Arboricultural Impact Assessment

BE-718.2b

Penistone Grammar School, Huddersfield Road, Penistone, Sheffield S36 7BX

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Grid reference	SE 24338 03953
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Executive Summary

Bagshaw Ecology Ltd have been instructed by 10architect Ltd to undertake an Arboricultural Impact Assessment of the land at Penistone Grammar School, Huddersfield Road, Penistone, Sheffield, S36 7BX in relation to an application for planning. The development proposals include construction of a new extension which will be adjoined to the south of the existing building.

The site survey identified six individual trees, four groups of trees and two hedges, on or immediately adjacent to the site. These included one Category A group of high quality, two Category B trees of moderate quality, two Category C trees, three groups and two hedges of low quality, and two Category U trees - which regardless of proposals - should be removed for sound management reasons.

None of the trees on or immediately adjacent to the site are afforded protection by individual Tree Preservation Orders (TPOs).

The development proposals will necessitate the removal of one Category C tree, three Category C groups, and one Category C hedge. Removal of these trees is required to facilitate construction of the new building - and as such, without their removal, the proposed development would be unviable. The removal of two Category U trees has been recommended regardless to the development proposals.

The root protection areas (RPAs) of two trees are encroached upon by the main site access route. It is recommended that ground protection is used in these areas to protect tree roots from irreparable damage.

It is recommended that an Arboricultural Method Statement is followed during construction works.

It is suggested that specified tree removals are mitigated by further planting. At least ten trees should therefore be incorporated into the proposed development.

1. Introduction

1.1. Background

Bagshaw Ecology Ltd have been requested by 10 Architect to undertake an Arboricultural Impact Assessment of the land at Penistone Grammar School, Huddersfield Road, Penistone, Sheffield, S36 7BX.

The purpose of the report is to:

- Assess the quality of the trees on and immediately adjacent to the site, in accordance with BS5837: 2012 – Trees in Relation to Design, Demolition and Construction: Recommendations (hereafter referred to as BS5837: 2012).
- Identify trees suitable for retention and for removal due to the proposed development.
- Prescribe tree protection measures to ensure that retained trees survive the proposed development and thrive after its completion.
- Prescribe arboricultural recommendations for the long-term management of trees on the site.
- To assess the site for its suitability for mitigation planting, and to specify planting requirements.

1.2. Site Details

The site is located at grid reference SE 24338 03953, and is accessed off the east of Huddersfield Road. The site is bordered by Huddersfield Road to the west, agricultural farmland to the south and east and residential properties to the north.

The site comprises art of the grounds of Penistone Grammar School, and is set within a larger school complex and an adjacent area of amenity grassland and planted trees.

Figure 1: Aerial imagery of site and surrounding area (Google Earth Pro, 2018)

1.3. Proposed Development

The development proposals are to construct a new extension which will adjoin to the south of the existing building.

2. Methods

2.1. Desk Based Study

The local council was consulted to determine if any trees on the site and immediately adjacent to the site are protected by Tree Preservation Orders (TPOs) and/or are within Conservation Areas. Cranfield (2018) was consulted as to the soil type of the surrounding area.

2.2. Site Survey

The site survey was carried out on Monday 18th June 2018. The weather at the time of the survey was clear and dry, and visibility was good.

The survey was carried out by Jack Delaney, an arboricultural consultant, who has worked in the arboricultural industry for ten years and holds an FdSc in Arboriculture.

All trees on site were inspected from ground level, using the Visual Tree Assessment (VTA) method (Mattheck *et al*, 2015). Any notable defects of trees were recorded, although the site survey did not constitute a full tree safety assessment.

Tree heights and crown clearances were measured to the nearest 0.1 m with a clinometer. Crown spreads of trees were measured on their, north, east, south and west aspects to the nearest 0.1m.

