Appendix 15.3: Terrestrial Invertebrate Report

CASCADE

London Borough of Richmond upon Thames

Richmond upon Thames College Development

Terrestrial Invertebrate Survey Report

September 2014

In Association with:
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Albion Ecology

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Contents

1 INTRODUCTION

1.1 BACKGROUND

Cascade Consulting was commissioned to undertake an updated Extended Phase 1 Habitat Survey of land surrounding the REEC Development, located off the A316 Chertsey Road, Richmond upon Thames (grid reference TQ 17375 72880) in support of a proposed planning application for the site and the recommendations in the Extended Phase 1 Habitat Survey Report (**Appendix 15.1** to Chapter 15 – Ecology).

1.2 PURPOSE OF REPORT

This report provides an assessment of the terrestrial invertebrate value of the REEC site, based on the habitats present and species identified during a walkover assessment. The habitats of value to terrestrial invertebrates within and adjacent to the site were identified, and inform the design of appropriate ecological mitigation and enhancement measures which can be incorporated within the scheme design. The report also considers whether further detailed surveys are required.

1.3 SURVEY AREA

The proposed development site is located in the London Borough of Richmond upon Thames (LBRuT). The site is bordered by the River Crane to the south, Duke of Northumberland's River to the west, A316 to the north and residential properties to the east. The site is located within the urban context of Twickenham, with residential properties surrounding the site.

The land incorporated within and immediately adjacent to the site identified in **Figure 1.1** was subject to field survey, and is referred to in this report as the 'survey area'. In addition, surrounding land up to 2km from the proposed development was subject to a desk-based searched, referred to as the 'study area', to provide contextual information about local ecological conditions.

1.4 PROTECTED SPECIES LEGISLATION

Although stag beetle *Lucanus cervus* are listed in Schedule 5 of the Wildlife and Countryside Act (as amended) 1981, their protection through this legislation is concerned with its trade in the UK.

The stag beetle is listed under Annex II of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. However, the species is not included within the Conservation of Habitats and Species Regulations (as amended) 2010. Consequently, it is possible to designate a Special Area of Conservation based on the presence of a significant population of the species,

however, they do not receive direct legal protection as a European Protected Species.

No other species of relevance to the assessment are afforded legal protection.

1.5 SURVEY AIMS AND OBJECTIVES

The overall survey aim was to assess the site's ecological importance for terrestrial invertebrates to highlight the presence of ecological constraints associated with the assemblage or abundance of populations present or species composition.

The specific objectives were to:

- review existing ecological information for the site;
- identify species present within the survey area;
- identify habitats of value to invertebrate species within the survey area.

Legend

Site Boundary

Existing Buildings

CASCADE

Not to scale

Note: All locations are approximate

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Drawing Source: Holt Number PL-01

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Planning Application Boundary

For Information Only

Figure Number:	Date:
Figure 1.1	September 2015

2 METHODOLOGY

2.1 DESK STUDY

A number of web-based information sources were used to collate baseline information on terrestrial invertebrate species within the study area. This included consideration of designated sites in which invertebrate species form part of the designation and records of legally protected or ecologically significant species. The following information sources were used to collate the information:

- Multi-Agency Geographic Information for the Countryside website (www.magic.gov.uk);
- National Biodiversity Network (NBN) website (www.searchnbn.net)
- UK Biodiversity Action Plan (BAP) website (http://jncc.defra.gov.uk)
- London BAP website (www.lbp.org.uk)
- London Borough of Richmond upon Thames BAP website (www.richmond.gov.uk);
- Friends of the River Crane Environment website (www.force.org.uk).

2.2 FIELD SURVEY

A walkover survey of the survey area was undertaken on 14 August 2014 to determine which habitats were of value to terrestrial invertebrates and identify the species present. As it is impracticable to survey all the potential invertebrate species present within any given site, specific groups of species were examined. These groups are sufficiently well known to allow for meaningful comparisons to be made with other sites, both locally and nationally, and are important as indicators of the quality of a site and the habitats present[1].

The groups covered during the survey were:

- Mollusca (slugs and snails)
- Arachnida (spiders, harvestmen and pseudoscorpions)
- Isopoda (woodlice)
- Thysanura (bristletails)
- Ephermeroptera (mayflies)

[1] Brooks, S. J. (1993) Joint Committee for the Conservation of British Invertebrates: Guidelines for Invertebrate Surveys. *British Wildlife* 4 (5) pp 283-287.

- Odonata (dragonflies and damselflies)
- Plecoptera (stoneflies)
- Orthoptera (grasshoppers and crickets)
- Dictyoptera (cockroaches)
- Dermaptera (earwigs).
- Hemiptera-Heteroptera (true-bugs)
- Hemiptera-Homoptera (hoppers)
- Neuroptera (lace-wings)
- Mecoptera (scorpion-flies)
- Lepidoptera (butterflies and moths)
- Trichoptera (caddis flies)
- Diptera (true flies)
- Aculeate Hymenoptera (ants, bees and wasps)
- Coleoptera (beetles).

2.3 ASSESSMENT METHODOLOGY

In accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Assessment[2], the ecological value of the invertebrate interest at the site should be assessed based on the following geographic frame of reference:

- *International* - e.g. existing or warranting designation as a Special Area of Conservation (SAC) and/or of significant conservation status for Europe.
- *National* - e.g. existing or warranting designation as a Site of Special Scientific Interest (SSSI) and/or of significant conservation status for England.
- *Regional* - e.g. habitats or species valuable at a regional level and/or of significant conservation status for the South East of England.
- *Metropolitan* - e.g. existing or warranting designation as a Site of Metropolitan Importance for Nature Conservation (SMINC) and/or of significant conservation status for London.

[2] Institute of Ecology and Environmental Management (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom* (version 7 July 2006).

- *Borough* - e.g. habitats or species of significant conservation status for London Borough of Richmond upon Thames.
- *Local* - e.g. habitats or species of significant conservation status for Twickenham.
- *Within immediate survey area only* - e.g. habitats or species of conservation status for the site and immediate surrounding lands.

2.4 SURVEY LIMITATIONS

The timing of the survey was outside of the flight period of many species associated with rough grassland, such as that alongside Challenge Court. However, as this habitat falls outside of the study area this potential limitation is not considered to impact on the aims of the assessment.

3 RESULTS

3.1 DESK STUDY

3.1.1 Designated Sites

The following designated sites have been identified in the Extended Phase 1 Habitat survey as supporting significant assemblages, populations or species of invertebrates, although further considerations are identified for site selection only those relevant to invertebrates are listed here:

- **Isleworth Ait Local Nature Reserve** - several rare beetles and two rare species of mollusc;
- **Ham Lands Local Nature Reserve** - mosaic of habitat types attracting many butterfly species;
- **River Thames and Tidal Tributaries Site of Metropolitan Importance for Nature Conservation (SMINC)** - the numerous islands present support important invertebrate communities, including several nationally important snails;
- **Mogden Sewage Works Borough 1 Site of Importance for Nature Conservation (SINC)** - the site supports the nationally rare and declining phoenix fly;
- **Duke of Northumberland's River north of Kneller Road Borough 1 SINC** - the site has improved habitat provision for wildlife including invertebrates, which includes the banded demoiselle *Calopteryx splendens*.
- **The Copse, Holly Hedge Field & Ham Avenues Borough 2 SINC** - the site supports much dead wood that provides important habitat for insects;
- **Fulwell & Twickenham Golf Courses Borough 2 SINC** - the acid grassland present within the site provides habitat for the copper butterfly *Lycaena phlaeas*.
- **Strawberry Hill Golf Course Borough 2 SINC** - The site includes a triangle to the south-east which receives little disturbance and as a result is an important area for butterflies;
- **Teddington Cemetery Local SINC** - the presence of stonecrops *Crassulaceae* on many of the graves provides a valuable source of nectrr for invertebrates;
- **Twickenham Cemetery Local SINC** - the mixture of habitats present on site provide valuable habitats for butterflies, including the common blue *Polyommatus icarus*, meadow brown *Maniola jurtina*, gatekeeper *Pyronia tithonus* and speckled wood *Pararge aegeria*.

- **Inwood Park Local SINC** - the site provides important habitat for butterflies, including orange tip *Abnthocharis cardamines*, brimstone *Gonepteryx rhamni*, speckled wood and small tortoiseshell *Aglais urticae*.

3.1.2 Species

National Biodiversity Network Database

A search of the NBN database revealed the presence of 809 invertebrate species within the 10km grid square containing the proposed scheme. This included a total of 105 ecologically significant invertebrate species that includes three endangered species, 12 rare species, seven vulnerable species, 82 nationally notable species and one priority species. The full list of ecologically significant invertebrate species is included in **Appendix 1**.

Greenspace Information for Greater London

The relevant records of legally protected and ecologically significant invertebrate species for the study area provided by Greenspace Information for Greater London (GIGL) are provided in **Table 3.1**.

Table 3.1 Legally Protected and Ecologically Significant Invertebrate Species Present within the Study Area (from GIGL)

Species	Designation	Date	Proximity
Asiraca clavicornis	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Raglius alboacuminatus	Nationally notable B	2010	1.6km
Edwardsiana ishidai	Nationally notable B	2010	1.8km
Quedius (Microsaurus) scitus	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Stag beetle *Lucanus cervus*	Hab&Spp Dir Anx 2 NERC Sect. 41 UK BAP Priority London BAP Priority Nationally notable B Local Sp. of Cons Conc	2011	650m
Hawthorn Jewel Beetle *Agrilus (Anambus) sinuatus*	Nationally notable A Local Sp. of Cons Conc	2010	1km
Dasytes plumbeus	Nationally notable B	2010	1.8km
Adonis' Ladybird *Hippodamia (Adonia) variegata*	Nationally notable B Local Sp. of Cons Conc	2010	1.6km
Ischnomera cyanea	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Phytoecia cylindrica	Nationally notable B Local Sp. of Cons Conc	2010	1.8km

Species	Designation	Date	Proximity
Mallow flea bee *Podagrica fuscicornis*	Nationally notable B	2010	1.8km
Cossonus linearis	Nationally notable A Local Sp. of Cons Conc	2010	1.8km
White ermine *Spilosoma lubricipeda*	NERC Sect. 41 UK BAP Priority London BAP Priority Local Sp. of Cons Conc	2010	1.8km
Cinnabar *Tyria jacobaeae*	NERC Sect. 41 UK BAP Priority London BAP Priority Local Sp. of Cons Conc	2012	1.3km
Volucella ianis	Nationally notable Local Sp. of Cons Conc	2010	1.8km
Mintho rufiventris	Nationally notable	2010	1km
Brown ant *Lasius brunneus*	Nationally notable A Local Sp. of Cons Conc	2010	1.8km

Friends of the River Crane Environment

The Friends of the River Crane Environment (FORCE) have identified a number of invertebrate species that are commonly present along the River Crane corridor, although detailed species surveys have not been carried out. Butterflies such as peacock, comma, brimstone, holly blue and orange tip are abundant in the area. Less familiar species include the large skipper, scorpion flies and the rose chafer beetle.

3.1.3 Local Biodiversity Action Plan

The London Borough of Richmond upon Thames BAP identifies a number of terrestrial invertebrate species whose presence in the Borough is considered to be of ecological importance. These are listed in **Table 3.2**, the priority species are identified in bold and their inclusion within the UK and London BAP identified.

Table 3.2 BAP Invertebrate Species in the London Borough of Richmond upon Thames

	UK BAP	London BAP	LBRuT BAP
Stag Beetle *Lucanus cervus*	✓	✓	✓
Bumble Bee *Apidae*	✓[3]		✓
Small Copper Butterfly *Lycaena phlaeas*			✓
Dragonflies *Odonata*			✓
Cardinal Click Beetle *Ampedus cardinalis*			✓

3.2 WALKOVER SURVEY

The walkover survey concentrated on three main habitats on site, which were:

A. the grounds of Richmond upon Thames College;

B. rough grassland alongside Challenge Court; and,

C. the margins of the amenity grassland habitat (playing fields/parkland).

A total of 155 different species were identified within the survey area. The grounds of Richmond upon Thames College supported the greatest diversity of species present (97 species) with the parkland margins and rough grassland alongside Challenge Court supporting a good diversity of species (70 and 59[4] respectively). The full results are identified in **Table 3.3** below.

Table 3.3 Invertebrate Species Identified Within the Survey Area

Species	Status	Area		
		A	B	C
Rounded snail *Discus rotundatus*	Common	1	1	1
Large black slug *Arion ater*	Common		1	
Field slug *Deroceras reticulatum*	Common	1		1
Budapest snail *Tandonia budapestensis*	Common	1	1	1
Garden snail *Helix aspera*	Common	1	1	1
Lithobius forficatus (a centipede)	Common	1	1	
Oniscus asellus (a woodlouse)	Common	1	1	1
Philoscia muscorum (a woodlouse)	Common	1	1	1
Armadillium vulgare (a pill woodlouse)	Common	1	1	1
Harpactea hombergii (a spider)	Common	1		1
Mouse spider *Scotophaeus blackwallii*	Common	1		

[3] Large Garden bumblebee, great yellow bumblebee and short-haired bumble bee only.
[4] It is noted that the survey timing did not coincide with the flight times of some species typically associated with the habitat type, and therefore a greater species diversity would be expected.

Species	Status	Area		
		A	B	C
Ero aphana (a pirate spider)	Formerly RDB2	1		
Daddy long legs spider *Pholcus phalangoides*	Common	1		
Steatoda grossa (a comb-footed spider)	Common	1		
False black widow spider *Steatoda nobilis*	Local	1		
Anelosimus vittatus (a comb-footed spider)	Common	1		1
Paidiscura pallens (a comb-footed spider)	Common	1	1	
Enoplognatha ovata (a comb-footed spider)	Common	1	1	
Theridion tinctum (a comb-footed spider)	Common	1		
Linyphia triangularis (a money spider)	Common	1		
Lephthyphantes leprosus (a money spider)	Common	1		
Tetragnatha extensa (a long-jawed orb spider)	Common			1
Metallina segmentata (a long-jawed orb spider)	Common			1
Common garden spider *Araneus diadematus*	Common	1	1	1
Nuctenea umbratica (an orb weaver)	Common	1	1	1
Araniella cucurbitina (an orb weaver)	Common			
Zygiella x-notata (an orb weaver)	Common	1		
Pardosa pullata (a wolf spider)	Common			1
Nursery tent spider *Pisaura mirabilis*	Common	1		1
Labyrinth spider *Agelena labyrinthica*	Common			
Tegenaria gigantea (a house spider)	Common	1		
Nigma walckenaeri (a mesh-webbed spider)	Notable B	1		
Amaurobius fenestralis (a lace-webbed spider)	Common			1
Amarobius similis (a lace-webbed spider)	Common	1		
Philodromus albidus (a running crab spider)	Common	1		1
Philodromus dispar (a running crab spider)	Common	1		1
Tibellus oblongus (a running crab spider)	Common		1	
Misumena vatia (a crab spider)	Common		1	
Xysticus cristatus (a crab spider)	Common			
Zebra jumping spider *Salticus scenicus*	Common	1		
Sitticus pubescens (a jumping spider)	Common	1		
Dicranocephalus ramosus (a harvestman)	Common	1	1	1
Leiobunum rotundatum (a harvestman)	Common	1		1
Paroligolophus agrestis (a harvestmand)	Common	1		1
Southern Hawker *Aeshna cyanea*	Common		1	
Common darter *Sympetrum striolatum*	Common			1
Roesel's bush-cricket *Metrioptera roeselii*	Common			1
Southern oak bush cricket *Meconema meridionale*	Recent colonist	1	1	
Speckled bush-cricket *Leptophyes punctatissima*	Common	1		
Field grasshopper *Chorhippus brunneus*	Common		1	1
Meadow grasshopper *Chorthippus parallelus*	Common		1	
Common earwig *Foficula auricularia*	Common	1	1	1
Physatocheila dumetorum (a lacebug)	Common	1		

Species	Status	Area		
		A	B	C
Ivy lacebug *Derephysia foliacea*	Local	1		
Empicoris vagabundus (a thread legged bug)	Common	1		
Blepharidopterus angulatus (a plantbug)	Common	1		1
Deraeocoris lutescens (a plantbug)	Common	1		1
Tarnished plant bug *Lygus rugilipennis*	Common			1
Liocoris tripustulatus (a plantbug)	Common		1	1
Megacoelum beckeri (a plantbug)	Local	1		
Megacoelum infusum (a plantbug)	Common			1
Orthops kalmii (a plantbug)	Local		1	
Philphorus perplexus (a plantbug)	Common	1		
Campyloneura virgula (a plantbug)	Common	1		
Pinatilus cervinus (a plantbug)	Common	1		
Phytocoris tiliae (a plantbug)	Common			1
Orthotylus caprai (a plantbug)	Recent colonist	1		
Anthocoris confusus (an anthocorid bug)	Common	1	1	1
Anthocoris nemoralis (an anthocorid bug)	Common	1	1	
Anthocoris nemorum (an anthocorid bug)	Common		1	
Orius laevigatus (an anthocorid bug)	Common	1		
Kleidocerys resedae (a seed bug)	Common	1		1
Cypress seed bug *Orsillus depressus*	Common	1		
Coreus marginatus (a squash bug)	Common	1	1	1
Juniper shield bug *Elasmostethus tristriatus*	Common	1		
Elasmostethus interstinctus (a squash bug)	Common	1		1
Tritomegas sexmaculatus (a shield bug)	Recent colonist	1		
Green shield bug *Palomena prasina*	Common	1		1
Parent bug *Elasmucha grisea*	Common	1		
Ivy hopper *Issus coleoptratus*	Common	1		1
Fieberiella florii (a froghopper)	Recent colonist	1		
Common froghopper *Philaenus spumarius*	Common	1	1	1
Eurhadina concinna (a leafhopper)	Common	1		
Idiocerus albicans (a leafhopper)	Common	1		
Acericerus heydenii (a leafhopper)	Recent colonist	1		
Cypress hopper *Liguropia juniperi*	Recent colonist	1		
Hornbeam leafhopper *Typhlocyba bifasciata*	Local	1		
Empoasca vitis (a leafhopper)	Common	1		
Tamarisk hopper *Opsius stactogalus*	Local			1
White poplar hopper *Zygina nivea*	Recent colonist	1		
Zyginella pulchra (a hopper)	Recent colonist	1		
Cacopsylla fulgularis (a psyllid bug)	Naturalised	1		
Floria variegata (a psyllid bug)	Naturalised	1		
Fig plant bug *Homotoma ficus*	Naturalised	1		
Pemphigus spyrothecae (an aphid)	Common			1

