time (and therefore money) by identifying working methods and systems that are site efficient.
5. As living entities sensitive to their environment, the condition of trees changes, and over the course of a project it may be necessary to advise on additional tree surgery or felling as a result of, for example disease or storm damage.
6. An Arboriculturalist will provide detailed briefing notes and "toolbox talks" to site staff to ensure their compliance with conditions and prevent arboricultural breaches of conditions arising which can have severe consequences for project progression.
7. Close liaison between the Site Manager and the Arboriculturalist will ensure that the retained trees are protected but as minimal an inconvenience to construction as possible. This leads to the final outcome which is the completion of the project with retained healthy trees complementing the buildings in the manner that the designers and planners envisaged.



David M Carmichael
Practice Manager



Tree Protection Briefing Note

Introduction:

The trees that are to remain as part of the development are important and must not be harmed. They have been carefully selected as part of an extensive appraisal, design and planning process and therefore are legally protected by a combination of Tree Preservation Orders and Planning Conditions. This means that any damage caused to retained trees is a serious offence, as is the undertaking of any work to trees that has not been authorised in writing by the Local Planning Authority. Contravention of this legislation is liable to lead to heavy personal or corporate fines together with the imposition of stop notices, expensive mitigation measures and replacement planting instructions. Given this, it is vital that all development staff are familiar with the approved Tree Protection Plan (TPP).

Typical Forms of Construction Damage to Trees:

1. **Physical Injury to Trunk and Crown.** Construction equipment can injure the above-ground portion of a tree by breaking branches, tearing the bark, and wounding the trunk. These injuries are permanent and, if extensive, can be fatal.
2. **Root Cutting*.** Excavation, grading and trenching associated with construction and underground service installation can be very damaging to tree roots which are vital for both anchoring the tree in the ground and gathering moisture and nutrients. Unacceptable levels of damage to the roots will lead to a tree losing vitality, dropping branches, dying or becoming unsafe – either immediately or in the future.
3. **Soil Compaction.** An ideal soil for root growth and development contains about 50% pore space for water and air movement. Tracking by construction equipment and the storage of materials can compact soil and dramatically reduce pore space. Compaction inhibits root growth, limits water penetration, and decreases oxygen needed for root survival. If the compaction is too severe, in addition to preventing effective root growth, it will cause physical injury to both anchor and feed roots.
4. **Smothering Roots by Adding Soil*.** The majority of fine moisture and nutrient absorbing roots are within the top 30 cm of soil. Even a few centimetres of soil piled over the root system to change the grade can smother fine roots and eventually lead to the death of larger roots.
5. **Rooting Zone Contamination*.** Many materials used on development sites (e.g. salt, lime, concrete, cement, oil) are toxic to trees. If such contaminants are spilled or allowed to leach into the RPA, they can quickly kill the roots, thus causing the same effects as root cutting, soil compaction and smothering.



* As the location of tree roots cannot be seen, each retained tree close to a developable portion of the site has a designated Root Protection Area (RPA) as shown on the approved TPP. No excavation, grading, trenching, storage of materials nor any other activity may take place within the designated RPA unless it is in accordance with the approved Tree Protection Plan and completed under the supervision of Hayden's Arboricultural Consultants.

Preventing Damage to Trees During Construction:

The approved TPP provides specific instruction on the tree protection measures required across whole site in order to prevent damage. The primary methods of protection are as follows: -

1. **Installation of Protective Fencing.** The alignment and specification of this is shown to scale on the approved TPP. It must be erected prior to any demolition or development commencing on site and must not be moved or altered without prior written agreement of the Hayden's Arboricultural Consultants or the Local Planning Authority. No activities may take place within the fenced area, and no materials may be stored within the fenced area. The fencing may not be removed until ALL construction activities in the vicinity have been completed and only then with the written agreement of Hayden's Arboricultural Consultants or the Local Planning Authority.
2. **Ground Protection.** Where fencing is impractical the TPP provides instruction on other forms of effective ground protection. An example of this would be the provision of a temporary load bearing surface to prevent soil compaction and contamination. This must be of bespoke design for each situation so as to ensure it is fit for purpose. As with the fencing, this must be installed prior to any demolition or development commencing on site and must not be moved or altered without prior written agreement of the Hayden's Arboricultural Consultants or the Local Planning Authority. The temporary ground protection may not be removed until ALL construction activities in the vicinity have been completed and only then with the written agreement of Hayden's Arboricultural Consultants or the Local Planning Authority.
3. **Monitoring Visits from Hayden's Arboricultural Consultants.** Under the terms of the planning permission the development must be monitored by an Arboriculturalist on a suitably frequent basis. The purpose of this is twofold: -
 - a. To ensure that the above tree protection measures are complied with and report findings to the developers AND the Local Planning Authority.
 - b. To be available to provide help and advice regarding the inevitable requests for changes and supervision when working around retained tree.
4. **Operational Planning.** Whilst it is understood that trees are far from the only issue to be managed on site, they do represent a significant and potentially costly constraint if the protection measures required in the TPP are not strictly adhered to and as a result construction damage to trees occurs. Therefore, if problems in terms of work space conflicting with tree protection measures are identified, early liaison with Hayden's Arboricultural Consultants is essential so as to agree supervised works, alternate working methods or if necessary seek additional approval from the Local Planning Authority. Failure to identify these matters at an early stage may lead to significant delays as it can be a lengthy procedure in gaining a response from the Local Planning Authority.



Conclusion:

- Tree Protection Measures are there to protect the environment. They are also there to protect you. If they are complied with, trees will not be harmed. Therefore, DO NOT amend the protection unless you have written consent from Hayden's Arboricultural Consultants or the Local Planning Authority.
- If you are unsure on any tree related matter, seek advice before you act. Hayden's Arboricultural Consultants will discuss your concerns and help find practical and timely solutions (where possible).
- Hayden's Arboricultural Consultants, in conjunction with the Local Planning Authority, may change the frequency of Arboricultural Monitoring Inspections if it is deemed necessary to ensure the approved standards of tree protection are adhered to.
- Hayden's Arboricultural Consultants can be contacted in the first instance at the Head Office on 01284 765391.