The diameter at breast height (DBH) of trees was measured to the nearest 10mm. This was used to calculate the root protection area (RPA) of trees using methods prescribed in BS5837: 2012:

- For single stem trees, the RPA was calculated as a circle with a radius 12 times the DBH.
- For trees with 2-5 stems, the RPA was calculated using the formula:

  $$\text{RPA} = \sqrt{(\mathbf{Stem\ 1\ DBH})^2 + (\ \mathbf{Stem\ 2\ DBH})^2 + \ldots (\mathbf{Stem\ 5\ DBH})^2}$$

- For trees with 6 or more stems, the RPA was calculated using the formula:

  $$\text{RPA} = \sqrt{(\boldsymbol{\mu\ DBH})^2\ \mathbf{x\ number\ of\ stems}}$$

In accordance with BS5837: 2012, trees were classified as either A, B, C or U, using the criteria shown in Table 1.

Table 1: BS5837 Cascade Chart (adapted from British Standards, 2012)

Category	Definition	Retention	Colour code
Category A	Trees of high quality with an estimated remaining life expectancy of at least 40 years; trees that are particularly good examples of their species, especially if rare or unusual.	Highly desirable	Light green
Category B	Trees of moderate quality with an estimated remaining life expectancy of at least 20 years; trees lacking the special quality to merit category A designation.	Desirable	Dark blue
Category C	Trees of low quality with an estimated remaining contribution of at least 10 years, or trees with a stem diameter below 150mm; unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.	Feasible, but should be removed if posing a constraint to development	Grey
Category U	Trees that have serious, irremediable, structural and/or physiological defects, including those that will become unviable after removal of other category U trees.	Unfeasible	Dark red

2.3. Constraints

The survey was constrained by the season in which it took place. Some pathogens of trees, in particular fruiting bodies of decay fungi, are only visible at certain times of year.

3. Results

3.1. Desk Based Study

A search on the website of Barnsley Metropolitan Borough Council (2018) confirmed that none of the trees on or immediately adjacent to the site are afforded protection by Tree Preservation Orders.

Cranfield (2018) states that the surrounding area consists of acid loamy and clayey soils, which are seasonally wet. No further detailed soil analysis was carried out as part of the survey.

3.2. Tree Population Assessment

The site survey identified a total of six trees, four groups of trees and two hedge lines with the potential to be affected by the development proposals.

The trees on the site include one Category A group of high quality, two Category B trees of moderate quality, two Category C trees, three groups and two hedge lines of low quality, and two Category U trees which should ideally be removed regardless to the development proposal.

Table 2: Summary of Tree Categories

Category	Description	Tree/group numbers	Totals
A	Trees of high quality which should where be possible be retained throughout any proposed development	G4	1 Group
B	Trees of moderate quality which should where possible be retained throughout any proposed development	T5, T6	2 Trees
C	Trees of low quality which should not be considered a constraint to development	T1, T4 G1, G2, G3 H1, H2	2 Trees 3 Groups 2 Hedges
U	Trees which should be removed for sound management reasons, regardless of proposals	T2, T3	2 Trees
		Total:	**6 Trees** **4 Groups** **2 Hedges**

Tree data can be viewed in Appendix 1: Tree Survey Schedule. Tree locations can be viewed in Appendix 3: Tree Constraints Plan.

Tree species on and adjacent to the site include; sycamore *Acer pseudoplatanus,* Balsam Poplar *Populus balsamifera*, cherry *Prunus* spp., and Hornbeam *Carpinus betulus.*

4. Impact Assessment

4.1. Tree removals

According to the development proposals, T2 and T3 will necessitate removal. As these are both Category U trees, their removal would be recommended regardless of the development proposals.

T4 lies directly in the footprint of the proposed new building, therefore its removal is unavoidable. T4 is a Category C tree of low arboricultural merit and as such, should not be considered a constraint to the development.

G1 and H1 will necessitate removal to facilitate construction of the proposed new structure. The RPAs of G1 and H1 are encroached upon by approximately 93% and 40% respectively, and therefore retention of these is unfeasible. G1 and H1 are both Category C and of low arboricultural merit; as such these should not be considered a constraint to the development.