Species	Status	Area		
		A	B	C
Crambus lathoniellus (a crambid moth)	Common		1	
Firethorn leafminer *Phyllonorhycter leucographella*	Common	1		
Large white *Pieris brassicae*	Common			1
Small white *Pieris rapae*	Common		1	
Common blue *Polyommatus icarus*	Common		1	
Red admiral *Vanessa atalanta*	Common			1
Small tortoiseshell *Aglais urticae*	Common			1
Peacock *Inachis io*	Common		1	
Silver Y *Autographa gamma*	Common			1
Chorisops tibialis (a soldier fly)	Common	1		
Marmalade hoverfly *Episyrphus balteatus*	Common	1	1	1
Narcissus bulb fly *Merodon equestris*	Common	1		
Sphaerophoria scripta (a hoverfly)	Common		1	
Syritta pipiens (a hoverfly)	Common		1	
Syrphus ribesii (a hoverfly)	Common		1	
Anomoia purmunda (a picture winged fly)	Common	1		
Flesh fly *Sarcophaga carnaria*	Common		1	1
Eriothrix rufomaculata (a tachinid fly)	Common		1	1
Lasius niger s.s. (an ant)	Common	1	1	1
Bicolored tree ant *Lasius brunneus*	Notable A			1
Ancistrocerus gazella (a vespid wasp)	Common			
Common wasp *Vespula vulgaris*	Common			1
Lasioglossum calceatum (a bee)	Common		1	1
Osmia rufa (a bee)	Common		1	
Megachile willughbiella (a bee)	Common		1	
Bombus lapidarius (a bumblebee)	Common		1	
Bombus lucorum agg (a bumblebee)	Common	1	1	1
Bombus pascuorum (a bumblebee)	Common		1	1
Bombus pratorum (a bumblebee)	Common		1	1
Hive bee *Apis mellifera*	Domesticated	1	1	1
Parasitic wasp *Ichneumon suspiciosus*	Common	1		
Black-clock *Pterostichus madidus*	Common			1
Harpalus affinis (a ground beetle)	Common			1
Common sun beetle *Amara aenea*	Common		1	
Tachyporus chrysomelinus (a rove beetle)	Common			1
Drusilla canaliculata (a rove beetle)	Common	1	1	1
Stag beetle *Lucanus cervus*	Notable B			1
Brachypterus glaber (a pollen beetle)	Common		1	1
Meligethes aeneus (a pollen beetle)	Common		1	1
Scymnus interruptus (a ladybird)	Local	1		
Rhyzobius chrysomeloides (a ladybird)	Local	1	1	
Rhysobius litura (a ladybird)	Common			

Species	Status	Area		
		A	B	C
Harlequin ladybird *Harmonia axydris*	Naturalised	1	1	1
Nephus quadrimaculatus (a ladybird)	Formerly RDB2	1		1
2-spot ladybird *Adalia bipunctata*	Common	1	1	1
10-spot ladybird *Adalia decempunctata*	Common	1		
7-spot ladybird *Coccinella septempunctata*	Common	1	1	1
14-spot ladybird *Propylea 14-punctata*	Common	1		
Cartodere bifasciata (a lathriid beetle)	Common	1		
Cartodere nodifer (a lathriid beetle)	Common	1		
Cis bilamellatus (a lathriid beetle)	Common	1		
Dacne rufifrons (a lathriid beetle)	Local	1		
Olibrus flavicornis (a phalacrid beetle)	RDBK		1	
Hairy wanderer *Lagria hirta*	Common	1		1
Psylloides dulcamarae (a flea beetle)	Common	1		
Aspidapion radiolus (a weevil)	Common		1	1
Malvapion malvae (a weevil)	Common		1	1
Protapion fulvipes (a clover weevil)	Common		1	
Sitona lineatus (a weevil)	Common	1	1	
Nedyus quadrimaculatus (a weevil)	Common			1
Total		**97**	**50**	**64**

Five species records are considered to be of particular note, which are:

- *Nigma walckaenaeri* (a mesh-webbed spider) - Nationally Scarce B species identified within the college grounds;
- *Ero aphana* (a pirate spider) - formerly a Red Data Book 2 species that should still be considered Nationally Scarce, identified on ivy along the southern edge of the college block;
- Bicolored tree ant *Lasius brunneus* - Nationally Scarce A species, which was frequent across the survey area on a wide variety of trees;
- Stag beetle *Lucanus cervus* - Nationally Scarce B species that is not uncommon in suburban Greater London, adult female and larvae found on separate tree stumps along southern boundary; and,
- *Nephus quadrimaculatus* (a ladybird) - formerly a Red Data Book 2 species that should still be considered Nationally Scarce, present within the college grounds and park margins.

In addition to these, the presence of bumblebee *Bombus* species are of local conservation concern, as identified in both the LBRuT and UK BAPs, which also list stag beetle as a priority species along with the London BAP.

4 DISCUSSION AND RECOMMENDATIONS

The shrubs and plants growing on the college grounds yielded a diverse assemblage with numerous recently established naturalised species as well as local natives that are of individual conservation concern. The Cypress *Cupressocyparis lelandii* trees within the college grounds yielded the formerly scarce mired bug *Megacoelum beckeri*, which was formerly restricted to heathland pines, but appears to have adapted to life on cypress trees.

Peripheral trees along the southern edge of the site boundary supported the stag beetle and bicolored ant, both species of conservation concern. The stag beetle were associated with the rotting stumps of trees whilst the bicolored ant was associated with cavities in the trunks and braches of trees, both living and dead.

Considering the species present and the assemblage of species present in each location, the presence of terrestrial invertebrate species are considered to be of **local biodiversity value**.

Further survey of the survey area is not considered to be necessary, as the assessment has identified key areas of habitat for terrestrial invertebrates that is sufficient to inform the design and implementation of any mitigation measures through the Ecological Impact Assessment process.

APPENDIX 1

Table A1 Ecologically Significant Invertebrate Species within the 10km Grid Square containing the Scheme

Scientific Name	Common Name	Status
Abdera biflexuosa		Nationally Notable B
Abdera flexuosa		Nationally Notable B
Abdera quadrifasciata		Nationally Notable A
Abraeus granulum		Nationally Notable A
Ampedus cardinalis	Cardinal Click Beetle	Vulnerable
Anacaena bipustulata		Nationally Notable B
Anaglyptus mysticus		Nationally Notable B
Anisoxya fuscula		Nationally Notable A
Anitys rubens		Nationally Notable B
Anobium inexspectatum		Nationally Notable B
Anthocoris visci		Nationally Notable B
Auplopus carbonarius		Nationally Notable B
Cassida nobilis		Nationally Notable B
Chorisops nagatomii	Bright Four-spined Legionnaire	Nationally Notable
Chrysolina oricalcia		Nationally Notable B
Cleptes nitidulus		Nationally Notable A
Cleptes semiauratus		Nationally Notable B
Clitostethus arcuatus		Endangered
Colydium elongatum		Rare
Conopalpus testaceus		Nationally Notable B
Corticaria alleni		Nationally Notable
Cryptarcha strigata		Nationally Notable B
Ctesias serra	Cobweb Beetle	Nationally Notable B
Diodontus insidiosus		Rare
Donacia sparganii		Nationally Notable A
Dorcatoma flavicornis		Nationally Notable B
Drino lota		Nationally Notable
Elater ferrugineus		Endangered
Eledona agricola		Nationally Notable B
Enicmus brevicornis		Nationally Notable
Enicmus rugosus		Nationally Notable
Enochrus melanocephalus		Nationally Notable B
Ephemera lineata		Vulnerable
Ferdinandea ruficornis		Nationally Notable
Gonocerus acuteangulatus	Box Bug	Endangered
Gymnosoma rotundatum		Rare
Gyrinus urinator		Nationally Notable B
Hedychridium coriaceum		Rare
Hedychridium cupreum		Nationally Notable B

Scientific Name	Common Name	Status
Hedychrum niemelai		Rare
Helochares lividus		Nationally Notable B
Helochares punctatus		Nationally Notable B
Hydaticus seminiger		Nationally Notable B
Hydrochus angustatus		Nationally Notable B
Hydroglyphus geminus		Nationally Notable B
Hydrovatus clypealis		Nationally Notable A
Iassus scutellaris		Nationally Notable A
Ischnomera cyanea		Nationally Notable B
Lasius brunneus	Brown Ant	Nationally Notable A
Lucanus cervus	Stag Beetle	Nationally Notable B
Lymexylon navale		Vulnerable
Macropis europaea		Nationally Notable A
Malthinus frontalis		Nationally Notable B
Megatoma undata		Nationally Notable B
Melasis buprestoides		Nationally Notable B
Melitta tricincta		Nationally Notable B
Microdynerus exilis		Nationally Notable B
Mycetophagus piceus		Nationally Notable B
Mycetophagus quadriguttatus		Nationally Notable A
Mythimna turca	Double-line	Priority Species
Nephus quadrimaculatus		Vulnerable
Nomada flavopicta		Nationally Notable B
Nomada fucata		Nationally Notable A
Nomada fulvicornis		Rare
Nomada hirtipes		Rare
Nomada lathburiana		Rare
Nysson dimidiatus	Small Spurred Digger Wasp	Nationally Notable B
Nysson trimaculatus		Nationally Notable B
Oligota apicata		Nationally Notable
Opilo mollis		Nationally Notable B
Orchesia micans		Nationally Notable B
Oxycera morrisii	White-barred Soldier	Nationally Notable
Peltodytes caesus		Nationally Notable B
Philanthus triangulum	Bee Wolf	Vulnerable
Phloiotrya vaudoueri		Nationally Notable B
Platypus cylindrus	Pinhole Borer	Nationally Notable B
Ponera coarctata	Indolent Ant	Nationally Notable B
Prionocyphon serricornis		Nationally Notable B
Prionus coriarius	Tanner Beetle	Nationally Notable A
Prionychus ater		Nationally Notable B
Procraerus tibialis		Rare
Pseudus schencki		Nationally Notable A

Scientific Name	Common Name	Status
Psilota anthracina		Vulnerable
Pyrochroa coccinea	Black-headed Cardinal Beetle	Nationally Notable B
Scolytus mali	Large Fruit Bark Beetle	Nationally Notable B
Solva marginata	Drab Wood-soldierfly	Nationally Notable
Sphecodes crassus		Nationally Notable B
Sphecodes miniatus		Nationally Notable B
Sphecodes niger		Rare
Sphecodes reticulatus		Nationally Notable A
Sphindus dubius		Nationally Notable B
Stelis punctulatissima		Nationally Notable B
Stenelmis canaliculata		Vulnerable
Stratiomys potamida	Banded General	Nationally Notable
Stratiomys singularior	Flecked General	Nationally Notable
Synchita humeralis		Nationally Notable B
Synchita separanda		Rare
Tillus elongatus		Nationally Notable B
Tiphia minuta	Small Tiphia	Nationally Notable B
Tomoxia bucephala		Nationally Notable A
Trinodes hirtus		Rare
Tychius pusillus		Nationally Notable B
Vanoyia tenuicornis	Long-horned Soldier	Nationally Notable
Volucella inanis		Nationally Notable
Volucella zonaria		Nationally Notable

Appendix 15.4: Ecological Impact Characterisation

ECOLOGICAL IMPACT CHARACTERISATION

Site Enabling, Demolition and Construction

Predicted Effects – Designated Sites

Habitat Loss and Fragmentation

The proposed development does not fall within or immediately adjacent to any statutory or non-statutory designated site, and therefore there will be no habitat loss or fragmentation as a result. No impacts on the adjacent SLINCs are anticipated.

Habitat Deterioration

Adverse effects upon designated sites could occur as a result of habitat deterioration, reducing its suitability to support significant species or inhibit its ecological function. Habitat deterioration can occur as a result of dust generation, noise generation, lighting, the encroachment of construction activities and water quality and run-off.

The generation of noise has the potential to influence the ecological functioning of habitats associated with both the Twickenham Junction Rough SLINC and Duke of Northumberland's River south of Kneller Road Borough II SINC. However, modelling results identified in Chapter 8: Noise and Vibration identify that impacts are likely to be very small or imperceptible. Noise levels calculated in the vicinity of the Duke of Northumberland's River, at Gladstone Close on the far side to the Proposed Redevelopment, were identified as comprising a **negligible** increase in noise levels. Noise levels at the closest receptor to the Twickenham Junction Rough SLINC, on Craneford Way, show a moderate impact for the first nine months with a negligible impact for the remaining time. As a result, the impact of noise upon the Twickenham Junction Rough SLINC is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Although dust, generated during the demolition and construction phases, has the potential to adversely affect sensitive habitats, the level of deposition would need to be severe before adverse effects are realised. The Design Manual for Roads and Bridges[1] summarises the sensitivity of floral species to dust deposition, identifying that the most sensitive species appear to be affected by dust deposition at levels above 1,000mg/m^3/day. Put into context, this is a level five times greater than that at which dust deposition may start to cause a perceptible nuisance to humans and

[1] Design Manual for Roads and Bridges (2007) Volume 11, Section 3, Part 1, Air Quality. Appendix F. DMRB, May 2007.

comprises the most sensitive species, with others tolerable of a level much greater than this. The likely zone of influence of dust impacts is identified in guidance provided by the Institute on Air Quality Management[2], which identifies 50m from the boundary of the site, plus 50m from haulage routes used by construction vehicles for up to 500m from the site, is appropriate screening criteria for detailed assessment of impacts from construction and demolition sites. Therefore, the scheme has potential to impact upon Twickenham Junction Rough Local SINC and the Duke of Northumberland's River south of Kneller Road Borough II SINC. The impact of dust upon these designated sites is considered to represent a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The provision of lighting during the construction phase has the potential to adversely affect nearby designated sites where light is allowed to spill beyond the development site. Given the small extent of the proposed works, the impact is likely to be fairly limited. Therefore, the impact of lighting on designated sites is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The main drainage, both foul and surface water, connects to the Thames Water sewer located in Craneford Way. As a result, impacts associated with water quality and run-off from the main college site are not considered likely to cause adverse effects upon any of the designated sites. However, construction activities associated with the upgrade to the playing fields and footpath to the south of Craneford Way could give rise to impacts upon the River Crane at St. Margarets Borough II SINCs.The conversion of the playing fields into artificial surfaces could result in a significant area of soil being exposed alongside the River Crane. The risk of soils being washed into the adjacent River Crane is dependent upon the timing of works and period of exposure; however the discharge of significant volumes of sediment could cause adverse effects on the designated site downstream. Similarly, the risk of impact associated with a release of pollutant materials would be limitedrelatively small as the works are unlikely to require significant numbers of machinery for long-periods of time.

Works on the junction of Langhorn Drive and the A316 could also potentially give rise to discharge of sediments and pollutants to the Duke of Northumberland's River. There may also be a need to dispose of groundwater pumped out during dewatering of excavations. This could potentially cause deterioration of the River Crane at St.

[2] Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM. London.

Margaret's Borough II SINC and the Duke of Northumberland's River south of Kneller Road Borough II SINC and Duke of Northumberland's River north of Kneller Road Borough I SINC as a result of potential impacts to water quality.

Such pollution impacts on these borough-designated river habitats are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **borough scale** with **probable likelihood**. This equates to a **moderate adverse effect**.

Predicted Effects – Non-designated Habitat

Considering the urban context of the site, the majority of the development area comprises building and landscaping associated with the college with semi-natural habitats of greater biodiversity value typically in the adjacent habitats.

Habitat Loss and Fragmentation

Clearance of the development site will result in the loss of around 70 scattered trees, with the remainder of the potentially sensitive habitats falling outside the development boundary. The scattered trees located along the A316 (northern boundary), Marsh Farm Lane (western boundary) and Craneford Way sports pitches to the South are likely to be retained, with those located within the development boundary to be felled as part of the scheme. The trees within the development area are considered to be of lower biodiversity value, as they do not provide significant habitat for breeding birds, and are typically of amenity value to the college only. Therefore, the loss of scattered trees within the development boundary is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **minor adverse effect**.

The development will not, however, result in fragmentation of habitats. The River Crane corridor to the south and Duke of Northumberland's River to the west comprise the main ecological corridors in the local area, and no habitat loss associated with the development is anticipated in these locations as part of the scheme. The likely retention of the scattered trees along the A316 and Marsh Farm Lane will also prevent any fragmentation of habitats. Therefore, adverse effects associated with habitat fragmentation are **negligible**.

Habitat Deterioration

Adverse effects may also arise as a result of indirect deterioration of habitats, which may occur as a result of the generation of dust, noise, air quality effects, the encroachment of construction activities or water quality and run-off effects.

As previously identified, the level of deposition of dust would need to be severe before adverse effects upon floral species are realised and the IAQM guidance[3] provides guidance on the zone of influence of dust generation: 50m from the site and 50m from haulage routes for up to 500m from the site. Each of the sensitive habitats identified fall within this zone of influence: River Crane, Duke of Northumberland's River, Urban Greenspace BAP habitat, broadleaved semi-natural woodland, poor-semi-improved grassland and scattered trees. However, considering the susceptibility of floral species to dust, any such impact is considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The incursion of plant or personnel into retained habitat could result in deterioration of habitat quality. The retained trees around the periphery of the site are at greatest risk, with construction activities having the potential to cause damage through severance of roots or through collision. However, the landscaping principles set out in the Design Code submitted as part of the OPA include provision for protection of the existing trees along the A316 and Egerton Road, including protection of the root areas of the trees. The magnitude of such an impact is considered likely to be less than the habitat loss.. Incursion of plant into other sensitive habitats is considered unlikely, due to the presence of a significant boundary (e.g. the wall separating the Craneford West playing fields, and fencing along the River Crane). Consequently, retained habitat encroachment impacts from construction activities relate to scattered trees and are considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. Such effect is considered to comprise a **negligible effect**;

As previously identified, the main drainage, both foul and surface water, connects to the Thames Water sewer located in Craneford Way. Therefore, impacts associated with water quality and run-off from the main college site are not considered likely to adversely affect the identified sensitive habitats. However, upgrade of the sports pitches in Craneford Way does pose a risk to the River Crane with regards to run-off and potential pollution events, as previously discussed. The discharge of sediments through run-off are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. The discharge of pollutants into the River Crane is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **unlikely**

[3] Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM, London.

probability. Both are considered to comprise **minor adverse effects**.