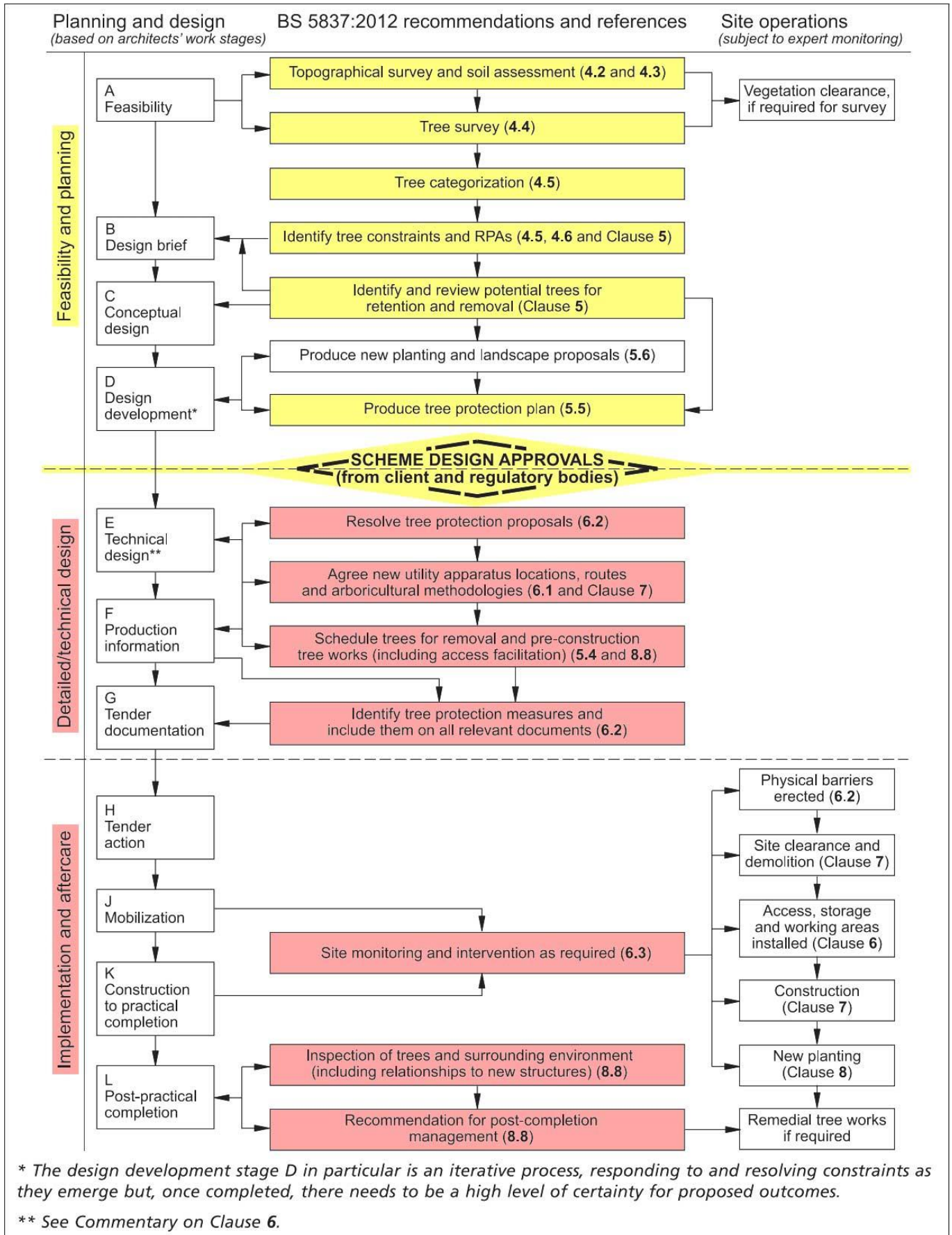
David M Carmichael
Practice Manager



Appendix F

Advisory Information & Sample Specifications

1. BS 5837:2012 Figure 1 - Flow Chart – Design and Construction & Tree Care



European Protected Species and woodland operations. (V4)

Complete all sections of the Checklist

Checklist

1	<p>Are you within, or close to, the known mapped range of any of the protected species OTHER THAN BATS which are potentially everywhere? Tick any that apply. See distribution maps in the Good Practice Guidance for each species -</p> <p><input type="checkbox"/> Dormice <input type="checkbox"/> Otters <input type="checkbox"/> Great crested newts <input type="checkbox"/> Sand lizards <input type="checkbox"/> Smooth snakes</p>	YES
		NO

2	<p>Does your wood contain any of the following habitats? Tick any that apply.</p> <p><input type="checkbox"/> Old trees with holes and crevices which might be used bats <input type="checkbox"/> Species rich scrub/coppice, early growth stage plantations and forest interfaces <input type="checkbox"/> Rivers on which otters might be found <input type="checkbox"/> Ponds which might be occupied by great crested newts <input type="checkbox"/> Open areas on heathy soils</p>	YES
		NO

3	<p>Have any of the protected species been recorded in this wood or on adjoining sites? Tick any that apply. Indicate which sources of information you have checked:</p> <p><input type="checkbox"/> National Biodiversity Network (www.nbn.org.uk) <input type="checkbox"/> Local Biological Records Centre <input type="checkbox"/> Local Wildlife Trust <input type="checkbox"/> Other <i>Specify Other:</i></p>	YES
		NO

4	<p>Have your inspections or any expert surveys found any of the following signs or evidence? Tick any that apply.</p> <p><input type="checkbox"/> Signs (e.g. otter spraint, nuts gnawed by dormice, leaves folded by newts) <input type="checkbox"/> Sightings (or echo-location) <input type="checkbox"/> Potential breeding or roosting sites (e.g. veteran trees, old trees with crevices, riverside hollow trees, ponds, timber stacks, large fallen deadwood) <input type="checkbox"/> Confirmed breeding or roosting sites (i.e. evidence of sites actually being used) <i>Details:</i></p>	YES
		NO

CHECK POINT

If you have answered NO to ALL of the above then only bats need to be considered in your operations.

If you have answered YES to any of the above then the species concerned must be considered as well as bats.

5	<p>Do the operations comply with Good Practice for bats and any other species found (or likely to be found in your wood) or can the operations be modified to do so? <i>Details: Use reverse of form to expand as required:</i></p>	YES
		NO

6	<p><u>Whether or not a licence is required...</u> Has the information been communicated to operators (including the location of breeding sites and sensitive areas)? Tick any that apply.</p> <p><input type="checkbox"/> Included in documentation (e.g. contract, letter of instruction, site assessment or other management plan) <input type="checkbox"/> Shown to operators and/or their supervisor <input type="checkbox"/> Marked with paint or hazard tape <input type="checkbox"/> Shown on the site plan <i>Other means:</i></p>	YES
		NO

7	<p>Have arrangements for supervision been made to ensure Good Practice guidance is complied with during the operations? <i>Details:</i></p>	YES
		NO

Details

Name of Wood:										
Grid Reference: <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> </tr> </table>										
Area: (ha) <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> </tr> </table>										
Date of Assessment: <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"> <tr> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> <td style="width: 25px;"> </td> </tr> </table>										
Name of Assessor:										