Although <1% of the RPA of G3 is encroached upon by the proposed new building, it is envisaged that these trees will pose a constraint during the construction process. Not only that, but as these young trees mature, there proximity to the proposed structure suggests that these are likely to be of increasing nuisance.

According to the development proposals G2 and H2 should not pose a constraint. However, if in due course, these trees are found to pose a restriction to the construction process, it is suggested these Category C trees should be removed as necessary. The low quality of these groups and area that they cover also implies the expenditure involved in installing tree protective fencing would be wholly unnecessary.

4.2. Root protection areas affected by development

The RPA's of T5 (35%), T6 (15%) and T7 (10%) will all be encroached upon by the main site access route.

In order to ensure retention of these trees and minimise damage to roots, during these works ground protection should be installed in all areas where the site access route passes through their RPAs. The process of ground protection installation is further detailed in Appendix 5: Arboricultural Method Statement; precise locations of where ground protection is required is given in Appendix 4: Tree Protection Plan.

5. Recommendations

5.1. Tree Works

Prior to works commencing, in order to make the proposed development feasible, it is recommended that T4 alongside G1, G3 and H1 are removed.

T2 and T3 have been recommended for removal on the basis that these are Category U trees.

Although none of the above trees are afforded protection by Tree Preservation Orders, the allocation of these may be subject to change. As such, all removals and/or facilitative pruning should only be carried out if consent from the local authority has been granted. Killing or damaging a protected tree is a criminal offence and can result in an unlimited fine.

All tree works, including tree removals, should be carried out by a fully insured and suitably qualified arboricultural contractor who is able to comply with BS3998: 2010 – Tree Works: Recommendations.

5.2. Tree Protection

It is recommended that works follow an Arboricultural Method Statement (AMS). An outline AMS can be viewed in Appendix 5. This should be reviewed by an arboricultural consultant prior to the commencement of works on the site.

Temporary tree protection fencing and ground protection should be put in place throughout development works to ensure that retained trees survive the development and thrive upon its completion. The location of tree protection fencing can be viewed in Appendix 4: Tree Protection Plan, and details regarding its specification can be viewed in the outline AMS.

5.3. Mitigation

The development proposals will necessitate the removal of one Category C tree and three Category C groups/hedges. These trees are of limited environmental and amenity value, and removal is therefore considered low impact. The site is also set within the larger area of Penistone Grammar School, which has a high level of tree cover. However, a replanting scheme is recommended which will help offset the removal of trees; this should ideally seek to diversify species structure at the site, with native trees often providing the greatest ecological benefits.

Trees planted should be standard in size and should be planted in accordance with BS845: 2014 – Trees: from Nursery to Independence in the Landscape. All trees should be affixed with a wooden stake, secured to the tree by a biodegradable cable tie. An organic woodchip mulch should be applied in a 1m radius around tree stems.

The location of trees planted for mitigation should be detailed on a Landscape Planting Plan.

A minimum of ten trees should be included in mitigation planting. Tree species should be agreed with by the local authority tree officer. Suggested species include:

- Hornbeam *Carpinus betulus*
- Silver birch *Betula pendula*
- Sessile oak *Quercus petraea*
- Wild service tree *Sorbus torminalis*
- Maidenhair tree *Gingko biloba*

Aftercare will be required for a period of at least three years after planting. This should include watering, removal of weeds and if necessary, removal of cable ties, formative pruning and reapplication of mulch. If any trees fail to establish within this period then they should be replaced.