Predicted Effects – Species

Habitat Loss

The loss of scattered trees, dense scrub and amenity planting within the college grounds has the potential to impact upon the breeding bird assemblage. However, only the peripheral habitats on the College site were identified in the baseline as being of value. Most of the habitat of value to breeding birds is likely to be retained, notably the mature trees along the A316 and Marsh Farm Lane, and key habitats adjacent to the site will remain, notably the riparian habitats of the Duke of Northumberland's River, Craneford Way West playing field and Challenge Court. The loss of habitat for breeding birds within the Site is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **negligible effect**.

The development will not result in the loss of bat roosting habitat, with no active roosts identified and an absence of activity in areas supporting potential roosting structures. The main commuting routes were identified as along the row of mature trees along the A316 to the north, the Duke of Northumberland's River to the west and the River Crane/railway corridor to the south. All of these features will be retained, and therefore impacts to bats associated with habitat loss will be avoided.

However, the loss of habitat associated with the conversion of the playing fields alongside the A316 and conversion of part of Craneford Way East playing fields to artificial surfaces has the potential to impact upon the foraging resource for bats. This is considered to represent a **medium magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The loss of amenity grassland in the development area will reduce the extent of suitable foraging habitat for hedgehog and the loss of dense landscape shrub planting within the College site could result in the loss of nesting opportunities. Hedgehogs, however, can occupy overlapping home ranges of 10 to 40 hectares[4] and generally show a preference to urban green spaces with structures, over lawn without structures[5]. Consequently, the loss of habitat is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is

[4] Morris, P. A. and Reeve, N. J. (2008) Hedgehog *Erinaceus europaeus*. In: Harris, S. and Yalden, D. W. (Eds) Mammals of the British Isles: handbook. Mammal Society, Southampton. Pages 241-248

[5] Braaker, S., Moretti, M., Boesch, R., Ghazoul, J., Obrist, M. K. and Bontadina, F. (2014) Assessing habitat connectivity for ground-dwelling animals in an urban environment. *Ecological Applications* 24 (7) pp 1583 - 1595.

significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The development will result in the loss of habitat for invertebrate species, with the College grounds supporting the greatest diversity of species including three nationally scarce species and the amenity grassland margins supporting a good diversity of species including three nationally scarce species. Considering the scale of redevelopment of the site, some of the existing vegetation important for the diversity of invertebrate species and presence of significant species will be removed during vegetation clearance. The amenity grassland margins are also an important habitat for invertebrate species, supporting a good diversity and the presence of three nationally scarce species in the field to the south of the College. Although the amenity grassland areas will be subject to a loss of habitat, the margins will receive some protection, with marginal habitat along the College's northern boundary and surrounding the Craneford Way pitches likely to be retained. Significant habitat supporting stag beetle along the River Crane will also be retained. The impact of habitat loss upon the invertebrate community is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The likely retention of suitable habitat within the development area for stag beetle, the bicolored tree ant and *Nephus quadrimaculatus* will prevent the loss of the species within the local area. Although the presence of *Nigma walckaenaeri* and *Ero aphana* was restricted to habitat due to be lost as a result of the development, the habitat requirements are relatively common and therefore relocation in the local area is considered likely. As a result, the impact upon these species is considered to comprise a **low magnitude**, **short-term**, **temporary**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Habitat Fragmentation

Direct impacts on species associated with habitat fragmentation are considered unlikely, as the significant linear vegetation along the A316 and River Crane and mature trees on Marsh Farm Lane are likely to be retained. Therefore, impacts upon the movement of species, including bat commuting routes, will not be fragmented as a result of the development and will be **negligible**.

Although direct impacts associated with habitat fragmentation are unlikely, lighting of the development site during the site enabling, construction and demolition phases of the scheme will have the potential to cause a fragmentation effect for certain species. The spillage of light into boundary vegetation would be of particular concern

where commuting bat activity was identified, notably the row of mature trees along the northern boundary and the River Crane along the southern boundary of the site. Although the species identified in the baseline will readily use open space habitats[6] and may be attracted to white mercury street lighting for feeding[7], it can be particularly harmful when used in areas associated with foraging or commuting bats[8]. Considering the phasing of the development, the most significant impact would occur in the preparatory works, when the site access route and upgrade of the sports pitches run concurrently. Consequently, such an effect is considered to comprise a **medium magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The fragmentation effect as a result of lighting may also be a significant effect for hedgehog, as urban green spaces are important for the movement of hedgehog[9] and persistence of a population[10,11]. The Craneford Way East playing field provides the greatest opportunity for movement of hedgehog, with suitable habitat present in Craneford Way West field, Challenge Court and along the River Crane. With construction activities in the two main amenity grassland areas occurring concurrently during the preparatory phase, impacts will be greatest at this stage, with operational impacts influencing thereafter. Consequently, the indirect fragmentation of hedgehog habitat is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Habitat Improvement

Habitat enhancement for bats is proposed through the provision of bat roosting boxes or the incorporation of enclosed bat boxes into the external brickwork of new buildings. The impact of the habitat enhancement is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **beneficial** residual effect that is significant **within the zone of influence only** with **likely probability**. This equates to a **minor beneficial** effect.

Further habitat enhancement proposed for the Site includes the provision of

[6] Altringham, J. (2003) *British Bats*. New Naturalist Publication.

[7] Rydell, J. and Racey, P. A. (1993) *Street lamps and the feeding ecology of insectivorous bats*. Recent Advances in Bat Biology. Zoological Society of London Symposium abstracts.

[8] Bat Conservation Trust (2009) Bats and Lighting in the UK. Bats and the Built Environment Series. BCT. London.

[9] Braaker, S., Moretti, M., Boesch, R., Ghazoul, J., Obrist, M. K. and Bontadina, F. (2014) Assessing habitat connectivity for ground-dwelling animals in an urban environment. *Ecological Applications* 24 (7) pp 1583 - 1595.

[10] Hodgson, J. A., Thomas, C. D., Wintle, B. A. and Moilanen, A. (2009) Climate change, connectivity and conservation decision making: back to basics. *Journal of Applied Ecology* 46 pp964 - 969.

[11] Doerr, V. A. J., Barrett, T. and Doerr, E. D. (2011) Connectivity, dispersal behaviour and conservation under climate change: a response to Hodgson *et al. Journal of Applied Ecology* 70 pp 33 - 46.

deadwood habitat or a loggery (a hole in the ground with logs upended in it) for stag beetle and other invertebrates in the south-east corner of the College playing fields alongside the River Crane. The impact of the habitat enhancement is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **beneficial** residual effect that is significant **within the zone of influence only** with **likely probability**. This equates to a **minor beneficial** effect.

Habitat Deterioration

The deterioration of habitats, as identified above, will have implications on the species utilising them. As discussed, the habitats are unlikely to be affected as a result of the deposition of dust at levels identified, and as a result impacts upon faunal species are likely to be **negligible**.

The deterioration of habitats associated with the incursion of plant or personnel has the potential to reduce the suitability of habitats to support species. Any loss of scattered trees on the edges of the development will reduce the suitability of the habitats for breeding birds, increasing competition amongst species in the remaining habitat and has the potential for adverse impacts on commuting bats as a result of any gaps created in linear features. The impact on each feature is considered to comprise:

- Breeding birds – a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.
- Bats – a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Impacts associated with the incursion of personnel into remaining habitats on the site are not considered likely to be significant, with impacts on supported species also unlikely to be significant.

Disturbance

- The breeding bird assemblage and abundance utilising peripheral habitats identified as being of value within the baseline are likely to be influenced as a result of the noise generated during the site enabling, demolition and construction phase. However, the significance of the impact is reduced as the surrounding habitat includes areas of vegetation that could support breeding bird species and are not subject to significant noise impacts. As a result, the impact of noise disturbance on breeding birds is considered to comprise **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is

significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Adverse effects from noise on bat foraging and commuting activity is not considered to be likely, as the prescribed working hours during the construction phase, as set out in Chapter 6 (Scheme for Assessment), avoids the period in which bat activity will occur. As a result, impacts on bats is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**. Similarly, adverse effects on hedgehog as a result of disturbance is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Mortality/Injury

Mortality/injury of bat species and common reptiles are considered to be unlikely, as the development site is not considered to be suitable for the presence of common reptiles and unlikely to support roosting bats. However, clearance of the site has the potential to impact upon breeding birds and hedgehog and significant invertebrate species. Although all invertebrate species within the development site are potentially at risk, the majority of the species present are not of sufficient biodiversity interest to be considered in their own right.

The removal of vegetation at certain times in the year has the potential to cause harm to or mortality of nesting birds. The clearance of trees, scrub and shrubs during the breeding season (March to August inclusive) has potential to impact nesting birds, dependent chicks or eggs. However, as the majority of the habitat within the development site that is likely to be removed is of lower value to breeding birds, the impact will be restricted to a low number of individuals. This is considered to represent a **low magnitude, medium-term, temporary, multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**. Nevertheless, such an effect would constitute a legal offence.

The removal of vegetation could impact upon hedgehog, which typically nest at the base of thick hedges, bushes, garden sheds or piles of rubbish, and are particularly sensitive between November and mid-March when they hibernate. Considering the likely home range of hedgehogs and an absence of sightings during field survey, the impact is likely to be restricted to a very low number of individuals. The impact on hedgehog is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the**

zone of influence only with **unlikely probability**. This equates to a **negligible effect**.

The removal of suitable vegetation could result in adverse impacts on significant invertebrate species, notably *Nigma walckaenaeri* and *Ero aphana*. However, as the species do not have specific habitat requirements that are not available in the wider environment, the impact upon the species are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is **significant within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Spread of Invasive Species

Activities on the site, in particular vegetation removal as part of the demolition process, have the potential to spread invasive non-native floral species around the Site or to adjacent habitats. The risk of spreading wall cotoneaster is associated with the potential spread of seeds (red berries) or from node-rooting fragments of the plant. Although legislated, the primary concern for the species is the invasion of semi-natural habitat of high conservation value. In the urban environment, the species may provide a net benefit to the environment, as it provides a significant food resource for invertebrate and bird species. This is considered to represent a **neutral magnitude**, **long-term**, **single-event**, and **adverse effect** that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible** effect. Nevertheless, causing the species to spread or otherwise grow in the wild would constitute a legal offence.

Residual Effects – Designated Sites

Habitat Loss and Fragmentation

No impacts anticipated.

Habitat Deterioration

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat deterioration on the Twickenham Junction Rough SLINC. Therefore, the impact of habitat deterioration is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Incorporation of pollution prevention measures as identified in the mitigation measures will reduce the likelihood of sediment or pollutant discharge to the River Crane, and thus impacts on the River Crane at St. Margaret's Borough II SINCs, and

to the Duke of Northumberland's River south of Kneller Road Borough II SINC and Duke of Northumberland's River north of Kneller Road Borough I SINC. Furthermore, in the event that an incident should occur quick response as a result of the mitigation measures, such as appropriate location of spill kits and containment equipment, will reduce how much of the sediment/pollutant is discharged and therefore the magnitude of impact. As a result, the residual effect for both are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect**.

Residual Effects – Non-designated Habitats

Habitat Loss and Fragmentation

Scattered tree planting on the development site as part of the landscape design will provide some compensation for the loss of scattered trees during site clearance. As a result, the residual effect is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **minor beneficial effect**.

Habitat Deterioration

By demarcating sensitive retained habitats and providing toolbox talks for site personnel, the likelihood of impacts associated with the encroachment of construction activities will be reduced. In the event that encroachment does occur, the demarcation and increased awareness should restrict the extent of encroachment and therefore magnitude of impact. As a result, the encroachment of construction activities upon all sensitive habitats are considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. Such effect is considered to comprise a **negligible effect**.

Incorporation of pollution prevention measures as identified in the mitigation measures will reduce the likelihood of sediment or pollutant discharge to the non-designated section of the River Crane. Furthermore, in the event that an incident should occur quick response as a result of the mitigation measures, such as appropriate location of spill kits and containment equipment, will reduce how much of the sediment/pollutant is discharged and therefore the magnitude of impact. As a result, the residual effect for both are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely**

probability. This equates to a **negligible effect**.

Residual Effects – Species

Habitat Loss

Scattered tree planting on the development site as part of the landscape design will provide some compensation for the loss of scattered trees during site clearance. This planting has the potential to compensate for the loss of habitat identified as being of value to breeding birds, with additional habitat provision along the River Crane potentially of greatest influence. As a result, the residual effect is considered likely to comprise a **neutral magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The provision of suitable habitat planting within the Craneford Way East playing fields will provide some compensation for the loss of bat foraging habitat, with the aim of the planting to provide habitat for a greater diversity of invertebrate species on which bats will feed. However, the improvement here will not fully compensate for the loss of foraging habitat. As a result, the residual effect is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Further habitat enhancement for bats is proposed with the erection of bat boxes in peripheral vegetation or in buildings on the RREC site to improve roosting habitat provision locally. This will result in a residual effect that is considered likely to comprise a **low magnitude**, **medium-term**, **temporary**, **single-event** and **beneficial** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

The provision of suitable habitat planting within the development site will provide some compensation for the loss of habitat for invertebrates, with the aim of some planting to provide a diversity of floral species to attract a diversity of invertebrates. As a result, the residual effect on the invertebrate population is considered likely to comprise a **neutral magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

The provision of specific deadwood habitat/loggery within the development site will enhance habitat provision for stag beetle in line with the objectives of the local and regional Species Action Plans (SAPs). The residual effect of this is considered likely to comprise a **medium magnitude**, **long-term**, **permanent**, **single-event** and

beneficial residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

Habitat Fragmentation

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat fragmentation upon bats. By ensuring the mature trees along the northern boundary remain unlit and ensuring periods of darkness are provided, commuting activity associated with these features will be able to continue. Therefore, the impact of fragmentation is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Similarly, the impact of lighting on the fragmentation of habitats for hedgehog is reduced by following best practice guidance. Therefore, such an effect is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event**, and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Habitat Deterioration

By demarcating sensitive habitats and providing toolbox talks for site personnel, the likelihood of impacts associated with the encroachment of construction activities will be reduced. In the event that encroachment does occur, the demarcation and increased awareness should restrict the extent of encroachment and therefore magnitude of impact. As a result, the encroachment of construction activities upon all breeding birds and bats are considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. Such effect is considered to comprise a **negligible effect**.

Disturbance

The inclusion of mitigation measures will reduce the noise levels generated on site during all phases of the scheme, as demonstrated in Chapter 8: Noise and Vibration. As a result, the areas of habitat in which impacts are negligible are significantly increased, providing 'havens' in which bird species can continue breeding activity. As a result, the impact on breeding birds is considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Mortality/Injury

Control measures implemented through the CEMP will reduce the likelihood of impact associated with vegetation removal, by either avoiding key sensitive periods or undertaking the clearance in a specified manner. As a result, mortality/injury of breeding birds and hedgehog are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect** that is not significant.

The impact on significant invertebrates remains as predicted, with a **negligible effect**.

Spread of Invasive Species

Control measures implemented through the CEMP will prevent the spread of invasive non-native species around the site. As a result, the residual effect is considered likely to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect** t.

Operation

Predicted Effects – Designated Sites

Habitat Deterioration

Lighting of the proposed development will have a relatively small zone of influence, with designated sites separated from the development site considered unlikely to be affected by such changes. However, given the proximity of the Twickenham Junction Rough Local SINC to the development site, changes to lighting levels could impact upon the designated site.

The increase in the educational and residential population within the Site could affect designated sites through use of the footpaths for commuting or recreational use. The number of staff and students at the College will be similar to those currently present, but the change in access arrangements with the REEC development (restriction on egress from the east side of college) and the opportunity to use a new footpath to the station through Twickenham Rough may alter current pedestrian routes.

The Duke of Northumberland's River south of Kneller Road Borough II SINC is located alongside a local footpath utilised for activities such as dog walking. In addition, a new footpath is to be built, by others and independent of this application, passing through the designated SLINC in Twickenham Rough. The approved

Twickenham Junction Rough scheme (ref: 13/1147/FUL) incorporating the footpath, did not consider it likely that increased recreational use would have a significant adverse impact on the SLINC. Pedestrian flows heading south / south east / south west (towards Twickenham Rough) or north / northeast (towards the Duke of Northumberland's River) from the REEC are summarised in the table below.

Estimated Footpath Use From REEC Development

Source	College		Secondary School		SEN School		Residential	
Time period	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)
Pedestrians (S/SE/SW)	778	195	245	53	12	4	63	49
% assumed likely to use Twickenham Rough footpath	50%		20%		20%		20%	
Numbers likely to use Twickenham Rough footpath	389	97	51	11	2	1	13	10
Pedestrians (N/NW)	216	54	57	12	2	1	15	12
% assumed likely to use Duke of Northumberland's River footpath	50%		50%		50%		50%	
Numbers likely to use Duke of Northumberland's River footpath	108	27	29	6	1	0	8	6

From this, it is estimated that approximately 455 people might use the footpath through Twickenham Rough in the AM peak and approximately 119 in the PM peak. The PM peak is less busy because of staggered finish times for schools, college students and residents.