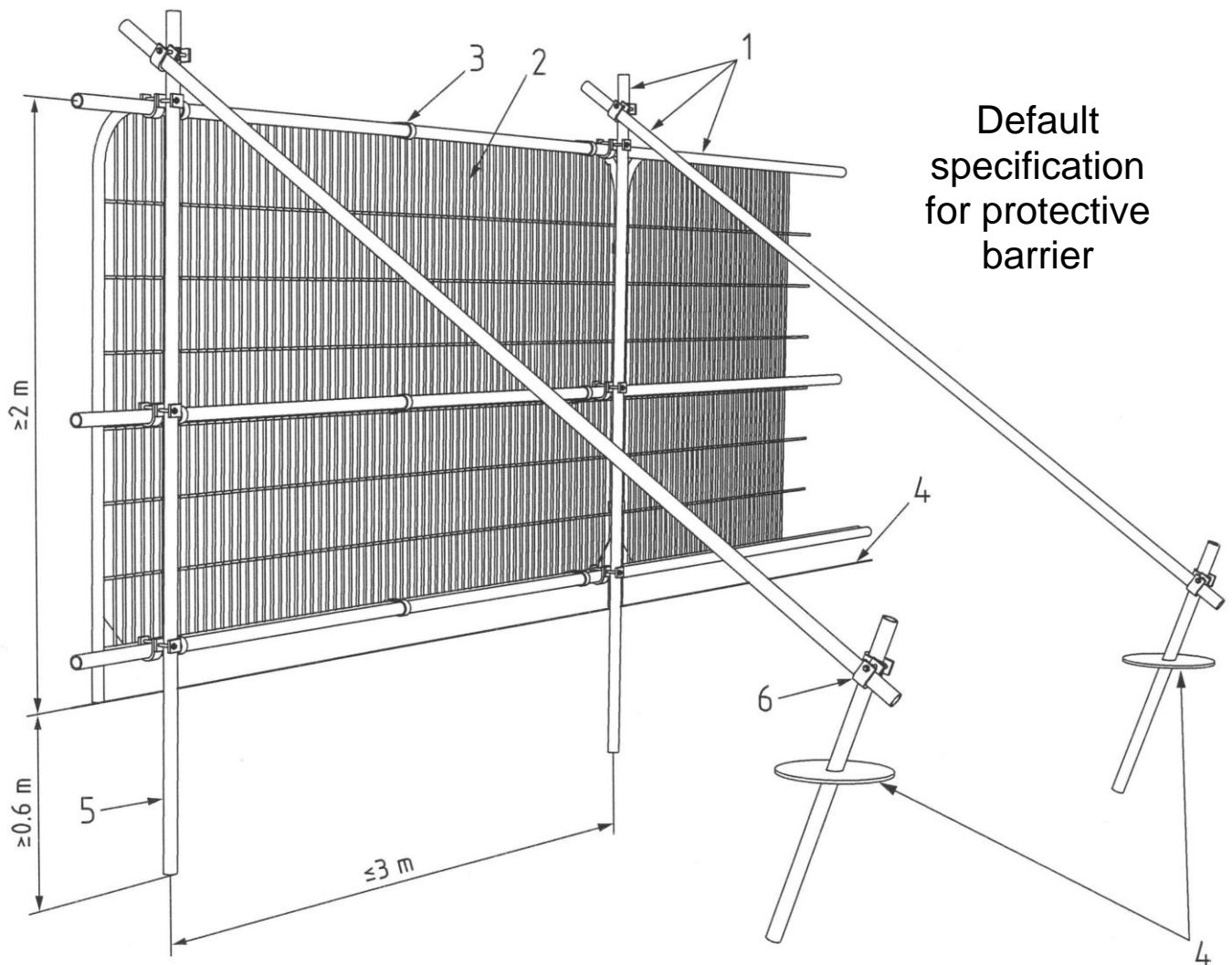
Notes

A licence is not required but continue to sections 6 and 7 below
You will need to obtain a licence BEFORE carrying out the work (see EPS Licence Application Forms and Notes)

You may commit an offence if you do not tell your operators about the protected species in your wood.

You may commit an offence if you do not take steps to ensure that your operators comply with the Good Practice guidance.
--