6. References

British Standards (2010). BS3998: 2010 – Tree Works: Recommendations. British Standards Institute, London

British Standards (2012). BS5837: 2012 - Trees in Relation to Design, Demolition and Construction: Recommendations. British Standards Institute, London

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Merchant, T. (2013). *Tree Condition Report, Arboricultural impact Assessment, Tree protection plan* [technical report]. Telford: Forester and Arborist Services Ltd

Barnsley Metropolitan Borough Council (2018) *Tree Protection Order and Conservation Area Interactive Map* [online]. Available at: >www.barnsley.gov.uk< [accessed 19th July 2018]

Appendices

Appendix 1: Tree Survey Schedule

A plan of the tree locations can be viewed in Appendix 2: Tree Constraints Plan.

Key			
Species	Common name following Johnson & More (2004)	**Age**	EM – Early mature; tree in 2/3 of estimated lifespan
Height	Measured to nearest 0.1m		M – Mature; tree in 3/3 of estimated lifespan
CC	Height of crown clearance, measured to nearest 0.1m		OM – Over mature; tree that has exceeded its natural life span
Stems	Number of stems bifurcating below 1.5 metres		V – Veteran tree
DBH	Diameter at breast height (1.5m), in millimetres	**RPA**	Root protection area, in metres squared
Crown spread	Measured to nearest 0.1m	**RPR**	Root protection radius from stem, in metres
Age	Y – Young sapling/newly planted tree	**SULE**	Safe useful life expectancy of tree, in years
	SM – Semi-mature; tree in 1/3 of estimated lifespan	**Category**	See BS5837 cascade chart (Table 1)
		#	Denotes estimated value

Individual Trees

Tree No.	Species	Height	CC	Stems	DBH	Crown Spread				Age	Comments	RPA	RPR	SULE	Category
						N	E	S	W						
T1	Balsam poplar *Populus balsamifera*	8.2	1.6	1	100	1	1	1	1	Y	Part of linear group. No major arboricultural defects.	5	1.2	21-40	C
T2	Cherry *Prunus* spp.	4.1	0	1	80	0	0	0	0	Y	Newly planted tree. Dead/dying.	4	1.1	<10	U
T3	Balsam poplar *Populus balsamifera*	5.2	0.5	1	80	0.2	0.3	0.3	0.3	Y	Newly planted tree. Sparsely foliated crown. In decline.	4	1.1	<10	U
T4	Cherry *Prunus* spp.	3.6	0	1	70	0.5	1	1	0.5	Y	Newly planted tree. Epicormic throughout crown. Minor deadwood.	2	0.8	11-20	C

Tree No.	Species	Height	CC	Stems	DBH	Crown Spread				Age	Comments	RPA	RPR	SULE	Category
						N	E	S	W						
T5	Sycamore *Acer pseudoplatanus*	12.4	2.5	1	720	7.2	5.8	6#	5#	M	Epicormic on main stem. Splits into multiple leaders at bole. Minor deadwood <100mm diameter. Lacks arboricultural qualities to warrant Category A classification.	235	8.6	40+	B
T6	Sycamore *Acer pseudoplatanus*	11.6	2.8	1	600#	6.9	6#	5#	5#	M	Epicormic on main stem. Minor deadwood <100mm diameter. Lacks arboricultural qualities to warrant Category A classification.	163	7.2	40+	B

Groups of Trees

Tree No.	Species	Av. Height	Av. CC	Approx. Stems	Av. DBH	Av. Crown Spread	Av. Age	Comments	RPA	RPR	SULE	Category
G1	Balsam poplar *Populus balsamifera*	8	0	6	100	1	EM	Linear group. Stakes and ties need adjustment. Strimmer/mower damage at base. Lacks arboricultural qualities for Category B classification.	5	1.2	21-40	C
G2	Balsam poplar *Populus balsamifera*	6.5	0.5	11	100	2	EM	Linear group. Stakes and ties require adjustment. Strimmer/mower damage at base. Lacks arboricultural qualities for Category B classification	5	1.2	21-40	C
G3	Cherry *Prunus* spp.	7	1.5	11	150	2	EM	Linear group. Stakes and ties require adjustment. Lacks arboricultural qualities for Category A classification	10	1.8	40+	C
G4	Sycamore *Acer pseudoplatanus*	17.5	2.8	7	600	9	M	Basal epicormic on three trees. Dense ivy on one tree. Minor deadwood <100mm diameter. Bat boxes.	163	7.2	40+	A