The Twickenham Rough application for the footpath was approved by LBRuT in the knowledge that students from the existing college would be able use it to access Twickenham and the station[12], and this footfall would therefore have been taken into account. However, the altered access arrangements for REEC (no egress from the east side of the college grounds) will change the desire lines and may slightly increase the flows. It is not considered likely that this small potential increase over the numbers considered for the scheme (ref: 13/1147/FUL) would materially change the likely impact on Twickenham Rough.

It is estimated that approximately 146 people might use the footpath along the Duke of Northumberland's River in the AM peak and 39 in the PM peak. Figures for usage

[12] Subject to other developments being approved and completed

may be higher in summer in good weather and lower in winter. Students from the existing college are currently able to utilise these paths so the predicted increase may represent an overestimate On inspection in May 2015, the footpath along the river south of the A316 was overgrown and did not appear to be heavily used, suggesting that there is some capacity for additional recreational use.

Although it is likely that there will be increased numbers using the footpaths adjacent to or within the designated sites, this is unlikely to affect the integrity of designated features. The Duke of Northumberland's River is designated for aquatic and marginal vegetation habitats which are not directly connected to the footpath and therefore are unlikely to be impacted by the increased footfall. Twickenham Rough is designated for rough grassland, tall herbs, scrub and young woodland and whilst these may be adversely impacted by the construction of the footpath, the increased use as a result of the RECC development is unlikely to result in an increased adverse impact on these habitats.

There remains likelihood that designated sites may experience some impact from increased use, primarily due to the potential for increased littering. This is considered likely to comprise an *adverse* residual effect that is significant at the *local scale* with *probable likelihood*, equating to a **minor adverse** effect.

Predicted Effects – Non-designated Habitats

Habitat Deterioration

Changes to the lighting associated with the development is only considered likely to have a small zone of influence, with the footpaths surrounding the River Crane remaining unlit. As a result, the changes in light provision will not affect the River Crane or the Duke of Northumberland's River. The broadleaved semi-natural woodland and Urban Greenspace BAP habitats are not considered to be sensitive to the changes identified.

The increase in the local resident population associated with the provision of 180 residential units compromising an additional population of 416 is likely to result in an increase in recreational pressure on local resources. As a result, the non-designated section of the River Crane, and other habitats on the Site may be subject to impact through trampling of the riparian habitat or an increase in littering from adjacent habitats. However the increase in pressure due to trampling is unlikely to have a significant effect. Consequently, such an effect is considered to comprise a **low magnitude**, **long-term, temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

There remains a likelihood that the riparian habitats associated with the non-designated section of the River Crane may experience some impact from increased littering. This is considered likely to comprise an *adverse* residual effect that is significant at the *local scale* with *probable likelihood*, equating to a **minor adverse** effect. The other habitats on site may also experience some impact from increased littering however this is considered to comprise an *adverse* effect that is significant *within the zone of influence only* with *probable likelihood*. This equates to a **negligible** effect.

Predicted Effects – Species

Habitat Fragmentation

Although changes to the lighting associated with the development are only considered likely to have a small zone of influence, this can have an influence on the movement of faunal species associated with the site.

Lighting of the access road and car parking along the northern boundary of the site is likely to impact upon bat commuting activity, with the southern side of the tree line likely to be important due to lighting currently provided on the A316. Although lighting could provide opportunistic feeding opportunities, with invertebrates attracted to the light, it can have an adverse impact on commuting bats due to an increased predation risk. As a result, provision of lighting along the access road has the potential to preclude commuting bats along this habitat. The fragmentation of habitats for bats as a result of lighting is considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Similarly, the provision of lighting along the northern and southern boundaries has the potential to impact upon the movement of hedgehogs. Lighting of the northern access road, in light of the habitat loss at construction phase, may preclude the movement of hedgehog in this area as they become more vulnerable to predation. Therefore, the fragmentation of habitats for hedgehog as a result of lighting is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect.**

Habitat Deterioration

Changes to the provision of lighting as a result of the changes to site layout could result in deterioration of the habitat present and its ability to support breeding birds and bats.

The provision of lighting on the site could impact upon the breeding bird assemblage where mitigation is unable to prevent spill into peripheral vegetation on or adjacent to the site. The light spill will make this habitat less suitable for nesting, for example as a result of increased predation risk. The habitat along the northern access route and Marsh Farm Lane are likely to be influenced, impacting upon a relatively significant proportion of the breeding bird habitat present. Consequently, such an impact is considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The provision of lighting may provide some opportunistic feeding opportunities for the bat species commonly present, as a result of the attraction of insects to the light, which can benefit the pipistrelle, serotine and *Nyctalus* species. Consequently, the impact of lighting on habitat provision is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **beneficial** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Residual Effects – Designated Sites

Habitat Deterioration

Incorporation of best practice guidelines in the design and provision of lighting around the site to minimise light spill will reduce the impact on the Twickenham Junction Rough Local SINC. As a result, the impact of lighting on the designated site is considered to comprise a **low magnitude**, **long-term**, **permanent, multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Residual Effects – Species

Habitat Fragmentation

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat fragmentation upon bats. By ensuring the mature trees along the northern boundary remain unlit and periods of darkness are provided, commuting activity associated with these features will be able to continue. Therefore, the impact of lighting on habitat fragmentation is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Similarly, the impact of lighting on the fragmentation of habitats for hedgehog is

reduced by following best practice guidance. Therefore, such an effect is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Habitat Deterioration

The impact of light spill on breeding birds will be minimised though implementation of best practice guidelines in the design and specification of scheme lighting. As a result, key habitats along the northern access route and Marsh Farm Lane will be protected. As a result, the residual effect is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Appendix 15.5: Arboricultural Impact Assessment

Note: This assessment was completed prior to a minor amendment to the application boundary along the River Crane. This boundary change did not have any implications for the AIA as all trees along the River Crane remain within the boundary.

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Arboricultural Report

Richmond upon Thames College
c/o Cascade Consulting (Environment and Planning) Ltd

Richmond upon Thames College, Richmond upon Thames

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Date: June 2015

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Purpose of Document

This report has been commissioned to provide an assessment of the trees at Richmond upon Thames College in accordance with the guidelines provided by BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations.*

It consists of:

- A **Tree Survey** that records all relevant information about the trees on or adjacent to the site that may be impacted by the proposals. This includes a **Tree Constraints Plan** that shows the location of the trees on the site irrespective of any development considerations.
- An **Arboricultural Impact Assessment** to consider the impact that the development proposal may have on the trees. It provides details of how any adverse impact will be mitigated (including indicative protection measures) and includes an **Arboricultural Impact Plan**. This shows the location of the trees in relation to the proposed development and the above and below ground constraints posed by the trees.
- A **Draft Arboricultural Method Statement** to provide details on how the retained trees will be protected and managed during the development process. This includes a **Draft Tree Protection Plan** that provides illustrative guidance on the tree protection measures.

The purpose of this report is to demonstrate how the tree constraints have been considered in the design and layout of the site. It also provides the local authority (London Borough of Richmond upon Thames) with the necessary information to assess the tree issues associated with the planning application.

The aim is to present the information in a manner that can easily be understood by people without specific knowledge of tree related matters.

Executive Summary

The development proposal at Richmond College is for the demolition of the existing college buildings and comprehensive redevelopment of the entire site. The development will require the removal of 71 trees located internally to the site. 23 of these trees would be recommended for removal irrespective of the development due to poor structural and physiological condition. The remaining trees will require removal in order for the proposed development to be constructed. The overall proposal is not considered to have a long-term negative impact on the wider community. Where practicable, key trees will be retained and protected throughout the development process and these are to be supplemented by replacement planting, which will provide a net gain in canopy cover, aesthetic value and biodiversity benefits throughout the site.

LOCKHART GARRATT

Table of Contents

Attachments:

Document/Plan	Ref	Version
Tree Schedule	14-1189	V3
Tree Constraints Plan	D14-1291	V3
Arboricultural Impacts Plan	D14-1756	V5
Draft Tree Protection Plan	D14-2956	V5

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1. SITE AND TREE SURVEY

Site Description

1.1. The site is located adjacent to Chertsey Road and is made up of buildings that form Richmond upon Thames College. The northern boundary consists of Chertsey Road. The eastern boundary is comprised of offsite residential properties. The southern boundary is the River Crane and the western boundary is a public footpath known as Marsh Farm Lane.

1.2. The southern part of the site is separated from the north by Craneford Way and comprises open amenity grassland.

1.3. The majority of the arboricultural features are located on the boundaries of the site, with several trees located internally between the built structures.

Tree Survey

1.4. The assessment of the trees has been carried out in accordance with the guidance provided in Annexe C of BS5837. In summary this requires that any tree on the site with a stem diameter of over 75mm at 1.5m above ground level is recorded.

1.5. All observations were made from ground level, without detailed investigation with regard to the general condition of the tree.

1.6. Trees that are located outside of the site have been considered as part of this survey, and have been annotated on the accompanying plan as such.

1.7. Stem diameter measurements were taken using a girthing tape and in accordance with Annexe D of BS5837. Where access to the base of the tree was not possible for any reason, the diameter has been estimated.

1.8. Height, crown spread and canopy clearance measurements are recorded in accordance with the measurement convention detailed in paragraph 4.4.2.6 of BS5837.

1.9. A copy of the schedule of trees is attached to the report (ref: 14-1189). The location of the trees has been plotted on the attached Tree Constraints Plan (TCP ref: D14-1291).

1.10. The trees are categorised in an order defined in Table 1 of BS5837, a copy of which can be seen in Appendix 2, but which can be summarised as:

A Category Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years

B Category Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years

C Category Trees of low quality and value currently in adequate condition able to remain until new planting can be established. These trees are expected to remain for a minimum of 10 years. It also includes young trees with a stem diameter less than 150mm measured at 1.5 metres above ground level.

U Category Trees in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural or forestry management.

1.11. Additionally, BS5837:2012 provides subcategories 1-3 within the category system outlined above which indicate the area(s) in which a tree or group retention value lies.

1. Mainly arboricultural.
2. Mainly landscape.
3. Mainly cultural, including conservation.

1.12. A summary of my assessment of the quality of these trees is shown in Table 1

Table 1 - An overview of tree quality within the surveyed area

	Category A	Category B	Category C	Category U	Total
Trees	3	32	51	17	**103**
Hedges	0	0	2	0	**2**
Groups	0	8	18	6	**32**
Total	**3**	**40**	**71**	**23**	**137**

Since conducting the survey the application boundary has been altered and a total of 40 trees are now outside the scope of this application. These have therefore not been considered within this report and have been omitted from the associated plans and attached tree schedule. My assessment of the 40 trees that have been omitted are presented in Table 2. A full list of these trees can be found in Appendix 4.

Table 1 - Surveyed trees that have been omitted from this report

	Category A	Category B	Category C	Category U	Total
Trees	2	6	15	8	**31**
Groups	0	2	6	1	**9**
Total	**2**	**8**	**21**	**9**	**40**

1.13. The location of the trees has been plotted on the TCP and can be identified through the colour coding detailed in the BS5837. To assist in identification of the tree category when printing in monochrome the following symbols have been used.


Category A


Category B


Category C


Category U

Constraints Posed by Existing Trees

1.14. Development proposals can impact on trees by causing them to be removed either immediately or in the future. It does this by adversely affecting their potential for retention either through disturbance to the Root Protection Area (RPA) or through the need for pruning.

1.15. Illustrative guidance of the constraints posed by the trees to the site can be seen on the attached TCP.

Above Ground Constraints & Proximity of Trees to Structures

1.16. Where the current and/or ultimate height of a Category A, B or C tree will cause an obstruction to the proposed development, this must be considered as a constraint. This is usually considered in terms of issues relating to shade and light.

1.17. Consideration is also given to species characteristics such as:

Deciduous or evergreen;

Density of foliage;

1.18. The tree canopies are marked on the attached TCP as a continuous line around each individual tree.

Below Ground Constraints

1.19. The below ground constraints are defined as the likely spread and disposition of the root system of the tree and are plotted on the attached TCP as a magenta circle around each tree with the text RPA inscribed in the line.

1.20. The RPA is defined as the minimum area (in m2) around the tree that is 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.

1.21. Section 4.6.2 & 4.6.3 of BS5837 allows for the shape of the RPA to be changed for the likely spread of the roots, taking into account factors such as:

Past or existing site conditions;

Soil type and structure;

Topography and drainage.

1.22. The total area of the RPA cannot be changed during any adjustment to the likely root spread.

1.23. No RPAs have been adjusted on this site.

2. ARBORICULTURAL IMPACT ASSESSMENT

Development Proposal

2.1. The proposal is for the demolition of the existing college buildings, site clearance and groundworks together with comprehensive redevelopment to provide:

A new campus for education and enterprise;

Upgrading of existing Craneford Way Playing Fields for use by the College, school and the local community;

Alterations to existing means of access for vehicles, pedestrians and cyclists from Ionghorn Drive and from Egerton Road;

Provision of on-site parking, open space and landscaping; and

New residential units together with associated parking, open space and landscaping.

2.2. The proposals submitted within this report have been guided by the constraints posed by the trees as indicated on the TCP.

2.3. Where feasible, tree retention has been a key consideration in the overall site design and layout. Tree removal has been limited to those that are necessary to enable the development proposal to proceed.

2.4. The proposed layout of the development is shown on the attached Arboricultural Impact Plan (AIP) (ref: D14-1756).

Summary of Impact of the Proposal

2.5. My assessment of the impact of this proposal on the trees is summarised in Table 3.

Table 3 - Summary of trees that will be affected by the proposed development

Impact	Reason	A	B	C	U	Total
Trees to be removed	To enable the proposed development to take place and for access to the site by vehicles	T68	G1, T17, T18, T21, T22, T33, G53, T54, T55, G56, G70, T74, T75 & G155	G2, G10, H14, G15, T16, G20, T24, T25, T27, T31, T32, H40, T41, G49, T63, T64, T65, T66, G67, T69, T71, T72, T73, G76, G77, G78, T79, T93, T116, T117, T118, G172 & T175	None	**48**
Retained trees that will potentially be affected through disturbance to RPAs	To enable the proposed construction to take place	T154 & T170	G9, T35, T58, T59, T60, T113, T153, T156, T157 & T173	T12, T13 & G50	None	**15**

Impact	Reason	A	B	C	U	Total
Trees to be removed irrespective of the development proposal	Poor condition or structural defects.	None	None	None	T5, T6, T11, T19, G23, T29, T30, G38, T48, T51, T52, T57, T95, T96, T104, T105, G110, T111, G112, T128, G159 & G174	23
No Impact	Retained trees unaffected by the proposals	None	G7, T8, T28, T42, G43, T61, T103, T107, T126, T127, T151, T158, T160, T162, T171 & T177	T3, T4, T26, T34, G36, T37, T39, T44, G45, G46, G47, T62, T94, T96, T100, T101, G102, T106, T108, T109, T114, T115, T119, T120, T121, T152, T161, T163, T164, G165, T166, G167, T168, T169 & T176	None	51
Total		**3**	**40**	**71**	**23**	**137**

Detailed Impact Appraisal

2.6. There are a total of 137 trees, and groups of trees, on this site, excluding 40 trees that are detailed in Section 1.11 of this report as now being omitted. Of this 137, 51 will not be impacted by the development proposals provided they are protected through the use of fencing. This fencing will be fit for the purpose of excluding construction activity and will remain in place throughout the duration of the development.

2.7. The remaining trees on site will be directly affected by the development proposals, either through direct loss or as a consequence of the disturbance to the rooting environment or remedial works to the tree canopy. The details of these impacts are considered in the following sections.

Trees to be removed

2.8. The design proposal for this development requires that 71 trees and groups of trees are removed.

2.9. Of the 71 a total of 23 trees or groups of trees would be recommended for removal irrespective of this design proposal due to poor structural and physiological condition. Therefore these are not considered further within this assessment.

2.10. Section 5.1.1 of BS5837:2012 recognises that the competing needs of development mean that trees are only one factor requiring consideration. It also states that misplaced tree retention can be detrimental on a site where it will cause excessive pressure on those trees being retained if those trees then require removal in the future.

2.11. A detailed assessment of the tree removals is presented in Table 4:

Table 4 - Detailed Impact Assessment of tree removals

Tree No	Reason for Removal	Evaluation of Impact	Proposed Mitigation
G1, G2, H14, T27, T32, T33, H40, T41, G49, G53, T54, T55, G56, T63, T64, T65, T66, G67, T68, T69, G70, T71, T72, T73, T74, T75, G76, G77, G78 & T79	These trees are located within the footprint of the proposed demolition and development of the central part of the site.	The majority of these trees are only visible internally to the site and therefore removal will not have a negative effect on the wider community. However, the removal of those trees that are visible to the wider community will have a negative impact on the aesthetics of the site.	Replacement planting internally to the site, and at boundary peripheries, will have a positive impact on the wider community. Further, it will provide a net gain in canopy cover across the site.
G10, G15, T16, T17, T18, G20, T21, T22, T25 & T24	These trees are located within the footprint of the proposed shared access route along the western boundary.	These trees are visible to members of the public that use the existing public footpath. The removal of these trees will have a negative impact on the wider community.	Replacement planting of better quality specimens will provide a net gain in canopy cover and will have a positive impact on members of the public using the proposed footpath.
G172 & T175	These trees are located within the footprint of the proposed sports pitches.	These trees are only partially visible externally to the site and therefore their removal will have a minor negative impact on the wider community.	The retention of key arboricultural features adjacent to the sports pitches is considered suitable mitigation for the loss of these low quality trees.
T116, T117 & T118	These trees are located within the footprint of the proposed access route on the western boundary.	These trees are all young specimens and, although visible to members of the public, due to their size and stature their removal will have no negative impact on the wider community.	Replacement planting throughout the site is considered suitable mitigation for the loss of these trees.

T93	This tree is located within the footprint of the proposed junction realignment off of Langhorn Drive.	This tree is a young specimen and due to its size and stature removal will have no negative impact on the wider community.	Replacement planting throughout the site is considered suitable mitigation for the loss of this tree.

2.12. Trees that have been identified for removal have been marked on the attached Draft TPP by a red dashed line.

Retained trees that will be affected by the development proposal

2.13. Section 5.3 (a) of BS5837 requires that any encroachment of the RPA by the proposed development must be justified and it must be demonstrated that the tree can remain viable. The area lost to encroachment must be compensated for elsewhere, contiguous with its RPA.