3. BS 5837:2012 Figure 2: Default specification for protective barrier

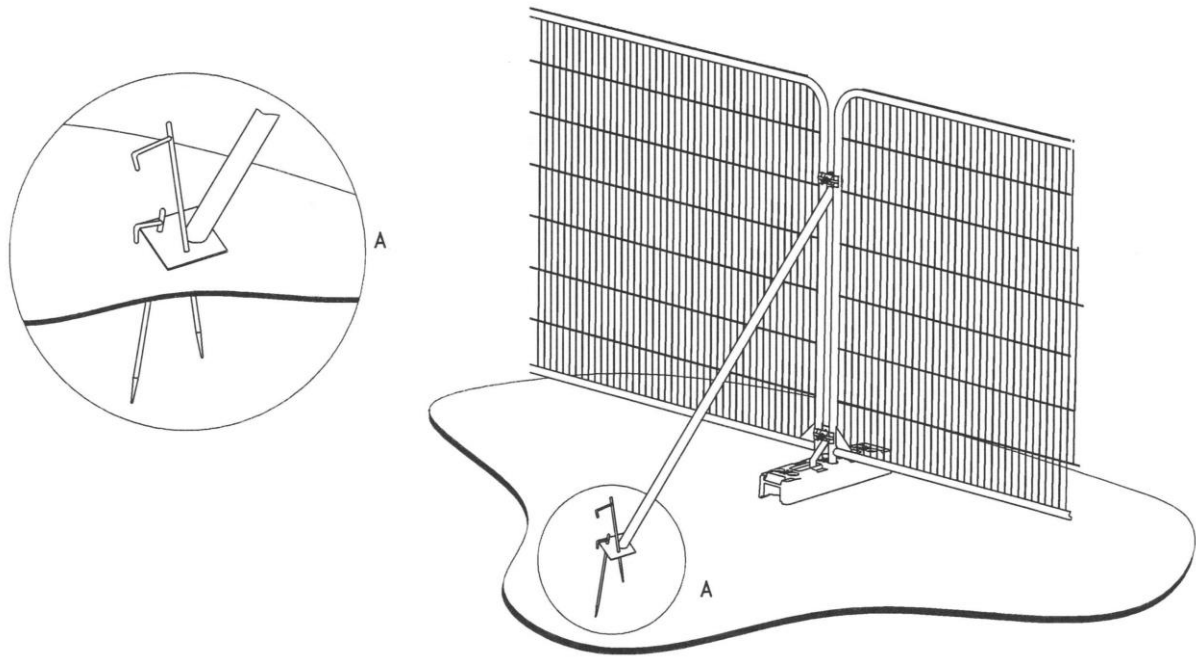


Default
specification
for protective
barrier

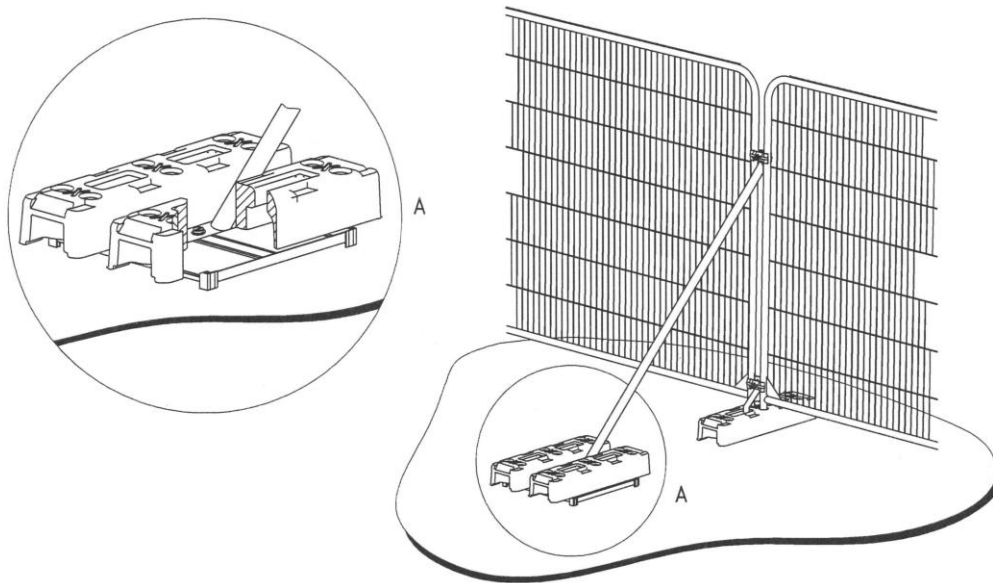
Key

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

4. BS 5837:2012 Figure 3: Examples of above-ground stabilizing systems

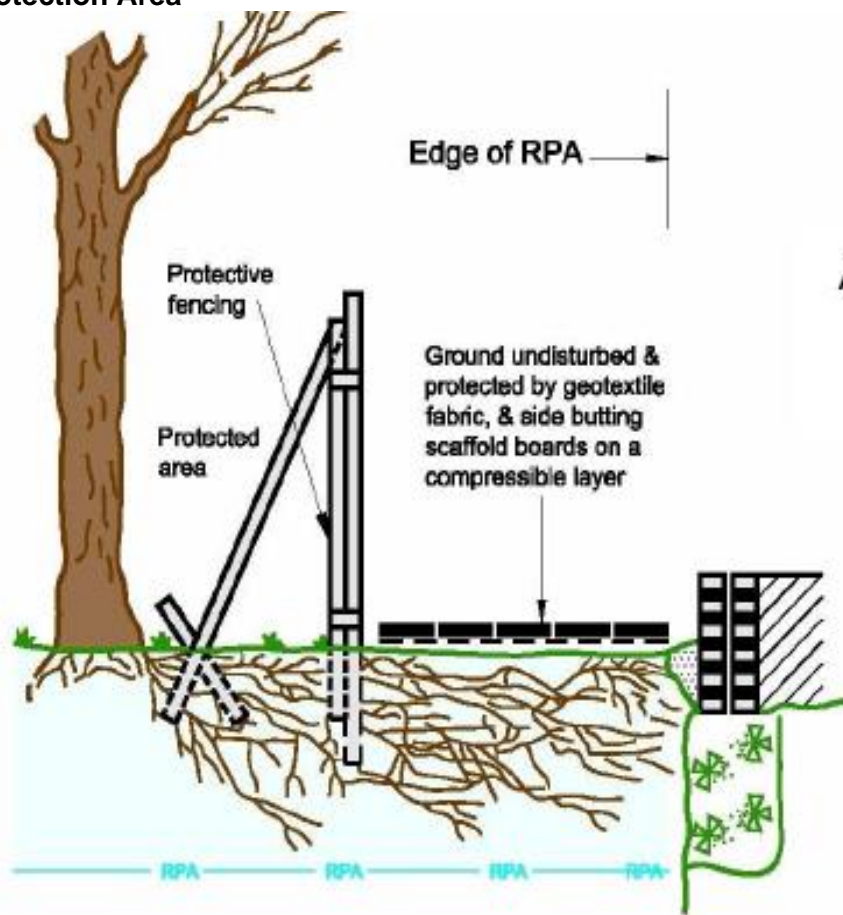


a) Stabilizer strut with base plate secured with ground pins



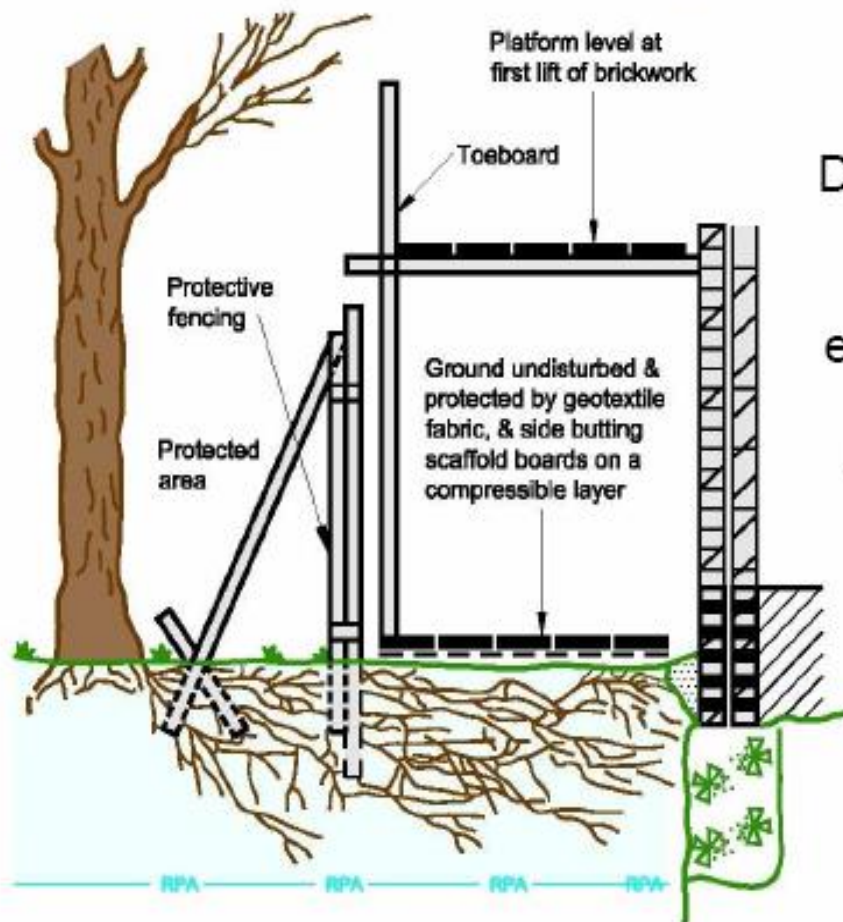
b) Stabilizer strut mounted on block tray

5. Figure 4 Detail of protective barrier where construction encroaches within BS5837:2012 Root Protection Area



Appendix No 2.1

Figure 4 -



Detail of protective barrier where construction encroaches within BS 5837:2012 Root Protection Area (RPA)

6. Air Spade/Air Excavation Specification

The largest specialist Arboricultural suppliers in the North of England.
UK Distributors to the Tree Care Industry of the

Industrial / Construction Applications

AIR-SPADE® is the ideal tool for contractors, utility companies and everyone practicing safe excavation. Common uses include:

Pot holing
Utility line Locating
Crack Cleaning
Valve box cleaning
Utility Installation
Line spotting for backhoe
Vacuum excavation
Trench rescue
Meter locating

Full Range of Parts Available

AIR-SPADE® Series 2000 tool *

2 ft. 3 ft, 4 ft or 5 ft. extensions

Custom length barrel
Extra 15, 25, or 60 scfm nozzle
Extra 105 or 150 scfm nozzle
Extra 225 scfm nozzle
45o Angled Adapter
Arboricultural Applications Benefits
AIR-SPADE® Handle

10 Ft. Lightweight Hose
25 Ft. Lightweight Hose
50 Ft. Lightweight Hose

Scratch Proof Face Shield

Spare Parts Kit
Storage Case with lock
* includes handle, 150 cfm / 90 psi nozzle, and 4 foot barrel.

Why does the AIR-SPADE® out perform other air tools?

In head to head tests, the AIR-SPADE® dislodged harder clay soil and dug faster than other air digging tools. Soil fractures from compressive stress, tons per square foot (tsf), exerted on its surface. As shown above for the same pressure and flow, compressed air exiting from a pipe nipple, orifice, or improperly designed nozzle expands outward rapidly to 3 to 4 times the area versus the jet from the patented supersonic nozzle in the AIR-SPADE®. The flow from these competitors can even go sub-sonic as indicated by the presence of a "Mach Disk," which can be seen in the flow if the

AIR-SPADE® AIR EXCAVATION TOOL Industrial / Construction Applications



Arboricultural Applications

Benefits

AIR-SPADE® is used by arborists and landscape professionals worldwide for:

Root Collar Excavation

Plant Aeration

Vertical Mulching

Soil Compaction Relief

Disease diagnosis and treatment

Transplanting

Bare rooting

Damage analysis

Locating Roots in New Construction

Root Pruning and Structure Analysis

Running utilities through the root zone

Radial trenching

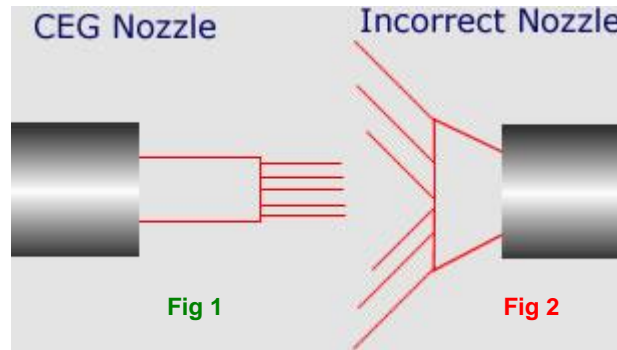
- Digs faster and harder soils than competitive or home made wands
- Less worker fatigue/injuries than a pick or shovel
- Faster and safer than hand digging
- Saves expensive hourly labour costs
- Non-damaging to all kinds of buried utilities or plant roots
- Digs without making mud and does not create "contaminated" spoil like water
- Excavated soil is ideal for recompaction
- Modular design with parts that screw together without tools
- Interchangeable nozzles sized to match air compressors from 15 to 250 scfm
- Interchangeable extensions to 8ft and reducers to 2 ft
- Ergonomic handle with thermal shield and pressure gauge
- Safety "dead Man" trigger with guard
- Electrically insulating barrel
- Hardened wear resistant stainless steel nozzle
- 45 deg adaptor

Will higher pressure make the AIR-SPADE® work Better?

How Does it Work?