Hedges

Tree No.	Species	Av. Height	Av. CC	Approx. Stems	Av. DBH	Av. Crown Spread	Av. Age	Comments	RPA	RPR	SULE	Category
H1	Hornbeam *Carpinus betulus*	1.5	0	50+	100#	1	SM	Linear group forming hedge. Lacks arboricultural qualities to warrant higher classification.	5	1.2	21-40	C
H2	Hornbeam *Carpinus betulus*	1.5	0	50+	100#	1	SM	Linear group forming hedge. Lacks arboricultural qualities to warrant higher classification.	5	1.2	21-40	C

Appendix 2: Tree Images

Plate 1: G1

Plate 2: G4

Plate 3: G2

Plate 3: G3

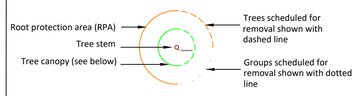
Plate 5: (left to right) T1, T2, T3 & T4

Appendix 3:
Tree Constraints Plan

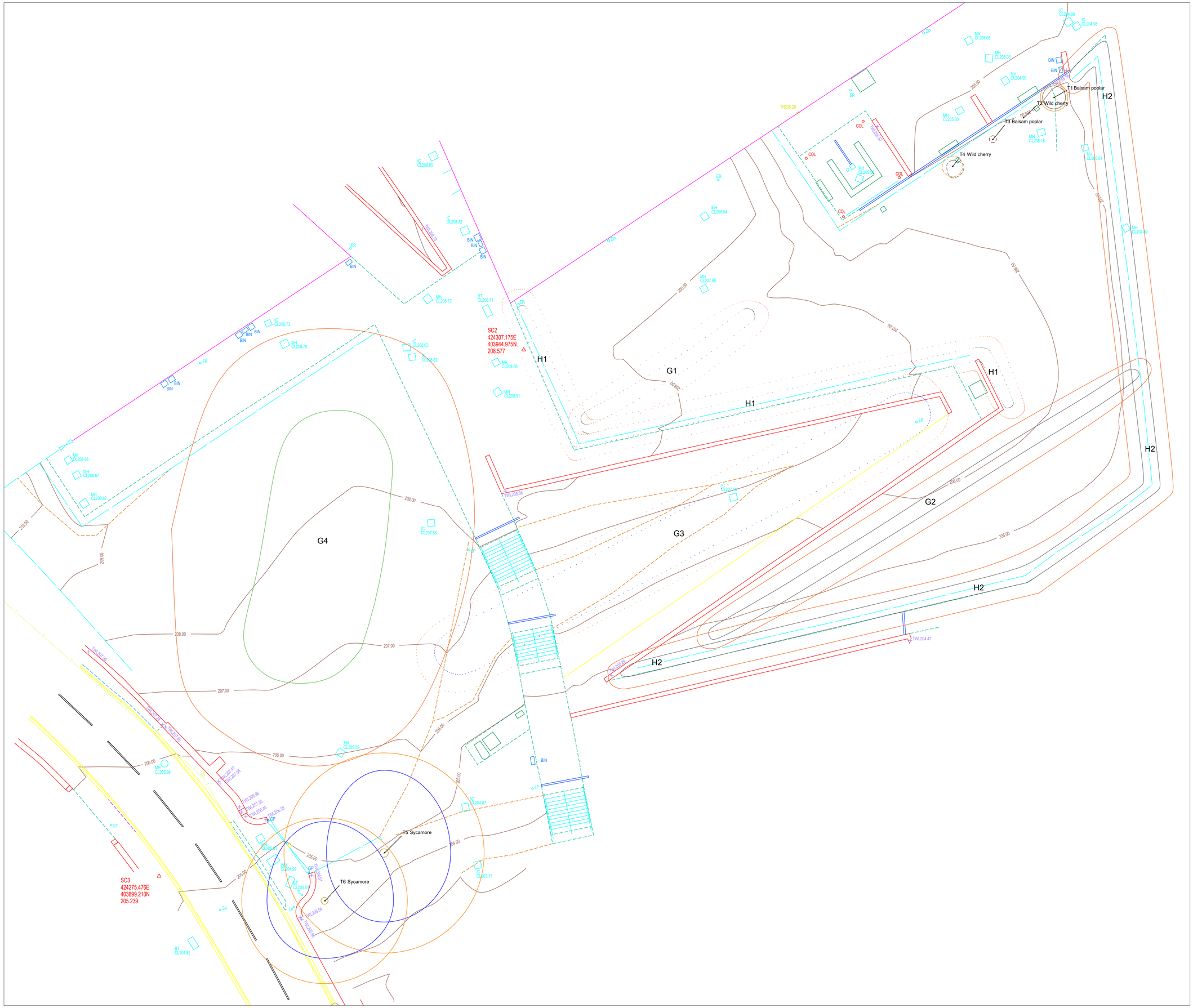
Project:	Penistone Grammar School
Drawn by:	Jack Delaney
Date:	17/12/2018
Scale:	1:150 @ A1