G9 - Various

2.14. This category B group is located on the northern boundary of the site. The RPA of this group is marginally encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 40m^2. This equates to 2.5% of the total RPA of this group.

2.15. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation, the proposal will not have an effect on the sustainability of this group.

T12 - Hornbeam

2.16. This category C tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 22m^2. This equates to 33% of the total RPA of this tree.

2.17. The area to the north and south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T13 - Alder

2.18. This category C tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 43m^2. This equates to 20% of the total RPA of this tree.

2.19. The area to the north and south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross

hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T35 - Sycamore

2.20. This category B tree is located on the southern boundary of the site. The RPA of this tree is marginally encroached by the proposed development of residential properties. The installation of these properties would encroach the RPA by approximately 16m^2. This equates to 5.5% of the total RPA of this tree.

2.21. The area directly south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Based on this area it is considered that this encroachment into the RPA will not have an adverse effect on the sustainability of this tree. Protective fencing will be used to ensure that the impact on the RPA of this tree is minimal.

G50 - Various

2.22. This category C group is located on the eastern boundary of the site within the rear garden of existing offsite properties. The RPA of this group is marginally encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 32m^2. This equates to 15.5% of the total RPA of this group.

2.23. The area to the east of this group consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T58 - Lime

2.24. This category B tree is located centrally to the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 8m^2. This equates to 16% of the total RPA of this tree.

2.25. The area to the north and south of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T59 - Horse Chestnut

2.26. This category B tree is located on the northern boundary of the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 8.5m^2. This equates to 4% of the total RPA of this tree.

2.27. The area to the north of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected

through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T60 - Horse Chestnut

2.28. This category B tree is located on the northern boundary of the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 31m^2. This equates to 15.5% of the total RPA of this tree.

2.29. The area to the north of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T113 - Ash

2.30. This category B tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 20m^2. This equates to 33% of the total RPA of this tree.

2.31. The tree is newly established in a designated tree pit and the area to the west of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T153 - Lime

2.32. This category B tree is located on the south western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 31m^2. This equates to 13% of the total RPA of this tree.

2.33. The area to the east of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T154 - False Acacia

2.34. This category B tree is located on the south western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 95m^2. This equates to 28% of the total RPA of this tree.

2.35. The area to the north and east of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T156 - Lime

2.36. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 69m^2. This equates to 25% of the total RPA of this tree.

2.37. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation the proposal will not have an effect on the sustainability of this tree.

T157 - Lombardy Poplar

2.38. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 56m^2. This equates to 8% of the total RPA of this tree.

2.39. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The area directly to the east and west of this tree consists of open amenity grass and provides suitable future potential for rooting and the remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation, and future rooting environment, the proposal will not have an effect on the sustainability of this tree.

T170 - Oak

2.40. This category A tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new access route into the site. The installation of this access would encroach the RPA by approximately 91m^2. This equates to 30% of the total RPA of this tree.

2.41. This tree has grown with an existing access point in close proximity to its base. The surface is made up of compacted aggregate and it is suspected that this will have allowed the filtration of water and nutrients to the rooting system of this tree. It is anticipated that this access will need to be removed and new instated, and that the encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. The new surface will need to consist of a porous surface in order to continue to allow the filtration of water and nutrients.

2.42. The permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and the current growing environment the proposal will not have an effect on the sustainability of this tree.

T173 - Horse Chestnut

2.43. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 141m^2. This equates to 32% of the total RPA of this tree.

2.44. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report.

The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation the proposal will not have an effect on the sustainability of this tree.

Proposal to Mitigate any Impact

Protection of retained trees

2.45. The successful retention of those trees that will remain on the site will be dependent upon the quality and maintenance of any protection system that is put in place. Indicative tree protection measures have been considered within this report.

2.46. The primary form of protection will be through the use of fencing. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the protected area. The Heras 151 system of fencing is commonly used to provide this level of protection.

2.47. The Heras fence panels should be joined using a coupling system such as the Heraslock Anti-tamper coupler, using a minimum of two clamps per panel side, and separated vertically by a distance of 1m. The panels should be secured to the ground using bracing poles or some other suitable form of support that ensures that they are fit for the purpose of excluding site traffic from the protected area and remain rigid and complete.

2.48. It is anticipated that an Arboricultural Method Statement will be required as a condition of any planning consent to provide detail of how the necessary tree protection can be implemented.

2.49. The processes of construction are highly unlikely to have a detrimental effect upon the health of the retained trees assuming recommendations made in this report are adhered to at all times by the contractors.

Summary of the Impact on Local Amenity and Character

2.50. The development proposal at Richmond College is for the demolition of the existing college buildings and comprehensive redevelopment of the entire site. The development will require the removal of 71 trees located internally to the site. 23 of these trees would be recommended for removal irrespective of the development due to poor structural and physiological condition. The remaining trees will require removal in order for the proposed development to be constructed. The overall proposal is not considered to have a long-term negative impact on the wider community. Where practicable, key trees will be retained and protected throughout the development process and these are to be supplemented by replacement planting, which will provide a net gain in canopy cover, aesthetic value and biodiversity benefits throughout the site.

3. DRAFT ARBORICULTURAL METHOD STATEMENT

Overview

3.1. The following explanations relate specifically to this site and they should be read in conjunction with the indicative Tree Protection Plan (TPP).

3.2. A copy of this report must be kept on site and be permanently available of the duration of the development. It can be:

- Included in the tender documents to identify and quantify the tree protection and management requirements;
- Used to plan the timing of site operations to minimise the impact on trees, and;
- Referenced on site for practical guidance on how to protect trees.

Arboricultural Supervision

3.3. An Arboricultural Clerk of Works (ACoW) will be appointed by the developer to advise on the tree management for the site and to attend:

- The pre-commencement meeting before any works start
- Regular supervision visits every two to four weeks, or as otherwise agreed; and
- As needed to oversee specific works that could affect trees

3.4. Additionally the consultant will have a supervisory input into the following operations:

- Site preparation, including tree works
- Installation, maintenance and removal of barriers
- Installation, maintenance and removal of ground protection
- Installation of new structures

Sequencing and Timing

3.5. Effective tree protection relies upon following a logical sequence of events and arboricultural inspection/supervision.

3.6. The retained ACoW's initial role is to liaise with the developer and LPA to ensure the tree protection measures are fit for purpose and in place before any works commence on the site. Once the site is working that role will switch to monitoring compliance with arboricultural planning conditions and advising on any tree problems that arise or modifications that become necessary.

3.7. It is the developer's responsibility to ensure that details of this Arboricultural Method Statement (AMS) and any agreed amendments are known and understood by all site personnel.

3.8. The final details of supervision and the frequency of inspection visits will be agreed at the pre-commencement meeting. The supervision arrangement will be sufficiently flexible to allow the supervision of all sensitive works as they occur.

3.9. The ACoW will make a record of the visits and these will be attached to the site copy of the AMS for inspection. A further copy will be sent to the LPA. The purpose of these written records is firstly to provide proof of compliance that will allow the developer to robustly demonstrate adherence to best practice in the event of any dispute. Secondly it will help the LPA efficiently discharge the relevant planning conditions. Appendix 5 gives a sample copy of a site inspection record.

Table 1 - Sequencing and Supervision

Stage	Action	Arboricultural Input Required
1	Pre-commencement meeting	Attend
2	Tree Removal and Tree Works	Inspect
3	Tree Protective Fencing	Supervise
4	Construction of special surfaces	Supervise
5	Specific tree protection measures	N/A
6	Demolition	Supervise
8	Development Phase	Inspect
9	Remove temporary surfaces	N/A
10	Remove tree protective fencing	Supervise
11	Landscaping & replacement planting	Inspect

Pre-commencing meeting

3.10. A pre-commencement site meeting involving the land owner, representative of the development company, ACoW, contractors and engineers (as appropriate), and relevant LPA officers will be held to ensure that all aspects of the tree protection processes are understood and agreed.

3.11. The meeting is where the details of the programme of tree protection will be agreed and finalised, which will then form the basis of any supervision arrangements between the ACoW and the developer

3.12. The ACoW will send a record of the meeting to all parties.

Tree Removal

3.13. Trees for removal have been noted on the TPP with a dashed red circle around each location. The following trees are scheduled for removal:

Table 2 - Trees for removal

Category A	Category B	Category C	Category U	Total
T68	G1, T17, T18, T21, T22, T33, G53, T54, T55, G56, G70, T74, T75 & G155	G2, G10, H14, G15, T16, G20, T24, T25, T27, T31, T32, H40, T41, G49, T63, T64, T65, T66, G67, T69, T71, T72, T73, G76, G77, G78, T79, T109, T116, T117, T118, G172 & T175	T5, T6, T11, T19, G23, T29, T30, G38, T48, T51, T52, T57, T95, T98, T104, T105, G110, T111, G112, T128, G159 & G174	71

Tree works

3.14. The details of tree works have been set out in the schedule attached to this report (ref: 14-1189). Obvious pruning to allow the installation of the structure has been listed, but additional minor pruning may be necessary to address unanticipated local problems with individual branches. Any additional works will be assessed and authorised as necessary by the retained ACoW. Where necessary, the LPA tree officer will be notified of any additional tree works.

Barriers and Ground Protection

The Construction Exclusion Zone

3.15. The primary means of protecting the Root Protection Area (RPA) of trees and Future Landscape Areas (FLA) is through the use of barriers formed by protective fencing. The enclosed area is the Construction Exclusion Zone (CEZ). The CEZ has been marked on the TPP by orange diagonal hatching.

3.16. The CEZs are to be afforded protection at all times and will be protected by fencing. The type of fencing is detailed in section 3.18, below.

3.17. No works will be undertaken within any CEZ that causes compaction to the soil or severance of tree roots.

Tree Protective Fencing

3.18. A protective fence will be erected around the trees, prior to the commencement of any site works i.e. before any materials or machinery are brought on site, development or the stripping of soil commences.

3.19. The fence is to be sited in accordance with the TPP enclosed with this method statement. This is shown as a black dotted line with diagonal orange hatching indicating the enclosed CEZ. Details of minimum distances for the barriers from the trees can be seen in Appendix 4. These figures are based on a perfect circle for the RPA around the tree. Where the RPA has been offset the parameters for the fencing have been marked on the TPP. The location of these fences is indicative only and further detail will be provided once planning consent has been obtained.

3.20. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, the Heras 151 system of fencing will provide the necessary protection to the CEZ. Details of this fencing can be seen in Appendix 6.

3.21. All Heras fence panels will be joined using a coupling system such as the Heraslock Anti-tamper coupler, using a minimum of two clamps per panel side. Each panel will be fitted securely to a rubberised foot that will in turn be pinned to the ground using metal stakes driven a minimum of 500mm into the ground.

3.22. The fence will have signs attached to it stating that it defines a CEZ and that no works are permitted within the fence. No notice boards, cables or other services will be attached to any tree. An example of a fencing sign is provided in Appendix 7.

3.23. The protective fencing may only be removed following completion of all construction works.

Construction of Special Surfaces

3.24. Where, due to site constraints, construction activity cannot be excluded through the use of fencing, appropriate ground protection must be installed to protect the rooting environment during the construction process.

Temporary Ground Protection

3.25. **No trees on this site require temporary protective ground protection measures**. However, if temporary access is required to a CEZ then access may only be gained after consultation with the Local Planning Authority and following placement of materials that will spread the weight of any vehicular load and prevent compaction to the soil

3.26. For pedestrian movements within any CEZ then a single thickness scaffold board on top of a compressible layer (e.g. wood chip mulch) laid onto a geotextile fabric may be acceptable.

Permanent hard surfaces within the RPA

3.27. Where permanent hard surfaces are required within the RPA, there must be no excavation into the soil, either through the lowering of levels and/or scraping, other than the removal of turf or other surface vegetation. All such works shall be carried out using hand tools only.

3.28. 15 trees or groups of trees (G9, T12, T13, G50, T58, T59, T60, T113, T153, T154, T156, T157, T170, T173 & T174) will require permanent protection.

3.29. In order to protect the RPA of these trees a three-dimensional cellular confinement system will be installed. This is a load bearing system which protects roots from the effects of compaction from regular vehicular movement. The recommended product for this solution is CellWeb but whatever system is used, the end result must be that the underlying soil (rooting environment) remains undisturbed and retains the capacity to support existing and new roots.

3.30. The areas to be protected by the Cellweb have been marked on the TPP by the dark green cross-hatching.

3.31. The CellWeb will be pinned in place and backfilled with Type 1 MOT and finished with a metalled wearing surface. The edgings of the finished surface are to be installed on top of the CellWeb and will comprise of timber boards staked in place and backfilled with the wearing layer as previously described.

3.32. Details of Cellweb are included in Appendix 8, and a methodology for installation given in Appendix 9. This methodology has been provided by the manufacturer and it will be the responsibility of the contractor to ensure that whatever system is used, it is installed in accordance with the latest guidelines provided by the manufacturer.

Additional precautions outside the exclusion zone

3.33. Any risk from activities outside RPAs but close enough to have an impact will be assessed during the day-to-day running of the site, and appropriate precautions put in place to reduce that risk.

3.34. It is a presumption of this report that all RPAs that have been identified for protection but which lie outside of the protective fencing, will be protected from soil degradation at all times during construction activity.

3.35. Further details for working within the RPA are also provided in Appendix 10.

Specific Tree Protection Measures

3.36. No specific tree protection measures are required for any tree on this site other than those detailed in this AMS and defined on the TPP.

Inspection and Supervision

3.37. After the protective fencing and temporary ground protection has been erected, the retained ACoW will visit the site. The purpose of the visit will be to check that the fencing has been correctly installed so as to provide protection to the trees. The local authority tree officer will also be invited to inspect the tree protection measures prior to any works commencing.

3.38. The retained ACoW will provide a written report confirming satisfactory completion of this task. A copy of this report will be sent to the local planning authority.

Demolition

3.39. No demolition works will take place within the RPA of any retained tree on this site.

Development

3.40. Once all tree works and protective fencing have been completed, the developer can commence the on-site preparation works and construction can begin.

Site Storage, Cement Mixing and Washing Points

3.41. No storage of materials will take place within a CEZ.

3.42. No mixing or storage of materials will take place up a slope where they may leak into a CEZ. Where contours of the site create a risk of polluted water running into RPAs, precautionary measures of using heavy duty plastic sheeting and sandbags with the ability to contain accidental spillage will be put in place to prevent contamination.

Contractors Parking

3.43. Contractors parking will not be within or in close proximity to a CEZ.

Utility Services

3.44. There is no requirement for an service to be installed within a CEZ or RPA of any retained tree on this site.

Fires

3.45. No fires will be lit on this site.

Site Gradient

3.46. There will be no changes to any levels on this site within or in close proximity to the RPA of any retained tree on this site.

Use of Herbicides

3.47. There is no requirement of any herbicide to be used on this site.

Use of Sub-contractors

3.48. The main contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any tree on site.

Contingency planning

3.49. Water will be kept readily available on site and will be used to flush split materials through the soil and avoid contamination of tree roots.

3.50. At the time of any spillage the main contractor will contact the retained ACoW for advice.

Post Development

Removal of temporary surfaces

3.51. Any temporary surfaces will remain in place until all construction activity is finished and there is no realistic risk of damage.

3.52. The temporary ground protective measures will be removed progressively, starting at the furthest point from the temporary access road, and working backwards. All operations will take place from on top of the existing temporary surface. This will need to be done carefully to ensure that there is no excavation in the original surface level and there will be no damage to trees.

3.53. Once this material has been removed there will be no vehicular access to the site by this route.

Landscaping within the tree canopies

3.54. The final tidying up and reinstatement can only be carried out when all the protective measures have been removed. This means great care is required by the contractors to observe tree protection measures.

3.55. No machines can be used within the RPAs, which specifically excludes rotavators.

3.56. All new planting and soil level variations must be agreed and supervised by the retained ACoW.

Responsibilities

3.57. It is the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regards to tree protection is adopted on site.

3.58. The main contractor will be responsible for contacting the Local Planning Authority at any time issues are raised related to the trees on site.

3.59. If at any time pruning works are required permission must be sought from the Local Planning Authority first and then carried out in accordance with BS3998:2010 *Tree Works – Recommendations* and industry best practice.

3.60. The main contractor will ensure the build sequence is appropriate to ensure that no damage occurs to the trees during the construction processes. Protective fences will remain in position until completion of ALL construction works on the site.

3.61. The fencing and signs must be maintained in position at all times and checked on a regular basis by an on-site person designated that responsibility.

Completion Meeting

3.62. Upon completion of all works specified above and all procedures detailed, the ACoW will invite the LPA tree officer to meet on site to discuss the process and agree any final remedial works which may be required.

Contacts

3.63. Shows a list of all relevant contacts for this development:

Title	Name	Contact Number	Email
Landowner/Developer			
Agent			
LPA Case Officer			
LPA Tree Officer			
Site Manager			
ACoW			
Tree Surgeon			

THIS AMS IS NOT A CONTRACT. THE RETENTION OF A QUALFIIED ARBORICULTURIST FOR SUPERVISION AND MONITORING MUST BE AGREED PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.

Stephen Westmore MSc BSc (Hons) MArborA

Assistant Arboricultural Consultant

03 June 2015

Appendix 1: Administrative Background

Instruction

Written instruction was received on 29 July 2014 from Claire Pitcher of Cascade Consulting Ltd to carry out a survey of the trees at Richmond upon Thames College.

The survey was to be carried out in accordance with the recommendations laid down by BS5837: Trees in relation to construction, and to assist in the preparation of a report to accompany a planning application. The report was to include:

- A schedule of the relevant trees to include basis data and condition assessment
- An appraisal of the impact that the proposed development may have on the trees, and the resulting impact this may have on the local amenity.
- An arboricultural method statement dealing with protection and the management of the trees to be retained.