Increasing the air pressure above 90 psi on a properly designed supersonic nozzle does not lead to a proportional gain in excavation capability. For example, doubling the nozzle pressure to 180 psi increases the air jet force by only 10% and the exit momentum flux (stress seen by the soil) by only 45%. Supplying higher pressure to a nozzle designed to work at 90 psi actually un-focuses the air jet degrading performance and consuming more air.

Patented CEG Supersonic nozzle turns 90 psig compressed air into laser-like Mach 2 jet. Jet penetrates and fractures friable materials like soil but harmlessly goes around buried pipes, cables, fibre optic lines and tree roots.



Jet from CEG nozzle focuses all of its energy and momentum onto concentrated spot on the soil. **Fig 1**

Air from pipe nipple, orifice, or improperly designed nozzle, expands greatly reducing its effectiveness. **Fig 2**

In what types of soil will an AIR-SPADE® work?

Because of its unique, focused air-jet, the **AIR-SPADE®** works in most soils, even hard clays. Cohesive soils can be classified and described by unconfined compressive strength as shown below. Tests have shown the **AIR-SPADE®** to be effective in compacted soils with unconfined compressive strengths well above the values listed to the right for hard clay.

Watering the work area ahead of time can be helpful sometimes. Watering reduces airborne dust if the soil is extremely dry. It also reduces the soil's strength making the digging easier. Combined use of the **AIR-SPADE®** with a low pressure water jet is effective even with extreme cases of highly compacted or sun-baked soils.

The **AIR-SPADE®** in general will not cut through rock, since its unconfined compressive strength is much greater than for soil. In fact, soil results from the physical and chemical breakup of weathered rock. Shales, however, may be broken apart by the **AIR-SPADE®** if the jet is directed between the laminations of the rock. Similarly, the **AIR-SPADE®** will not dislodge hard frozen soil which may behave like pavement or concrete.

Type	Unconfined Compressive Strength tsf	Description Cohesive soils including:
A	≥ 1.5 stiff	Clay, silty clay, sandy clay, clay loam, caliche, hardpan, and sometimes silty clay loam and sandy clay loam.
B	< 1.5 and > 0.5 med	Granular cohesive soils like angular gravel, silt, silt loam, sandy loam, and sometimes silty clay loam and sandy clay loam.
C	≤ 0.5 soft /v.soft	Granular soils such as gravel, sand, loamy sand, submerged soil, or soil from which water is freely seeping.

What size nozzle should I use?

Nozzles are available that use from 15 to 225 cfm of compressed air. The amount of soil that can be dislodged in a given amount of time is roughly proportional to the amount of air used. The 150 cfm nozzle is the most commonly used size for arboricultural and industrial applications. It has good productivity and is designed to run from the most common size of portable air compressor, a 175 to 185 cfm unit

Pressure Loss (psi) for 50 feet of common air hose						Excavation Rates (cu ft / min)			Recommended Compressor Size	
Hose ID	FLOW 9CFM					Nozzle Air Flow (CFM)	Soil Type A	Soil Type C	Nozzle (cfm)	Flow Rating (cfm) at 100 psi
	25	60	105	150	225					
3/4"	0.3	1.6	5.6	12.3	25.0	25	0.9	0.4	25	25 - 30
1"	0.1	0.4	1.3	2.8	5.5	60	1.1	0.7	60	60 - 70
11/4"	0.0	0.1	0.4	0.8	2.0	105	1.5	0.9	105	125
						150	1.8	1.2	150	175 - 185
						225	2.3		225	250

How should I dig with the AIR-SPADE® ?

The **AIR-SPADE®** will dislodge up to several inches deep in a medium to stiff soil. High-speed movies show that an air-jet penetrates and dislodges the soil in a fraction of a second. Unless the soil is highly compacted, dwelling on the same spot is unnecessary and tends to increase spray. The **AIR-SPADE®** can be moved over the soil surface at a rate of about 1 to 2 feet per second. When several inches of soil have been loosened, the soil should be removed to expose a fresh working face for the air jet. Vacuum suction, as provided by our AIR-VAC and SAFEX® units, is an excellent companion to the **AIR-SPADE®** since it is likewise non-damaging.

What size of air hose do I need to use the AIR-SPADE® properly?

Compressed air flowing through a hose experiences a drop in pressure from friction and constrictions. Friction loss is proportional to the length of the hose. The amount of air, its pressure, the hose inner diameter and its smoothness also determine the loss. The table below shows the pressure loss for 50 feet of common air hose with couplings as a function of size and nozzle flow, cfm, for air at a pressure of 90 psi. Generally, a 1-inch air hose is recommended for use with the AIR-SPADE®.

How much will it Cost?

Arbor Kit complete includes:

AIR-SPADE® Series 2000 tool



45deg Angled Adapter
10 Ft. Lightweight Hose
Storage Case with lock
Shipping/Carriage to Mainland UK
Excluding vat
£995.00 *

Shipping/Carriage to Mainland UK
Excluding vat
£775.00

*Prices are subject to exchange rate fluctuations

AIR-SPADE® Series 2000

Who can supply me with it – and How long will it take to arrive?

You can be using this tool within 6 days of ordering it, it will be delivered to your door, carriage paid (Mainland UK).



The largest specialist Arboricultural suppliers in the North of England
Import the

AIR-SPADE®

Air Excavation Tool
&
Arbor Kit

CONTACT US NOW TO DISCUSS THIS INVALUABLE ADDITION TO YOUR WORKING TOOLS DO THE WORK FASTER - GET BETTER RESULTS !

TELEPHONE 0113 2296006:

EMAIL info@treesunlimited.co.uk

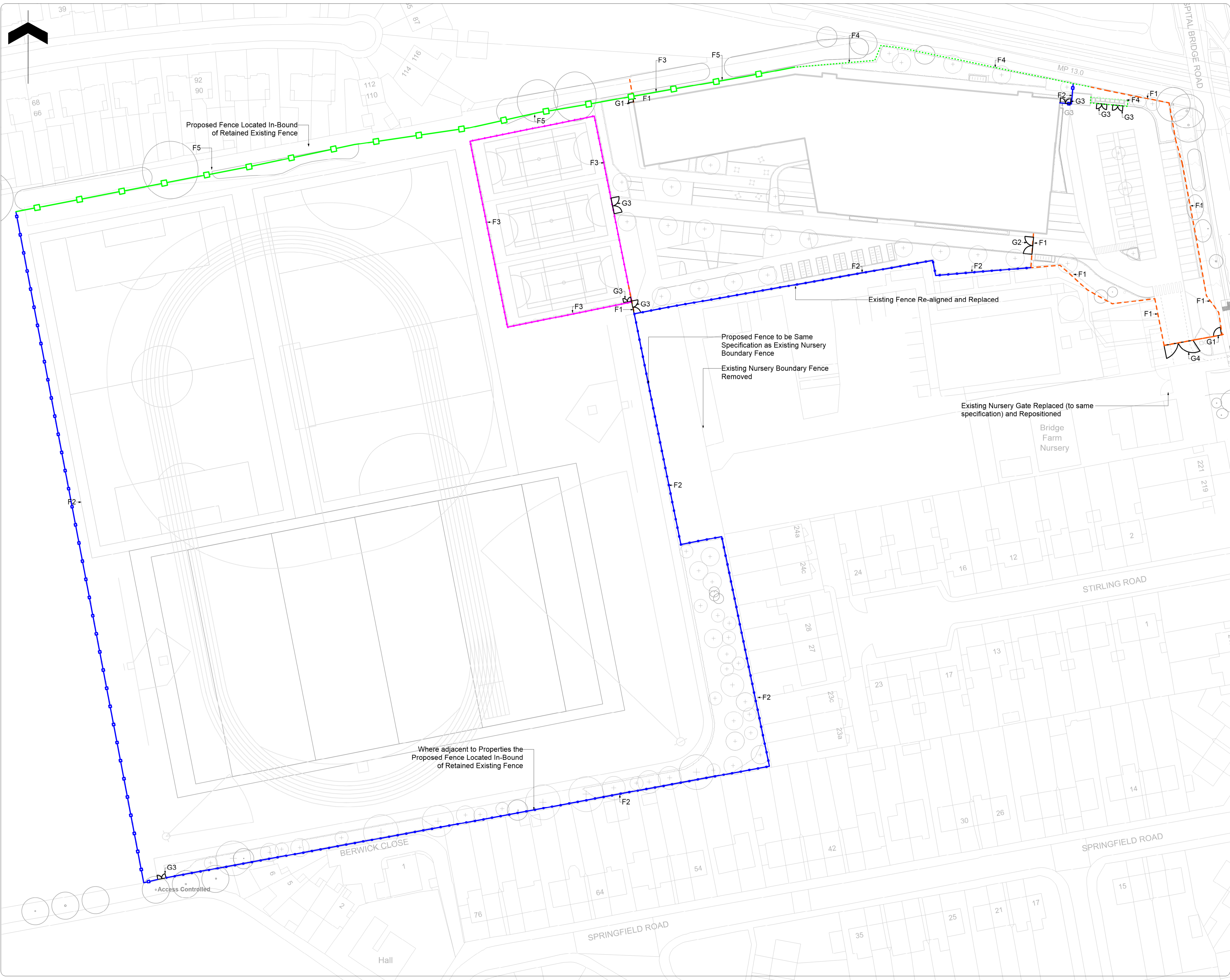
FAX 0113 2295171

Appendix G

Haydens Drawing

Appendix H

Drawing no. FS0316-ALA-00-XX-DR-L-0024 rev. P03



Notes
 1. Drawing not to be scaled for construction or setting out purposes.
 2. To be read in conjunction with Project Risk Register REF: XXX
 3. To be read in conjunction with all other Landscape Architect's drawings

KEY

- - - F1 Proposed Weldmesh Perimeter Fence
Supplier: CLD Fencing (or similar)
Product: Dulcock (or similar)
Height: 1.8m
Colour: Green
- - - F2 Proposed Weldmesh Perimeter Fence
Supplier: CLD Fencing (or similar)
Product: Dulcock (or similar)
Height: 2.4m
Colour: Green
- - - F3 Proposed Weldmesh Perimeter Sports Fence
Supplier: CLD Fencing (or similar)
Product: Dulcock (or similar)
Height: 3m
Colour: Green
- - - F4 Proposed Closeboard Timber Fence
Supplier: Contractor's choice
Height: 2.4m
- - - F5 Proposed Closeboard Timber Fence
Supplier: Contractor's choice
Height: 3m
- G1 Single Leaf Swing Pedestrian Gate
(Height to match fence)
- G2 Wide Double Leaf Vehicular Gate
(Height to match fence)
- G3 Wide Double Leaf Pedestrian Gate
(Height to match fence)
- G4 Wide Double Leaf Vehicular and Pedestrian Gate
(Height to match fence)

ID	RISK	MITIGATION	Date Mitigated
RESIDUAL PROJECT RISKS			

DATE	SUITABILITY	REV	DESCRIPTION OF REVISION	DRAWN BY	APPROVED BY
18.10.19	S3	P03	Site Coordination changes	LA	-
22.08.19	S3	P02	Amendments to Car Park Kerb Layout	CY	LA
10.01.19	S3	PROJ	Issued for contractors proposals	KH	LA