Do not scale off this drawing - to be reproduced in colour only

Key:



	Category A trees of high quality
	Category B trees of moderate quality
	Category C trees of low quality
	Category U trees unsuitable for retention



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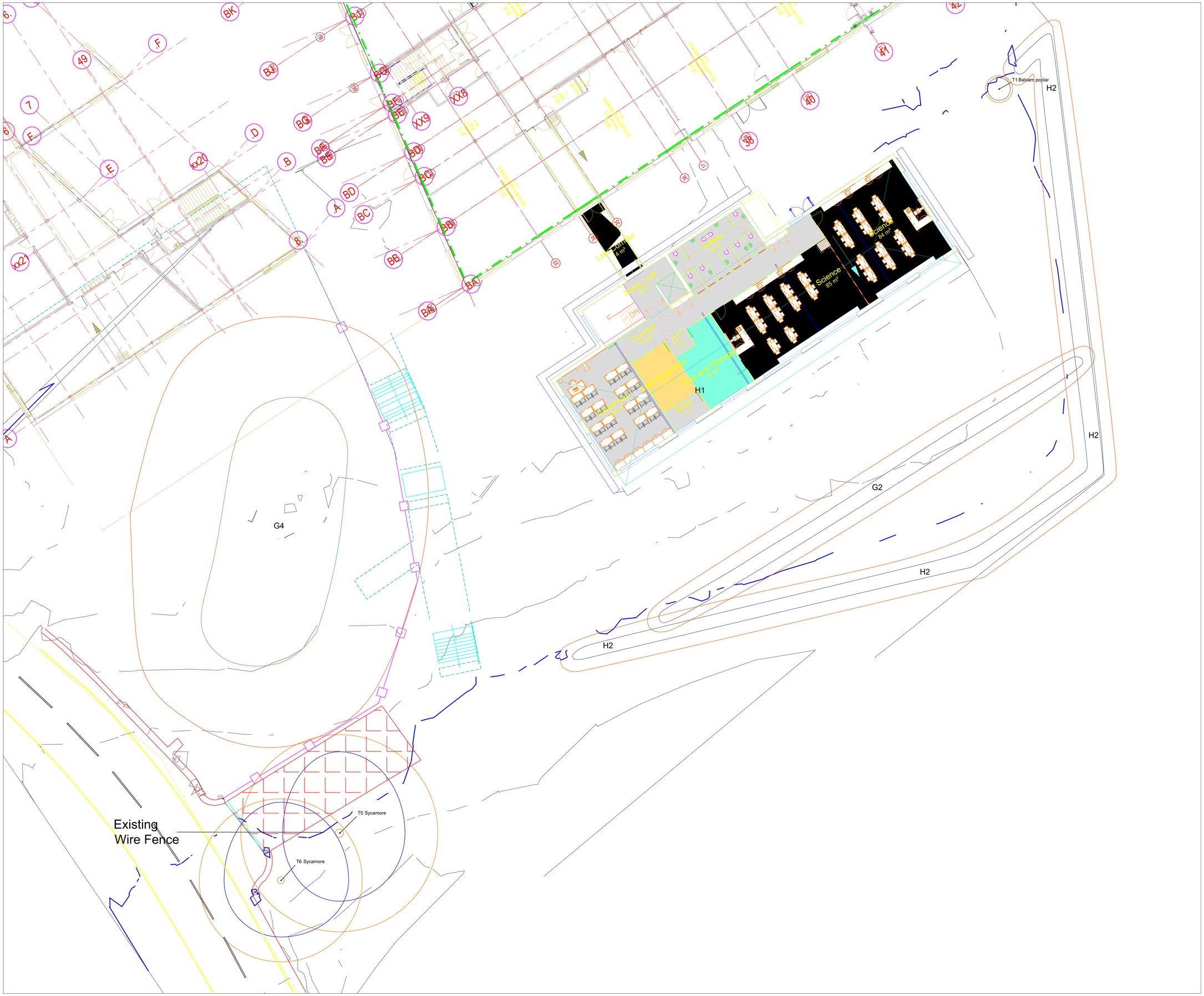
Appendix 4:
Tree Protection Plan