Documents Provided

The plan is derived from the following provided information:

- Topographical survey (07404-01B) prepared by 3Sixty Measurement in February 2008.
- Layout drawing (RCF-HOK-AR-Site-20150106-7) prepared by HOK, received by email on 02 June 2015.

Limitations of this report

The following limitations apply to this report:

Statutory Protection: The existence of tree preservation order or conservation area protection does not automatically mean trees are worthy of being a material constraint in a planning context. Trees can be formally protected but be in poor structural condition or in declining health, which means they are unsuitable for retention or influencing the future use of the site. Furthermore a planning consent automatically takes precedent over these forms of protection, which makes them of secondary importance. For these reasons, I do not check statutory protection as a matter of course in the process of preparing this report. However if any tree works are proposed before a planning consent is given, then the existence of any statutory protection must be checked with the local authority.

Ecology and Archaeology: Although trees can be a valuable ecological habitat and can grow in archeologically sensitive areas, I have no specialist expertise in these disciplines and this report does not consider those aspects.

Tree Safety: While every effort has been made to ensure that comments relating to the tree surveyed are accurate, it must be noted that no tree have been climbed, no internal inspections carried out and no excavation of root areas has taken place. As such this report should not be taken to mean or imply that any of the inspected trees should be considered safe. No tree can be guaranteed to be 100% safe as some defects are not detectable by visual non-climbed, non-invasive inspection. Failure of an apparently healthy tree, either in part or totally may occur as a result of physical or physiological stress.

Soil Assessment: A soil assessment should be undertaken by a suitably qualified person to assess soil structure, soil composition and soil pH. The purpose of this is to provide guidance in any decisions relating to:

- The root protection area
- Tree protection;
- New planting design; and
- Foundation design

No details of a soil survey have been provided for submission with this report.

Technical References

The arboricultural method statement is based purely on the following technical references:

- British Standards Institute (2012) BS5837: Trees in relation to design, demolition and construction – recommendations

Qualifications and Experience

This report is based on my site observations and the provided information.

I have 3 years arboricultural and forestry experience working in the public and private sector. I have undertaken work on a variety of projects on behalf of private and commercial clients.

I have an MSc in Arboriculture and Urban Forestry, awarded by Myerscough College and University of Central Lancashire. I also have a BSc in Countryside Management, awarded by Harper Adams University College.

I am a Professional member of the Arboricultural Association and an Associate member of the Institute of Chartered Foresters.

Support and guidance with this report has been provided by Rob Davidson, Senior Arboricultural Consultant for Lockhart Garratt Ltd.

Appendix 2: BS5837 Cascade Chart

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
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; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they might, as individuals, not necessarily be separable in this category, but collectively are growing as a landscape feature, supporting the next higher category	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

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Appendix 3: Tree Constraints Data

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
3	Red Horse Chestnut	430	5.2	84	9	4.6
4	Horse Chestnut	650	7.8	191	14	6.9
7	Red Horse Chestnut	600	7.2	163	13	6.4
8	Sycamore	660	7.9	197	14	7.0
9	Various	750	9.0	254	16	8.0
12	Hornbeam	385	4.6	67	8	4.1
13	Alder	680	8.2	209	14	7.2
26	Elder	160	1.9	12	3	1.7
28	Birch	270	3.2	33	6	2.9
34	Sycamore	250	3.0	28	5	2.7
35	Sycamore	810	9.7	297	17	8.6
36	Various	300	3.6	41	6	3.2
37	Sycamore	424	5.1	81	9	4.5
39	Sycamore	600	7.2	163	13	6.4
42	Alder	520	6.2	122	11	5.5
43	Prunus (Group)	400	4.8	72	9	4.3
44	Locust Tree / False Acacia (golden cultivar)	260	3.1	31	6	2.8
45	Cypress (Group)	300	3.6	41	6	3.2
46	Cypress (Group)	360	4.3	59	8	3.8
47	Western Red Cedar	300	3.6	41	6	3.2
50	Various	450	5.4	92	10	4.8

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
58	Lime	330	4.0	49	7	3.5
59	Horse Chestnut	700	8.4	222	15	7.4
60	Horse Chestnut	660	7.9	197	14	7.0
61	Red Horse Chestnut	300	3.6	41	6	3.2
62	Prunus	210	2.5	20	4	2.2
93	Ash (Common)	170	2.0	13	4	1.8
94	Ash (Common)	160	1.9	12	3	1.7
96	Ash (Common)	130	1.6	8	3	1.4
97	Ash (Common)	120	1.4	7	3	1.3
100	Ash (Common)	190	2.3	16	4	2.0
101	Ash (Common)	190	2.3	16	4	2.0
102	Ash (Common)	200	2.4	18	4	2.1
103	Ash (Common)	200	2.4	18	4	2.1
106	Ash (Common)	140	1.7	9	3	1.5
107	Alder (Common)	160	1.9	12	3	1.7
108	Alder (Common)	80	1.0	3	2	0.9
113	Ash (Common)	370	4.4	62	8	3.9
114	Alder (Common)	100	1.2	5	2	1.1
115	Alder (Common)	120	1.4	7	3	1.3
119	Prunus	160	1.9	12	3	1.7
120	Alder (Common)	164	2.0	12	3	1.7
121	Oak	80	1.0	3	2	0.9
126	Norway Maple	210	2.5	20	4	2.2
127	Oak	240	2.9	26	5	2.6
151	Lime	590	7.1	157	13	6.3
152	Red Horse	540	6.5	132	11	5.7

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
	Chestnut					
153	Lime	760	9.1	261	16	8.1
154	Locust Tree / False Acacia	880	10.6	350	19	9.4
156	Lime	790	9.5	282	17	8.4
157	Lombardy Poplar	1,900	22.8	1633	40	20.2
158	Norway Maple	390	4.7	69	8	4.1
160	Oak (Common)	328	3.9	49	7	3.5
161	Hawthorn	400	4.8	72	9	4.3
162	Oak (Common)	270	3.2	33	6	2.9
163	Sycamore	300	3.6	41	6	3.2
164	Sycamore	100	1.2	5	2	1.1
165	Sycamore	150	1.8	10	3	1.6
166	Sycamore	160	1.9	12	3	1.7
167	Sycamore	140	1.7	9	3	1.5
168	Whitebeam	430	5.2	84	9	4.6
169	Prunus	160	1.9	12	3	1.7
170	Oak (Common)	800	9.6	290	17	8.5
171	Sycamore	480	5.8	104	10	5.1
173	Horse Chestnut	970	11.6	426	21	10.3
176	Purple Plum	350	4.2	55	7	3.7
177	Lime	810	9.7	297	17	8.6

Explanatory Notes

General: The basic data listed in the first two columns is identical to that listed in the schedule in the attached tree schedule. The data in columns 3-5 are derived from the stem diameter by a simple calculation as described in BS5837.

Circle Radius: The circle radius has been calculated by obtaining the stem diameter (measured at 1.5m above the ground) in millimetres and multiplying it by 12. Where the tree is multi-stemmed, an average stem diameter is calculated by the following formula specified in section 4.6.1 (a) & (b) of BS5837:

For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter 1})^2 + (\text{stem diameter 2})^2 \ldots + (\text{stem diameter 5})^2}$$

For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

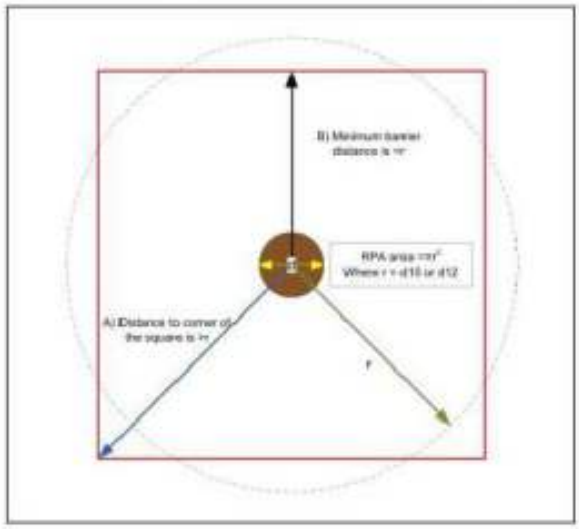
This total is then divided by 1000 to provide a circle radius in metres.

RPA Areas: The RPA has been assessed according to the recommendations set out in section 4.6 of BS5837. It is calculated by multiplying the radius squared by 3.142 (π)

Length of sides of a square: Section 5.5.3 of BS5837 recommends that the ground protection and barriers should be shown as a polygon surrounding the stem of the tree. With a circle, the distance from the edge of the circle to the centre will remain constant, but with a square, the distance from the centre of the tree to the sides of the square is less than the distance to the corner of the square. The area of the square must remain the same as the area of the circle. In order to ensure that it is the case, the length of side of the square is calculated at the square root of the RPA area.

Minimum barrier distance: This is the closest point that a side of the square can be to the centre of the tree. Figure 1 graphically illustrates the differences between a square and a circle in area. Where the distance from the centre of the tree to the corner of the square (A) is greater than the radius of the circle (r), but the distance from the centre of the tree to the side of the square (B) is greater than the radius of the circle (r), the total area will remain the same. The minimum barrier distance from the tree is calculated by taking the length of the side and dividing it by two.

Figure 1 - Graphical explanation for calculating the RPA



Clarification note on the RPA radius: The RPA radius is not the automatic minimum distance of the tree protection. It is a notional figure for use as a means of calculating the actual area of the RPA. BS5837 clarifies this at:

3.7 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 trees viability, and where the protection of the roots and soil structure is treated as a priority.

Appendix 4: Omitted tree data

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
80	Horse Chestnut	200	2.4	18	4	2.1
81	Ash (Common)	600	7.2	163	13	6.4
82	Horse Chestnut	190	2.3	16	4	2.0
83	Ash (Common)	161	1.9	12	3	1.7
84	Ash (Common)	450	5.4	92	10	4.8
85	Ash (Common)	410	4.9	76	9	4.4
86	Ash (Common)	600	7.2	163	13	6.4
87	Alder (Common)	230	2.8	24	5	2.4
88	Oak	450	5.4	92	10	4.8
89	Alder (Common)	210	2.5	20	4	2.2
90	Unidentified Broadleaf	200	2.4	18	4	2.1
91	Oak	950	11.4	408	20	10.1
92	Oak	80	1.0	3	2	0.9
122	Mixed species	300	3.6	41	6	3.2
123	Horse Chestnut	300	3.6	41	6	3.2
124	Cypress (Group)	200	2.4	18	4	2.1
129	White Willow	600	7.2	163	13	6.4
130	Locust Tree / False Acacia	290	3.5	38	6	3.1
131	White Willow	900	10.8	366	19	9.6
132	Mixed species	200	2.4	18	4	2.1
133	Horse Chestnut	200	2.4	18	4	2.1
134	Scots Pine	150	1.8	10	3	1.6
135	Scots Pine	400	4.8	72	9	4.3
136	Oak	170	2.0	13	4	1.8

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
137	Unidentified Broadleaf	600	7.2	163	13	6.4
138	Oak	380	4.6	65	8	4.0
139	Mixed species	300	3.6	41	6	3.2
140	Elder	460	5.5	96	10	4.9
141	Oak	164	2.0	12	3	1.7
142	Elder	385	4.6	67	8	4.1
143	Goat Willow	300	3.6	41	6	3.2
144	Oak	160	1.9	12	3	1.7
145	Ash	140	1.7	9	3	1.5
146	Field maple	100	1.2	5	2	1.1
147	Raywood Ash	140	1.7	9	3	1.5
148	Field maple	170	2.0	13	4	1.8
149	Field maple	100	1.2	5	2	1.1
150	Norway Maple	160	1.9	12	3	1.7

Appendix 5: Sample Site Inspection Record

Site		Date	
		Surveyor	
Ref No:		Planning Application No.	
Developer			
Site Agent		Contact No:	

Was all tree protective fencing in place?			
Details			
Action			
Was CEZ to agreed dimensions?			
Details			
Action			
Was debris/storage/groundwork evident within CEZ?			
Details			
Action			
Was there any evidence of damage to trees?			
Details			
Action			
Are any special works scheduled for coming build period?			
Details			
Action			
Additional Comments			

Any amendments proposed to plan?			
Details			
Action			

Signed:	
Name:	
Position:	

Circulation:				
Name	**Position**	**Company**	**Email**	**Phone**

Appendix 6: Tree Protective Fencing

Appendix 7: Example of Protective Fencing Signage

(Lockhart Garratt is able to provide useable, weather-proof copies of this sign if required, for attaching to the protective fencing. If required, please contact us for further details).

Appendix 8: Permanent Ground Protection

CellWeb™

Tree Root Protection System



The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction across new roadways and hard surfaces that require engineered, standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.

Product features

CellWeb™ comprises an expandable cellular mattress that is then filled with a clean, dune sub-base and above a Treetex 150 Geotextile.

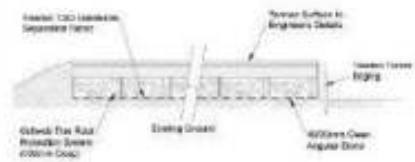
The honeycomb like structure is made of robust high density polyethylene (HDPE) that is simply stretched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CellWeb™ this is achieved without compaction and without reduction in permeability.

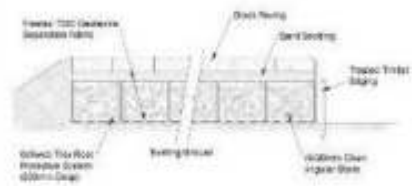
Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to nearby tree roots. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CellWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CellWeb™ significantly reduces surface rutting, increasing the long term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CellWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CellWeb's green credentials.

- No excavation – Soil structure remains undisturbed, risk of root damage minimised.
- Porous infill – Allows tree roots to conduct moisture and gas exchange.
- No compaction – No need to compact the infill to achieve a load-bearing structure.
- Lateral stability – Structure remains rigid to vertical loads.





Please call
01455 617 139
or email sales@geosyn.co.uk
for further information.

Wide product range

Large stock holding

Next day delivery

Appendix 9: Example Methodology for Construction of Surface

(This document has been produced by Geosynthetics Ltd for the installation of the Cellweb Tree Root Protection System – it does not apply to other products which may serve a similar purpose).

When considering damage to tree roots, in applications of vehicular access and parking, the risk of oxygen depletion caused by compaction of subsoil's, site clearance damaging the root source and type of reinforcement are areas which need to be given due consideration.

Other risk factors are:

• Creating an impermeable surface	
• Causing a rise in the water table due to construction	
• Increasing ground level	
• Contamination of subsoil's	
1. Compaction	
When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting traffic to be proposed:	
• Californian Bearing ratio (CBR) – Standard test method for measuring soil strength	
• Soil types	
• Water table	
• Maximum load (vehicles)	
• Acceptable rut depth	
• Reinforcement type	Cellweb Cellular Confinement 150mm deep

Type and Depth of engineered infill material	Clean, angular. Usually 40mm to 20mm.
2. Dig (site strip)	
Site stripping does damage some root structure prior to construction; however, the use of no-dig construction elevates the access road requiring edge protection.	
3. No dig	
3.1. Remove surface vegetation	Use a suitable herbicide suitable for the specific vegetation and not harmful to the tree root system
3.2. Place geotextile separation filtration layer	Use a Treetex T300 non woven Goetextile over the prepared sub-grade. Overlap dry joints by 300mm.
	The three dimensional cell structure, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system
3.4. Edge restraint	A treated timber edging is usually acceptable.
4. Cellular Confinement and Backfill Material.	

Expand the Cellweb 2.56m wide panels to the full 8.1 metre length. Pin the Cellweb panels with staking pins to anchor open the cells and staple adjacent panels together to create a continuous mattress. Infill the Cellweb with a no fines angular granular fill (typically 4-20mm) within each open cell. The use of cellular confinement reduces the bearing pressure on the subsoil by stabilising aggregate surfaces against rutting under wheel loads. Comparisons between cellular confinement and traditional aggregate and geogrid-reinforced structures demonstrate a 50% reduction in construction thickness of the granular material.

5. Surfacing Options
Block Paving: 5.1. Lay second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections 5.2. Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth. 5.3. Place block pavers as per manufacturers instructions.
Tarmac: Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.
Loose Gravel: 5.4. Ensure Cellweb is completely filled. 5.5. Place decorative aggregate to required depth NOTE: A treated timber edge should be provided to restrict gravel movement.
Grass Blocks: 5.6. Place second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections 5.7. Place 50/50 rootzone bedding layer to the required depth 5.8. Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix. 5.9. Seed as per architects instructions. (Alternatively the Grass Blocks may be infilled with gravel.) Concrete Slab 6.0 Lay Cellweb as previous and place second layer of Treetex Geotextile directly over the filled panels. Pour concrete base as specified.

If you have any queries about installation please contact Geosynthetics Ltd on 01455 617139.

Appendix 10: Site Guidance for working in the RPA

General Guidance for Working in RPAs

a) **What is the purpose of this guidance?**

This guidance sets out the general principle that must be followed when working in the RPA. Where more detail is required, it will be supplemented by illustrative specifications in other appendices to this document. Before work starts on site, the purpose of this guidance is to demonstrate to the LPA that tree protection issues have been properly considered and to provide a written record of how they will be implemented.