REVISIONS

SUITABILITY
S3- CONTRACTORS PROPOSALS

ares
 LANDSCAPE ARCHITECTS

Ares Landscape Architects LTD
 Galecrasher
 51 Eyre Lane
 Sheffield
 S1 4RB

t: 0114 276 2000
 e: hello@ares.eu.com
 w: ares.eu.com

CLIENT : **Bowmer and Kirkland**

PROJECT TITLE : **Turing House School**

DRAWING TITLE : **Fencing General Arrangement**

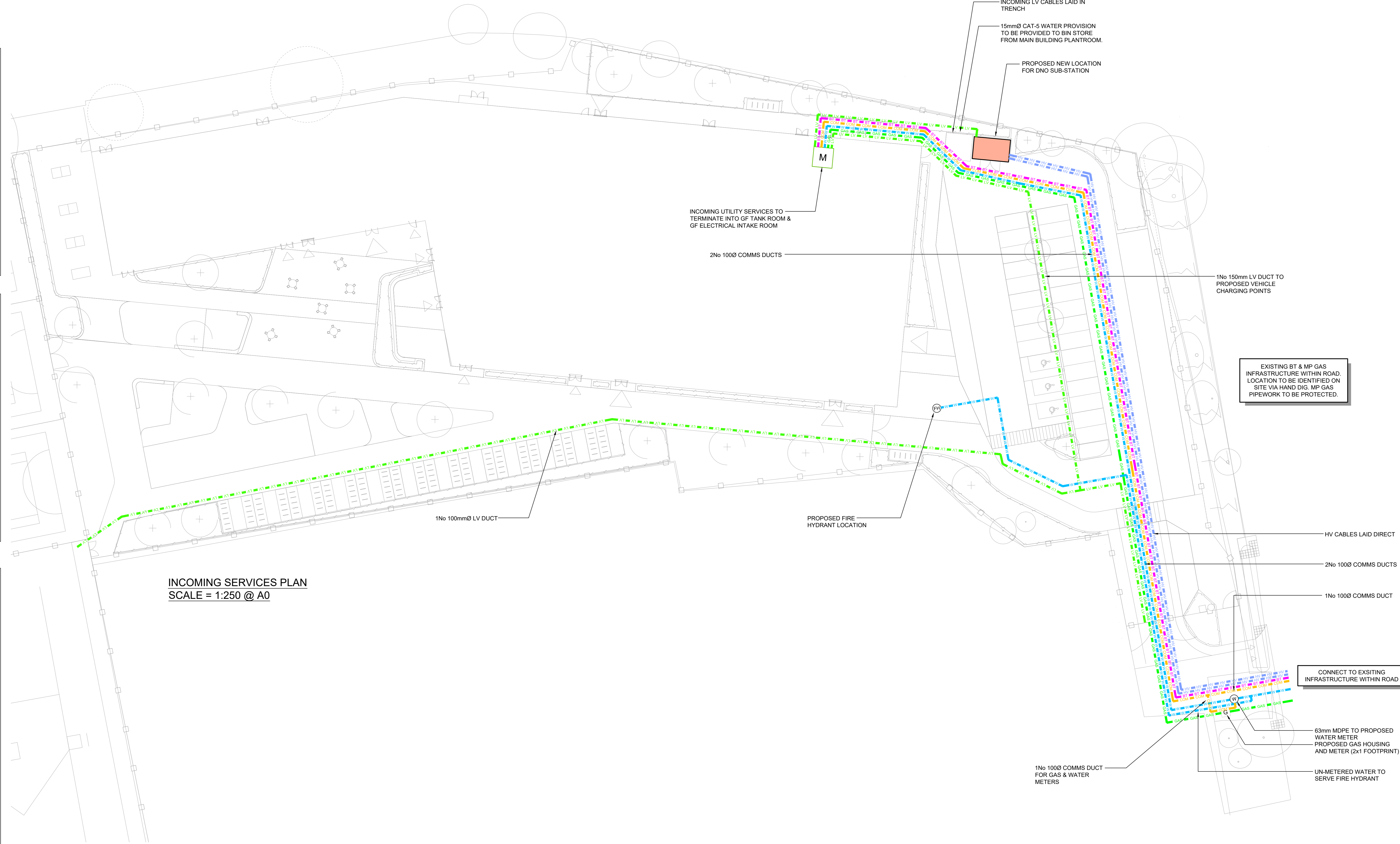
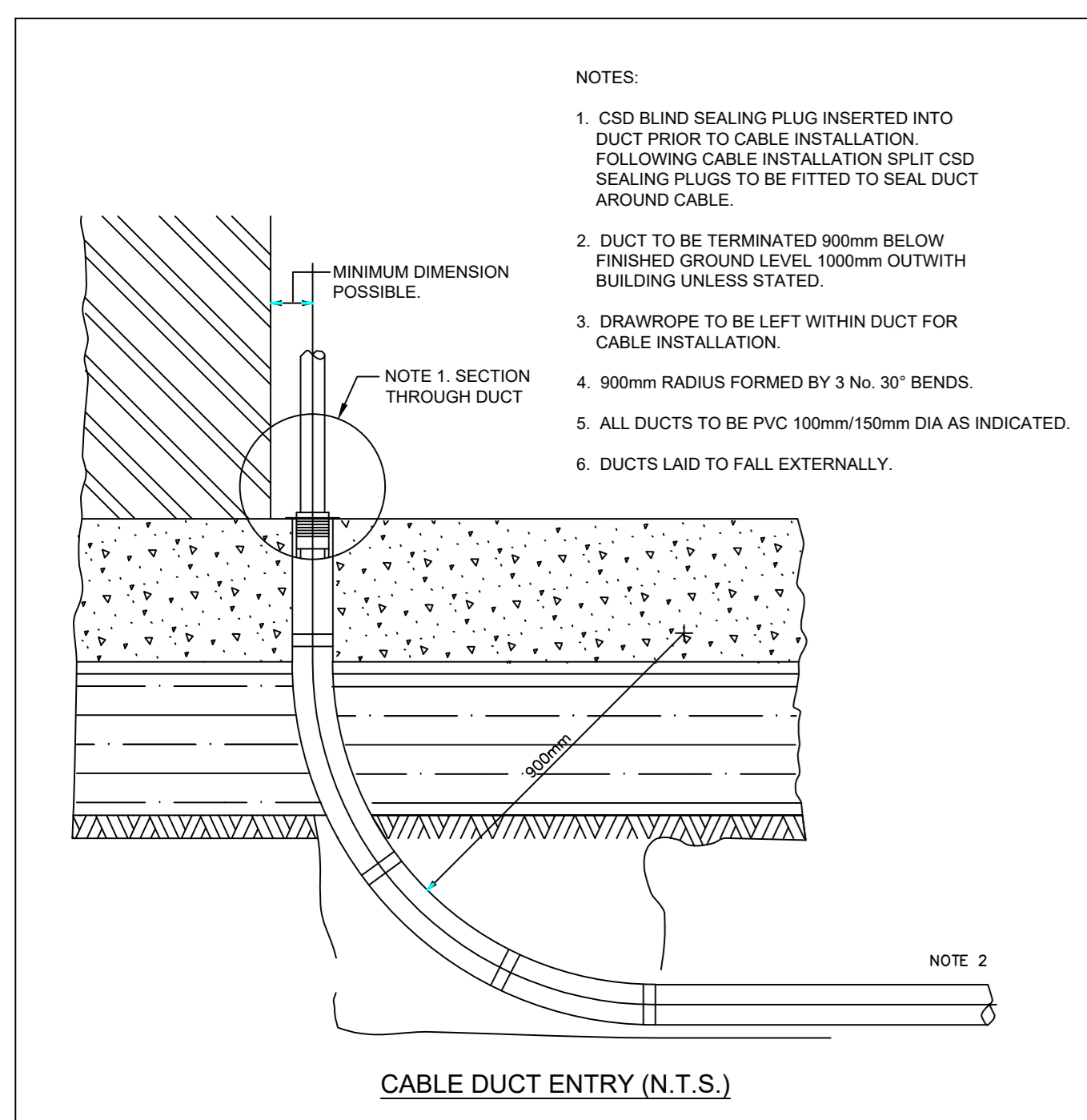
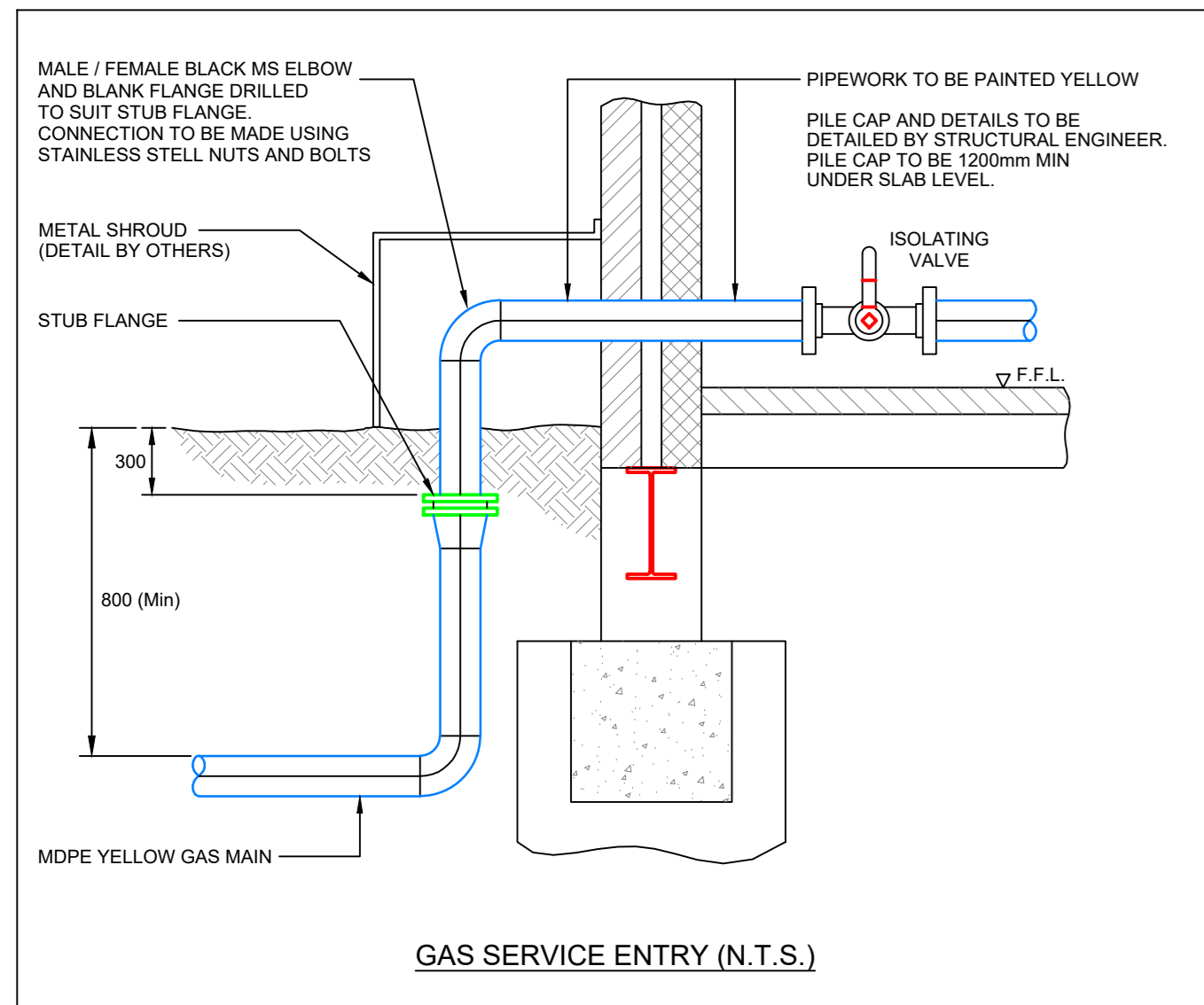
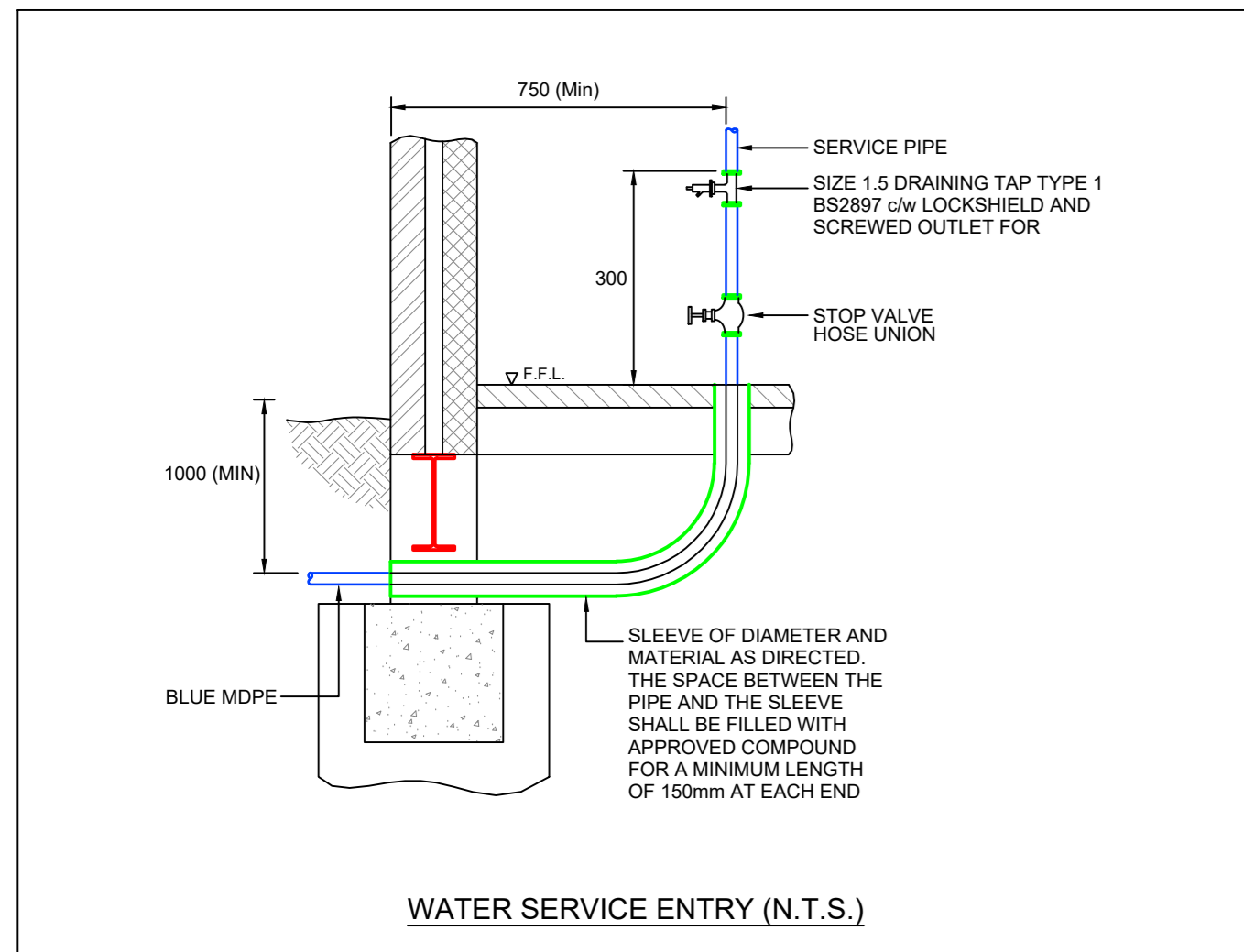
DRAWING SCALE : 1:500
 DRAWN BY : EC
 DRAWN DATE : 11.04.2018