Project:	Penistone Grammar School
Drawn by:	Jack Delaney
Date:	17/12/2018
Scale:	1:150 @ A1

Do not scale off this drawing - to be reproduced in colour only

Key:

	Category A trees of high quality
	Category B trees of moderate quality
	Category C trees of low quality
	Tree root protection area (RPA) - to remain in place throughout proposals
	Tree protecton fencing - to remain in place throughout development works
	Ground Protection



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Appendix 5: Arboricultural Method Statement

1. Introduction

Bagshaw Ecology have been requested by 10architect Ltd to produce an Arboricultural Method Statement in relation to the proposed development at Penistone Grammar School, Huddersfield Road, Penistone, Sheffield, S36 7BX in relation to an application for planning. The development proposals include construction of a new extension which will be adjoined to the south of the existing building.

This Arboricultural Method Statement should be read in conjunction with the Arboricultural Impact Assessment.

2. Timing of Works

The phasing of works should be carried out in accordance with Table 1, below.

Table 1. Timing of Works

Stage	Works
1	Site induction
2	Carry out tree removals
3	Install temporary tree protection fencing
4	Inspection by arboricultural consultant
5	Carry out construction works
6	Remove tree protection fencing once works completed
7	Final inspection by arboricultural consultant

3. Site Induction

Prior to works commencing, all contractors should attend a site induction. All contractors should be briefed on arboricultural concerns arising from the development proposals, including tree root protection areas (RPAs). This method statement should be issued to all contractors on the site.

4. Tree Removals

Prior to the commencement of works T2, T3, T4, G1, G3 and H1 should be removed. These works should be carried out by a suitable qualified and fully insured arboricultural contractor who is able to comply with BS3998: 2010 – Tree Works: Recommendations.

At time of survey none of the trees on site are afforded protection by a Tree Preservation Order, however this may be subject to change, and as such, any legal protection afforded trees should therefore be verified with the local authority prior to the commencement of works. Killing or damaging a protected tree is a criminal offence and can result in an unlimited fine.

5. Tree Protection Fencing

Prior to machinery entering the site, it will be necessary to ensure that all trees are adequately protected. This will require the installation of temporary of tree protection fencing on the site between construction areas, and adjacent trees.