Once the site work has started, this guidance is specifically for the site personnel to help them understand what has been agreed and explain what is required to fully meet their obligations to protect trees. All personnel working in the RPA must be properly briefed about their responsibilities towards important trees based on this guidance.

b) **What are the RPAs?**

RPAs are the areas surrounding important trees where disturbance must be minimised if they are to be successfully retained. All RPAs close to the construction area are identified on the Tree Protection Plan attached to this report. Damage to roots re degradation of the soil through compaction and/or excavation within the RPA will damage the tree. Any work operations within the RPA must be carried out with great care if trees are to be successfully retained.

c) **When should this guidance be followed?**

Anyone entering a RPA must follow this guidance if the trees are to be retained unharmed. Anyone working in a RPA must take care to minimise excavation into existing soil levels and limit any fill or covering that may affect soil permeability. There are two main scenarios where this guidance must be followed when entering and working within a RPA:

i. Removal of existing surfaces/structures and replacement with new surfaces, structures or landscaping

ii. Preparation and installation of new surfacing structures and/or landscaping.

d) **Where does this guidance apply?**

This guidance should always be read in conjunction with the site plans illustrating the areas where specific precautions are necessary. Each area where precautions are required is annotated on the plans as identified on their keys. All plans are illustrative and are intended to be interpreted in the context of the site conditions when the work commences. All protective measures should be installed according to the prevailing site conditions and agreed as satisfactory by the appropriate supervising officer before any demolition or construction works commence.

e) **What references is this guidance based on?**

This guidance is based in the assumption that the minimum general standards for development issues are those set out in BS5837 (2012): Trees in relation to design, demolition and construction – Recommendations, and the NJUG Vol.4 Issue 1: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees.

f) **Preventing adverse impact to the RPA beyond the immediate work area**

Any part of the RPA beyond the agreed work area must be isolated from the work operations by protective barriers or ground protection to at least the minimum standard described in BS5837 for the duration of the work.

g) **Excavation and dealing with roots**

All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.

If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 10-20cm behind the final face of the excavation.

Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots 2.5-10cm in diameter should only be cut in exceptional circumstances. Roots greater than 10cm in diameter should only be cut after consultation with the appropriate supervisory officer.

h) **Arboricultural supervision**

Any work within the RPA requires a high level of care. Qualified arboricultural supervision is essential to minimise the risk of misunderstanding and misinterpretation. Site personnel must be properly briefed before any works commence.

Ongoing work must be inspected regularly, and on completion, the work must be signed off by the arboriculturist to confirm compliance by the contractor. In the context of this guidance, an appropriate supervising officer would be an arboriculturist.

Installation of new surfaces in RPAs

a) **Basic Principles**

New surfacing is potentially damaging to trees because it may require changes to existing ground levels. This can result in damage to the soil structure affect the efficient exchange of water and gases in and out of the soil. Mature and over mature trees are much more likely to suffer as a result of these changes. These impacts can be minimised by reducing the extent of changes within the RPA. The most suitable surface will be one that is permeable (allowing the movement of water and gas), load bearing (to avoid compaction) and requires little or no excavation (to limit root damage). The actual specification is an engineering issue that needs to be addressed by a suitably qualified professional, and is beyond the scope of this report.

b) **Establish the depth of excavation and surface gradient**

The precise location and depth of roots within the soil is unpredictable and can only be established once digging has commenced. Ideally, all RPAs should be no-dig, but this is often not possible on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted. Some limited excavation may be required to achieve this, and this is not necessarily damaging to trees if it is done carefully and no large roots are cut. The top 5mm of soil on grass surfaces is unlikely

to contain any tree roots and therefore the removal of this will not impact the tree. It may be possible to dig deeper than this depending on local conditions, but this would need to be assessed by the retained ACoW.

On undulating surfaces, finished gradients/levels must be planned with sufficient flexibility so as to allow changes to occur if the excavation of high points reveals unexpected large roots. If roots are less than 25mm in diameter, it would normally be acceptable to cut these. However, for roots over 25mm diameter, cutting them may cause damage to the tree and further excavation may not be possible. In this case, the surrounding levels must be adjusted to take account of these high points, by filling with suitable material. If this is not possible and it is necessary to cut larger roots, discussions should be held with the retained ACoW before any final decision is made.

c) **Base and finish layer**

Once the sub-base layer is finished, the load-spreading surface is installed on top, without compaction. Generally, the load-spreading surface will normally be cellular and filled with crushed stone – care must to be taken as different products produce different results, and the detail must be confirmed prior to installation. Suitable finishes included washed gravel, permeable tarmac or permeable block paving. For lightly loaded surfaces such as pedestrian footpaths, preformed concrete slabs may be appropriate if the sub base is prepared as detailed above.

d) **Edge Retention**

Conventional kerb retention set in concrete trenches is likely to cause damage to the roots and should be avoided. Effective edge retention within the RPA must be custom designed to avoid significant excavation in to existing soil surfaces. Generally, the use of pre-formed edging secured by metal pins or wooden pegs will be sufficient to ensure minimal impact on the trees.

e) **Installing new surfacing on top of existing surfacing**

It may be possible/preferable in some instances to use existing surfaces as the base for a new surface. This will not normally result in any significant excavation that could damage the roots, so no special precautions are required. However, if large roots appear above the existing surface, then the precautions and procedures detailed above must be followed.

Client:	Cascade Consulting Ltd	Reference:	[illegible]
Site:	Richmond College	Surveyor: Robert Davidson / Stephen Westbrook	Date of survey: 10/03/2014

Key to Notations

Code	Definition	Age Class		Definition	Category		ULE	Sub category	
Stem Dia	Stem diameter (mm) at 1.5m above ground level	Y	Young	[illegible]					
H/C	[illegible]	EM	Early Mature	[illegible]	A	High Quality & Value	40+	1	Mainly arboricultural value
L.E.	[illegible]	M	Mature	[illegible]	B	Moderate Quality & Value	20-40	2	Mainly landscape value
CLE	Direction of Lowest Branch	OM	Over Mature	[illegible]	C	Low Quality & Value	10-20	3	Mainly cultural value
ULE	Useful Life Expectancy of tree in years	V	Veteran	[illegible]	U	Dead, dying or dangerous	<10		
Physiological condition	Good	No significant health problems	Fair	Symptoms of ill health that can be corrected	Poor	Significant ill health			
Structural condition	Good	No significant defects	Fair	Significant defects that can be corrected	Poor	Significant defects with no remedy			

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LE (m)	CLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
1	T1	Whitebeam	Sorbus sp	[illegible]	400	1	3	3	4	4	1	1	North	EM	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
2	T2	Ash	Fraxinus sp	11	400	1	6	6	7	6	1	2	North	M	Good	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
3	T3	Red Horse Chestnut	Aesculus carnea	[illegible]	400	1	4	4	4	4	1	2	East	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
4	T4	Horse Chestnut	Aesculus hippocastanum	14	650	1	5	5	4	4	1	1	North	EM	Good	Good	[illegible]	None	10-20	C1	[illegible]	[illegible]
5	T5	Horse Chestnut	Aesculus hippocastanum	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	OM	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
6	T6	Cypress	Chamaecyparis sp	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	North	OM	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
7	T7	Red Horse Chestnut	Aesculus carnea	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
8	T8	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
9	T9	Whitebeam	Sorbus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
10	T10	Whitebeam	Sorbus sp	[illegible]	300	1	3	3	4	4	-	1	North	EM	Fair	Fair	[illegible]	None	20-40	C1	[illegible]	[illegible]
11	T11	Pine	Pinus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	4	1	1	North	M	Fair	Poor	[illegible]	Fell	<10	U	[illegible]	[illegible]
12	T12	Hawthorn	Crataegus monogyna	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	-	North	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
13	T13	Pine	Pinus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	East	M	Good	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
14	T14	Cypress	Chamaecyparis sp	[illegible]	[illegible]	1	1	1	1	1	-	-	North	M	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
15	T15	Whitebeam	Sorbus sp	[illegible]	400	1	4	4	4	4	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
16	T16	Prunus	Prunus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	North	M	Good	Fair	None	None	10-20	C1	[illegible]	[illegible]
17	T17	Prunus	Prunus sp	[illegible]	[illegible]	1	4	[illegible]	4	4	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
18	T18	Prunus	Prunus sp	[illegible]	[illegible]	1	4	[illegible]	4	4	[illegible]	[illegible]	North	EM	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
19	T19	Prunus	Prunus sp	[illegible]	[illegible]	1	-	-	-	-	-	-	North	OM	Poor	Poor	Dead	Fell	<10	U	[illegible]	[illegible]
20	T20	Poplar	Populus sp	[illegible]	[illegible]	1	4	4	4	4	[illegible]	1	North	EM	Fair	Fair	[illegible]	None	20-40	C1	[illegible]	[illegible]
21	T21	Hawthorn	Crataegus monogyna	[illegible]	400	1	[illegible]	[illegible]	4	[illegible]	1	[illegible]	North	EM	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
22	T22	Prunus	Prunus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	4	4	[illegible]	[illegible]	North	M	Good	Fair	None	None	20-40	B1	[illegible]	[illegible]
23	T23	Poplar	Populus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	North	OM	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
24	T24	Birch	Betula sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
25	T25	Sycamore	Acer pseudoplatanus	[illegible]	600	[illegible]	4	[illegible]	[illegible]	[illegible]	-	-	North	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
26	T26	Lime	Tilia x europaea	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	North	M	Fair	Fair	None	None	10-20	C1	[illegible]	[illegible]
27	T27	Apple	Malus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	EM	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
28	T28	Birch	Betula sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
29	T29	Apple	Malus sp	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	North	M	Fair	Poor	[illegible]	Fell	<10	U	[illegible]	[illegible]
30	T30	Purple Plum	Prunus cerasifera 'Nigra'	[illegible]	[illegible]	1	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	West	OM	Fair	Poor	[illegible]	Fell - Remove stump	<10	U	[illegible]	[illegible]
31	T31	Apple	Malus sp	[illegible]	[illegible]	[illegible]	4	4	[illegible]	[illegible]	[illegible]	[illegible]	North	EM	Fair	Fair	[illegible]	None	20-40	C1	[illegible]	[illegible]
32	T32	Apple	Malus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	East	Y	Good	Good	[illegible]	None	20-40	C1	[illegible]	[illegible]
33	T33	Cedar	Cedrus sp	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
34	T34	Sycamore	Acer pseudoplatanus	11	250	1	4	2	4	[illegible]	[illegible]	2	North	EM	Fair	Fair	[illegible]	None	40+	C1	[illegible]	[illegible]
35	T35	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]

Key to Notations

		Age Class		Extention	Category Grading			
Stem Dia.	Stem diameter (mm) at 1.5m above ground level	Y	Young	[illegible]	Category		ULE	Sub category
C.C.	Height of crown clearance above ground level	EM	Early Mature	[illegible]	A	High Quality & Value	40+	1 Mainly arboricultural value
L.B.	Lowest branch height in metres	M	Mature	[illegible]	B	Moderate Quality & Value	20-40	2 Mainly landscape value
D.L.B.	Direction of Lowest branch	OM	Over Mature	[illegible]	C	Low Quality & Value	10-20	3 Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	[illegible]	U	Dead, dying or dangerous	<10	
Physiological condition	Good	No significant health problems		Fair: Symptoms of health that can be remediated	Poor	Significant ill health		
Structural condition	Good	No significant defects		Fair: Significant defects that can be remediated	Poor	Significant defects with no remedy		

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LB (m)	DLB (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat.	RPA (m2)	RPA Radial distance (m)
36	[illegible]	Various	Various sp	[illegible]	300	1	3	3	3	3	-	-	North	M	Fair	Fair	[illegible]	None	10-20	C2	41	4
37	T37	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	2	4	3	4	4	3	-	North	EM	Fair	Poor	[illegible]	None	20-40	C1	[illegible]	[illegible]
38	[illegible]	Cherry Laurel	Prunus laurocerasus	7	300	1	4	4	4	4	-	-	North	M	Fair	Poor	[illegible]	Fell	<10	U	41	4
39	T39	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	1	3	3	3	3	1	3	West	M	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	7
40	[illegible]	Cherry Laurel	Prunus laurocerasus	[illegible]	[illegible]	1	1	1	1	1	-	-	North	M	-	-	Boundary hedge	None	10-20	C2	7	[illegible]
41	T41	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	[illegible]	4	4	4	4	4	3	West	EM	Fair	Fair	Multi-stemmed	None	10-20	C2	[illegible]	[illegible]
42	T42	[illegible]	[illegible]	[illegible]	[illegible]	1	4	4	4	4	[illegible]	[illegible]	West	M	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]	7	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
44	T44	[illegible]	[illegible]	14	[illegible]	1	3	3	4	3	3	3	North	EM	Good	Fair	[illegible]	None	10-20	C1	[illegible]	3
45	[illegible]	Cypress (Group)	Chamaecyparis spp	[illegible]	300	1	4	4	4	4	1	1	North	M	Fair	Fair	[illegible]	None	10-20	C2	41	4
46	[illegible]	Cypress (Group)	Chamaecyparis spp	[illegible]	[illegible]	1	4	4	4	4	1	1	North	M	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	4
47	[illegible]	Western Red Cedar	Thuja plicata	[illegible]	300	1	4	4	4	4	1	1	North	M	Fair	Fair	[illegible]	None	10-20	C2	41	4
48	T48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	East	M	Fair	Poor	[illegible]	Fell. Remove stump	<10	U	[illegible]	[illegible]
49	[illegible]	Cypress (Group)	Chamaecyparis spp	[illegible]	[illegible]	1	3	3	3	3	-	3	East	M	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	3
50	[illegible]	Various	Various sp	[illegible]	[illegible]	1	4	4	4	4	-	4	East	M	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	[illegible]
51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	M	Fair	Poor	[illegible]	Fell	<10	U	[illegible]	[illegible]
52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	-	-	-	-	-	-	North	OM	Poor	Poor	Dead	Fell	<10	U	41	4
53	[illegible]	Various	Various sp	14	[illegible]	1	4	4	4	4	-	[illegible]	East	M	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
54	[illegible]	Lime	Tilia spp	7	[illegible]	1	4	4	4	4	[illegible]	[illegible]	North	EM	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
55	[illegible]	[illegible]	[illegible]	7	[illegible]	1	4	4	4	[illegible]	[illegible]	[illegible]	North	M	Good	Good	Stem damage. Root exposure	None	20-40	B1	[illegible]	[illegible]
56	[illegible]	Various	Various sp	[illegible]	[illegible]	1	4	4	4	4	1	1	West	EM	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
57	[illegible]	Oak	Quercus sp	11	[illegible]	1	4	4	4	[illegible]	[illegible]	[illegible]	West	OM	Poor	Poor	[illegible]	[illegible]	<10	U	[illegible]	[illegible]
58	[illegible]	Lime	Tilia spp	[illegible]	[illegible]	1	[illegible]	4	4	[illegible]	[illegible]	[illegible]	West	EM	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
59	[illegible]	Horse Chestnut	Aesculus hippocastanum	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
60	[illegible]	Horse Chestnut	Aesculus hippocastanum	[illegible]	[illegible]	1	7	7	7	[illegible]	[illegible]	[illegible]	West	M	Fair	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]
61	[illegible]	Red Horse Chestnut	Aesculus x carnea	7	[illegible]	1	4	4	4	[illegible]	[illegible]	[illegible]	North	EM	Good	Good	Multi-stemmed from 1.5m	None	20-40	B1	41	4
62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	4	-	1	West	EM	Good	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
63	[illegible]	Birch [illegible]	Betula [illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	EM	Good	Good	[illegible]	None	20-40	C1	7	[illegible]
64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	1	1	North	EM	Good	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
65	[illegible]	Birch	Betula sp	[illegible]	[illegible]	1	4	[illegible]	[illegible]	4	1	[illegible]	West	EM	Good	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
66	[illegible]	[illegible]	[illegible]	11	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	4	4	4	4	1	-	East	M	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	[illegible]

Key to Notations

			Age Class		Condition		Category Grading			
Stem Dia.	Stem diameter (mm) at 1.5m above ground level		Y	Young	[illegible]		A	High Quality & Value	40+	1 Mainly arboricultural values
H (m)	Height of tree in metres above ground level		EM	Early Mature	[illegible]		B	Moderate Quality & Value	20-40	2 Mainly landscape values
LB	[illegible]		M	Mature	[illegible]		C	Low Quality & Value	10-20	3 Mainly cultural values
CLB	[illegible]		OM	Over Mature	[illegible]		U	[illegible]	<10	
ULE	Useful Life Expectancy of tree in years		V	Veteran	[illegible]					
Physiological condition	Good	No significant health problems	Fair	Symptoms of health that can be remediated	Poor	Significant ill health				
Structural condition	Good	No significant defects	Fair	Significant defects that can be remediated	Poor	Significant defects with no remedy				