PAPER SIZE : A1
 APPROVED BY : LA

DRAWING NUMBER : **FS0316-ALA-00-XX-DR-L-0024**
 SUITABILITY : **S3**
 REVISION : **P03**

Appendix I

Drawing no. FS0316-TCL-XX-XX-DR-N9021



NOTES / LEGEND

COPYRIGHT
THIS DRAWING IS COPYRIGHT AND MAY NOT BE ALTERED, REPRODUCED OR USED OTHER THAN FOR THE CONTRACT WORKS FOR WHICH IT IS ISSUED WITHOUT THE WRITTEN PERMISSION OF CALLAGHAN GREEN LTD.

WARNING
DO NOT SCALE THIS DRAWING. VERIFY ALL DIMENSIONS AND STRUCTURAL DETAILS ON SITE. IF IN DOUBT, ASK BEFORE ACTING.

RELATED DOCUMENTS
READ THIS DRAWING IN CONJUNCTION WITH THE APPROPRIATE SPECIFICATIONS.

CHECKING
THIS DRAWING HAS BEEN GENERATED USING A COMPUTER AIDED DRAWING SYSTEM AS THE SYSTEM GENERATES A NEW DRAWING AT EACH REVISION. ONLY THE LATEST EDITION WILL HAVE BEEN INTIALED AND CHECKED.

GENERAL

- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWING SPECIFICATIONS AND SCHEDULES.
- ALL EQUIPMENT SHALL BE INDEPENDENTLY SUPPORTED FROM THE SLAB STRUCTURE AND NOT BE RELIANT ON THE CEILING OR OTHER SERVICES.
- ALL PENETRATIONS THROUGH WALL SHALL BE FILLED TO SUIT THE ACOUSTIC PERFORMANCE AND/OR THE FIRE REQUIREMENTS AS DETAILED ON THE ARCHITECTS DRAWINGS.
- ALL FINAL CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

NOTES

- ALL DUCT ROUTES AND CHAMBER POSITIONS ARE INDICATIVE ONLY. EXACT ROUTES / POSITIONS TO BE CONFIRMED ON SITE.
- ALL DUCTS / CHAMBERS TO INCLUDE DRAW ROPES.
- ALL DUCTS / CHAMBERS TO BE SEALED TO PREVENT WATER INGRESS.
- CABLE DUCT CHAMBERS TO BE INCLUDED AT ALL CHANGES OF DIRECTION AND EVERY 30M OF STRAIGHT RUN.

PROPOSED SERVICE ROUTES

HV CABLE DUCT

LV CABLE DUCT

COMMS DUCT

INCORPORATING BT DUCT

FIRE ALARMS DUCT

GAS PIPEWORK

WATER PIPEWORK

EXISTING SERVICES ARE SHOWN INDICATIVELY ONLY. EXACT LOCATION TO BE CONFIRMED ON SITE.

LAYOUT INDICATIVE ONLY. EXACT DUCT/SERVICE ROUTES TO BE DETERMINED BY GROUND WORKER ON SITE.

REV	DATE	ISSUED FOR COMMENT	AM	RH	DP
P1	04.10.19	ISSUED FOR COMMENT			

COMMENT

DESIGNER
CALLAGHAN GREEN
BUILDING SERVICES CONSULTANTS

CLIENT
Bowmer & Kirkland
Education

PROJECT
TURING HOUSE

DRAWING TITLE
MECHANICAL & ELECTRICAL SERVICES
PROPOSED EXTERNAL SITE SERVICES LAYOUT



SCALE	DRAWN BY	CHECKED BY	DATE
AS SHOWN	AM	DP	SEPT 19

DRAWING No. FS0316-TCL-XX-XX-DR-N-0021

- Arboricultural Impact Assessments ●
- Arboricultural Method Statements ●
- Tree Constraints Plans ●
- Arboricultural Feasibility Studies ●
- Shade Analysis ●
- Picus Tomography ●
- Arboricultural Consultancy for Local Planning Authority ●
- Quantified Tree Risk Assessment ●
- Health & Safety Audits for Tree Stocks ●
- Tree Stock Survey and Management ●
- Mortgage and Insurance Reports ●
- Subsidence Reports ●
- Woodland Management Plans ●
- Project Management ●
- Ecological Surveys ●