Tree protection fencing should consist of a vertical scaffold framework, well braced to resist impacts. The vertical poles should be spaced at a maximum interval of 3m and driven securely into the ground. Onto this framework, welded mesh panels should be fixed (see figure 1, below).

Laminated waterproof A3 signs should be fixed securely to fencing panels on each enclosure at 9m intervals. The signs should clearly read: 'Protected Tree Zone, no storage or operations within fenced off areas'.

If any breach in the tree protection measures occurs it is the site manager's responsibility to report this to an arboricultural consultant so the appropriate measures may be taken. As there are trees afforded protection by TPOs on the site, any breach in the tree protection resulting in the death of or damage to trees could result in a criminal offence being committed.

No materials hazardous to tree health, such as oil, bitumen or cement should be stored within the protective fencing. Where possible this area should be extended to 10m away from the fencing.

Where there is a risk of polluted water runoff into RPAs, heavy duty plastic sheeting and sandbags must be used to contain any spillages and prevent contamination.

No fires should be lit within 20 metres of the protective fencing.

Once the construction works have been completed, the tree protection fencing may be removed. This should be done with care to ensure that no damage to trees is caused.

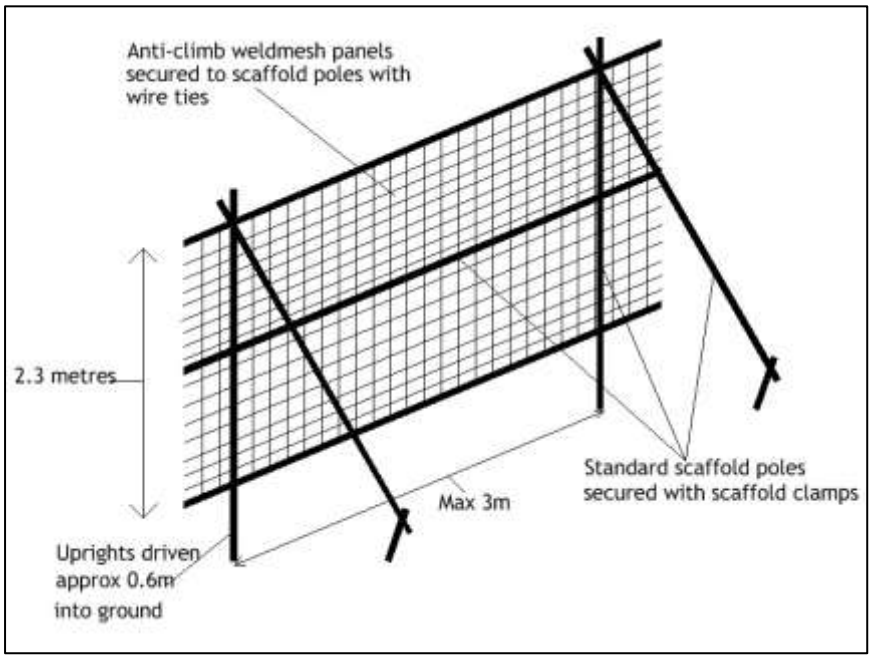

Figure 1. Temporary Protective Fencing

6. Ground Protection

In areas where the site access route dissects through the RPAs of T5 and T6, this has been facilitated with a setback in alignment of the protective fencing.

Prior to the commencement of works, ground protection should be installed in all areas where the site access passes through RPAs; this should incorporate inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip) which should be laid onto a geotextile membrane.

Any plant or machinery operating within the RPA of T5 and T6 should ensure it is operated on the ground protection.

7. Supervised works and further inspection

It is advised that installation of tree protective fencing and ground protection is supervised by a consultant arboriculturalist.

Further inspections by an arboricultural consultant should be undertaken:

- Once the tree protection fencing and ground protection has been installed - to determine if it is satisfactory.
- Upon completion of the development works.

After each inspection a letter should be submitted by the arboricultural consultant to the local authority tree officer to confirm if the method statement has been followed correctly and if trees have not been adversely affected by construction works.