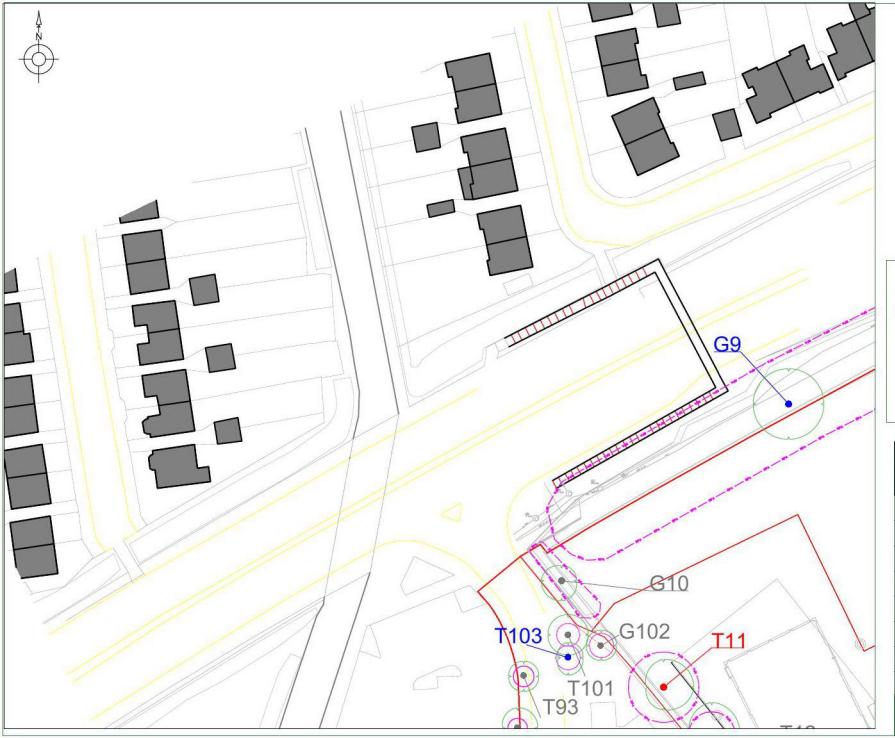
Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia	No of Stems	N	E	S	W	CC (m)	LB (m)	CLB (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
[illegible]	[illegible]	Swamp Cypress	Taxodium distichum	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	East	M	Good	Good	[illegible]	None	40+	A1	[illegible]	[illegible]
[illegible]	[illegible]	Eucalyptus	Eucalyptus globulus	[illegible]	[illegible]	1	4	[illegible]	[illegible]	[illegible]	[illegible]	4	East	M	Fair	Fair	[illegible]	[illegible]	20-40	C1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	Fig	Ficus carica	[illegible]	[illegible]	1	-	[illegible]	[illegible]	[illegible]	-	-	North	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Cypress	Chamaecyparis sp	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	-	1	-	M	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	4
[illegible]	[illegible]	Prunus	Prunus sp	[illegible]	[illegible]	[illegible]	4	4	4	4	[illegible]	[illegible]	East	M	Fair	Poor	[illegible]	None	10-20	C1	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Good	None	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	1	4	4	4	4	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	C2	[illegible]	4
[illegible]	[illegible]	Sycamore	Acer pseudoplatanus	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	20-40	C2	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	4	4	4	4	[illegible]	[illegible]	North	M	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	[illegible]
[illegible]	[illegible]	Prunus	Prunus sp	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	North	M	Good	Good	[illegible]	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	Y	Good	Good	Limited rooting environment	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	4	4	[illegible]	[illegible]	[illegible]	[illegible]	West	Y	Good	Good	Limited rooting environment	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	4	[illegible]	4	[illegible]	[illegible]	[illegible]	North	Y	Fair	Poor	Stem damage [illegible]	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	Y	Fair	Fair	Limited rooting environment	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	North	Y	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	Y	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	4	4	4	[illegible]	[illegible]	[illegible]	North	EM	Good	Fair	Limited rooting environment	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	4	4	4	4	1	-	North	EM	Fair	Fair	[illegible]	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	-	1	North	EM	Fair	Fair	[illegible]	None	10-20	C2	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	East	EM	Good	Fair	[illegible]	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	East	Y	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	Y	Poor	Fair	Limited rooting environment	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	-	1	North	EM	Fair	Poor	Poor form	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Alder (Common)	Alnus glutinosa	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	North	EM	Fair	Fair	None	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	Alder (Common)	Alnus glutinosa	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	-	1	North	Y	Fair	Fair	None	None	10-20	C1	[illegible]	1
[illegible]	[illegible]	Alder (Common)	Alnus glutinosa	[illegible]	[illegible]	1	1	[illegible]	1	1	-	1	West	Y	Fair	Fair	None	None	10-20	C1	[illegible]	1
[illegible]	[illegible]	Ash (Common)	Fraxinus excelsior	4	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	West	Y	Poor	Poor	[illegible]	None	<10	U	[illegible]	1

Key to Notations						
		Age Class		Condition	Category Grading	
Stem Dia.	Stem diameter (mm) at 1.5m above ground level	Y	Young	First 1/3rd of life expectancy	Category	ULE / Sub category
C.C.	Height of crown clearance above ground level	EM	Early Mature	Second 1/3rd of life expectancy	A – High Quality & Value	40+ / 1 Mainly arboricultural value
L.B.	Lowest branch height in metres	M	Mature	Final 1/3rd of life expectancy	B – Moderate Quality & Value	20-40 / 2 Mainly landscape value
C.L.B.	Direction of Lowest branch	OM	Over Mature	Beyond life expectancy, in natural decline	C – Low Quality & Value	10-20 / 3 Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	Great age & girth, high conservation value	U – [illegible]	<10
Physiological condition	Good	No significant health problems	Fair	Symptoms of health that can be remediated	Poor	Significant ill health
Structural condition	Good	No significant defects	Fair	Significant defects that can be remediated	Poor	Significant defects with no remedy

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	S	E	W	CC (m)	LB (m)	CLB (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
111	T111	Horse Chestnut	Aesculus hippocastanum	8	220	1	3	4	3	3	-	1	West	EM	Poor	Poor	Stem decay	None	<10	U	22	3
112	T112	Ash (Common)	Fraxinus excelsior	8	180	1	3	3	3	3	-	1	West	EM	Fair	Poor	Self seeded on edge of [illegible]	None	<10	U	15	2
113	T113	Ash (Common)	Fraxinus excelsior	12	370	1	5	4	6	5	2	2	West	EM	Good	Fair	Good form [illegible]	None	20-40	B1	64	5
114	T114	Alder (Common)	Alnus glutinosa	3.5	100	1	2	2	2	2	1	2	West	Y	Fair	Fair	None	None	10-20	C1	5	1
115	T115	Alder (Common)	Alnus glutinosa	3.5	120	1	2	2	2	2	1	2	North	Y	Fair	Fair	None	None	10-20	C1	7	2
116	T116	Alder (Common)	Alnus glutinosa	3.5	100	1	1	1	1	1	1	1	East	Y	Fair	Fair	None	None	10-20	C1	5	1
117	T117	Alder (Common)	Alnus glutinosa	3	130	1	1	1	1	1	1	1	East	Y	Fair	Fair	None	None	10-20	C1	7	2
118	T118	Horse Chestnut	Aesculus hippocastanum	3.5	110	1	2	2	2	2	2	2	North	Y	Fair	Fair	None	None	10-20	C1	5	1
119	T119	Prunus	Prunus sp	7	150	1	4	4	4	3	2	2	North	EM	Poor	Fair	Poor form	None	10-20	C1	10	2
120	T120	Alder (Common)	Alnus glutinosa	6	164	2	3	3	3	3	1	2	West	Y	Fair	Fair	Twin stem	None	10-20	C1	14	2
121	T121	Oak	Quercus sp	5	70	1	1	1	1	1	2	2	West	Y	Good	Good	None	None	20-40	C1	2	1
126	T126	Norway Maple	Acer platanoides	7	280	1	4	3	3	3	2	2	North	EM	Fair	Fair	None	None	20-40	B1	35	3
127	T127	Oak	Quercus sp	8	240	1	5	4	5	5	1	2	East	EM	Good	Fair	None	None	20-40	B1	28	3
128	T128	White Willow	Salix alba	12	600	2	4	5	6	6	1	1	East	OM	Fair	Poor	Co-dominant stem decay	None	<10	U	232	8
151	T151	Lime	Tilia sp	15	550	1	6	5	7	5	1	2	North	M	Good	Good	None	None	20-40	B1	162	7
152	T152	Red Horse Chestnut	Aesculus x carnea	12	540	1	6	7	6	6	1	2	West	M	Fair	Fair	Stem decay/Canker	None	10-20	C1	127	7
153	T153	Lime	Tilia sp	21	700	1	7	6	7	7	2	2	North	M	Good	Good	Minor deadwood [illegible]	None	20-40	B1	224	8
154	T154	Locust Tree / False Acacia	Robinia pseudoacacia	16	880	1	6	5	7	7	2	2	East	M	Good	Good	Good example of species	None	40+	A1	346	11
155	G155	Locust Tree / False Acacia	Robinia pseudoacacia	12	300	1	3	3	3	3	1	2	North	EM	Good	Good	[illegible]	None	20-40	B2	35	3
156	T156	Lime	Tilia sp	22	700	1	6	6	6	6	2	2	North	M	Good	Good	None	None	20-40	B1	220	8
157	T157	London Plane	Platanus x hispanica	24	1100	1	4	4	4	4	2	2	West	M	Good	Good	Good example of species	None	20-40	B1	402	12
158	T158	Norway Maple	Acer platanoides	10	330	1	4	4	5	5	2	2	North	EM	Good	Good	[illegible]	None	40+	B1	70	5
159	G159	Locust Tree / False Acacia	Robinia pseudoacacia	16	1150	1	10	7	7	5	2	2	West	OM	Good	Fair	Stem decay [illegible]	None	<10	U	598	14
160	T160	Oak (common)	Quercus robur	8	320	1	3	4	3	3	1	-	North	EM	Good	Fair	Twin stem from ground	None	20-40	B1	46	4
161	T161	Hawthorn	Crataegus sp	5	400	1	1	1	1	1	2	2	East	M	Fair	Fair	Poor form	None	10-20	C1	73	5
162	T162	Oak (common)	Quercus robur	7	270	1	2	3	3	3	-	1	North	EM	Good	Good	Good prospect	None	40+	B1	33	3
163	T163	Sycamore	Acer pseudoplatanus	5	300	1	2	2	2	2	-	1	North	M	Fair	Fair	Offsite	None	10-20	C1	41	4
164	T164	Sycamore	Acer pseudoplatanus	4	100	1	2	2	2	2	-	1	North	Y	Fair	Poor	Self seeded in fence [illegible]	None	10-20	C1	5	1
165	G165	Sycamore	Acer pseudoplatanus	4	110	1	2	2	2	2	-	1	North	Y	Fair	Poor	Self seeded in fence	None	10-20	C1	10	2
166	T166	Sycamore	Acer pseudoplatanus	5	110	1	2	2	2	2	-	-	North	Y	Fair	Poor	Self seeded in fence	None	10-20	C1	10	2
167	G167	Sycamore	Acer pseudoplatanus	5	140	1	2	2	2	2	-	-	North	Y	Fair	Poor	Group of 3 self seeded in fence	None	10-20	C1	10	2
168	T168	Whitebeam	Sorbus aria	7	400	1	4	4	3	5	2	2	West	M	Fair	Fair	Ivy [illegible]	None	10-20	C1	73	5
169	T169	Prunus	Prunus sp	4.5	180	1	3	3	3	3	1	2	East	M	Fair	Fair	None	None	10-20	C1	10	2
170	T170	Oak (common)	Quercus robur	14	800	1	10	8	8	8	2	2	West	M	Good	Good	Good example of species	None	40+	A1	290	10
171	T171	Sycamore	Acer pseudoplatanus	11	480	1	6	6	7	7	2	2	West	M	Good	Good	None	None	20-40	B1	103	6
172	G172	Sycamore	Acer pseudoplatanus	12	400	1	3	3	3	3	-	1	North	M	Fair	Fair	Group of 3 [illegible]	None	20-40	C2	73	5

Key to Notations									
		Age Class		Criterion	Category Grading				
					Category		ULE	Sub category	
Stem Dia.	Stem diameter (mm) at 1.5m above ground level	Y	Young	1st 1/3rd of life expectancy	A	High Quality & Value	40+	1	Mainly arboricultural value
C.C.	Height of tree crown clearance above ground level	EM	Early Mature	2nd 1/3rd of life expectancy	B	Moderate Quality & Value	20-40	2	Mainly landscape value
L.B.	Lowest branch height in metres	M	Mature	Final 1/3rd of life expectancy	C	Low Quality & Value	10-20	3	Mainly cultural value
D.L.B.	Direction of Lowest branch	OM	Over Mature	Beyond life expectancy but in reduced state	U	Dead, dying or dangerous	<10		
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	Great age & girth high conservation value					
Physiological condition	Good	No significant health problems		Fair	Symptoms of health that can be remedied	Poor	Significant ill health		
Structural condition	Good	No significant defects		Fair	Significant defects that can be remedied	Poor	Significant defects with no remedy		

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LB (m)	DLB (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
[illegible]	[illegible]	Horse Chestnut	Aesculus hippocastanum	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	M	Fair	Good	None	None	20-40	B1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	OM	Poor	Poor	[illegible]	None	<10	U	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	West	M	Good	Good	None	None	10-20	C1	[illegible]	[illegible]
[illegible]	[illegible]	Purple Plum	[illegible]	[illegible]	[illegible]	1	4	[illegible]	4	1	1	[illegible]	West	M	Fair	Fair	None	None	10-20	C1	[illegible]	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	North	M	Good	Good	[illegible]	None	20-40	B1	[illegible]	[illegible]



LEGEND

Category A trees
T1

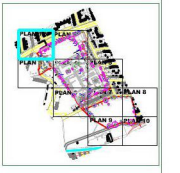
Category B trees
T1

Category C trees
T1

Category U trees
T1

Root Protection Area

Indicative Site Boundary



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TITLE: Tree Constraints Plan - Plan 1	
PROJECT SITE: Richmond College	
CLIENT: Cascade Consulting Ltd	
MAP REF: 3376/02/D14-1291	
REVISION: 2	
DATE: 26/11/14	SCALE: 1:500@A3
APPROVED BY: NB	PRODUCED BY: RD

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Appendix 15.3: Terrestrial Invertebrate Report

CASCADE

London Borough of Richmond upon Thames

Richmond upon Thames College Development

Terrestrial Invertebrate Survey Report

September 2014

In Association with:
Jonty Denton FRES FLS MIEEM
Albion Ecology

Client:	**London Borough of Richmond upon Thames**
Title:	**Richmond upon Thames College Development - Terrestrial Invertebrate Survey Report**
Project No:	**CC747**
Date of Issue:	**September 2014**
Status:	**FINAL**
Version No:	**1.0**

Produced By	**Authorised for Release By**
[redacted]	[redacted]
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Jonty Denton	**Dr Topsy Rudd**
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ISO 9001 REGISTERED FIRM

ISO 14001 REGISTERED FIRM

iema EIA

Contents

1 INTRODUCTION

1.1 BACKGROUND

Cascade Consulting was commissioned to undertake an updated Extended Phase 1 Habitat Survey of land surrounding the REEC Development, located off the A316 Chertsey Road, Richmond upon Thames (grid reference TQ 17375 72880) in support of a proposed planning application for the site and the recommendations in the Extended Phase 1 Habitat Survey Report (**Appendix 15.1** to Chapter 15 – Ecology).

1.2 PURPOSE OF REPORT

This report provides an assessment of the terrestrial invertebrate value of the REEC site, based on the habitats present and species identified during a walkover assessment. The habitats of value to terrestrial invertebrates within and adjacent to the site were identified, and inform the design of appropriate ecological mitigation and enhancement measures which can be incorporated within the scheme design. The report also considers whether further detailed surveys are required.

1.3 SURVEY AREA

The proposed development site is located in the London Borough of Richmond upon Thames (LBRuT). The site is bordered by the River Crane to the south, Duke of Northumberland's River to the west, A316 to the north and residential properties to the east. The site is located within the urban context of Twickenham, with residential properties surrounding the site.

The land incorporated within and immediately adjacent to the site identified in **Figure 1.1** was subject to field survey, and is referred to in this report as the 'survey area'. In addition, surrounding land up to 2km from the proposed development was subject to a desk-based searched, referred to as the 'study area', to provide contextual information about local ecological conditions.

1.4 PROTECTED SPECIES LEGISLATION

Although stag beetle *Lucanus cervus* are listed in Schedule 5 of the Wildlife and Countryside Act (as amended) 1981, their protection through this legislation is concerned with its trade in the UK.

The stag beetle is listed under Annex II of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. However, the species is not included within the Conservation of Habitats and Species Regulations (as amended) 2010. Consequently, it is possible to designate a Special Area of Conservation based on the presence of a significant population of the species,

however, they do not receive direct legal protection as a European Protected Species.

No other species of relevance to the assessment are afforded legal protection.

1.5 SURVEY AIMS AND OBJECTIVES

The overall survey aim was to assess the site's ecological importance for terrestrial invertebrates to highlight the presence of ecological constraints associated with the assemblage or abundance of populations present or species composition.

The specific objectives were to:

- review existing ecological information for the site;
- identify species present within the survey area;
- identify habitats of value to invertebrate species within the survey area.

Legend

Site Boundary

Existing Buildings

N

CASCADE

Not to scale

Note: All locations are approximate

Contains OS data © Crown Copyright 2015

Drawing Source: HoK Number PL-01

Project Title:
Richmond Education and Enterprise Campus Development

Figure Title:
Planning Application Boundary

For Information Only

Figure Number:	Date:
Figure 1.1	September 2015

2 METHODOLOGY

2.1 DESK STUDY

A number of web-based information sources were used to collate baseline information on terrestrial invertebrate species within the study area. This included consideration of designated sites in which invertebrate species form part of the designation and records of legally protected or ecologically significant species. The following information sources were used to collate the information:

- Multi-Agency Geographic Information for the Countryside website (www.magic.gov.uk);
- National Biodiversity Network (NBN) website (www.searchnbn.net)
- UK Biodiversity Action Plan (BAP) website (http://jncc.defra.gov.uk)
- London BAP website (www.lbp.org.uk)
- London Borough of Richmond upon Thames BAP website (www.richmond.gov.uk);
- Friends of the River Crane Environment website (www.force.org.uk).

2.2 FIELD SURVEY

A walkover survey of the survey area was undertaken on 14 August 2014 to determine which habitats were of value to terrestrial invertebrates and identify the species present. As it is impracticable to survey all the potential invertebrate species present within any given site, specific groups of species were examined. These groups are sufficiently well known to allow for meaningful comparisons to be made with other sites, both locally and nationally, and are important as indicators of the quality of a site and the habitats present[1].

The groups covered during the survey were:

- Mollusca (slugs and snails)
- Arachnida (spiders, harvestmen and pseudoscorpions)
- Isopoda (woodlice)
- Thysanura (bristletails)
- Ephermeroptera (mayflies)

[1] Brooks, S. J. (1993) Joint Committee for the Conservation of British Invertebrates: Guidelines for Invertebrate Surveys. *British Wildlife* 4 (5) pp 283-287.

- Odonata (dragonflies and damselflies)
- Plecoptera (stoneflies)
- Orthoptera (grasshoppers and crickets)
- Dictyoptera (cockroaches)
- Dermaptera (earwigs).

- Hemiptera-Heteroptera (true-bugs)
- Hemiptera-Homoptera (hoppers)
- Neuroptera (lace-wings)
- Mecoptera (scorpion-flies)
- Lepidoptera (butterflies and moths)
- Trichoptera (caddis flies)
- Diptera (true flies)
- Aculeate Hymenoptera (ants, bees and wasps)
- Coleoptera (beetles).

2.3 ASSESSMENT METHODOLOGY

In accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Assessment[2], the ecological value of the invertebrate interest at the site should be assessed based on the following geographic frame of reference:

- *International* - e.g. existing or warranting designation as a Special Area of Conservation (SAC) and/or of significant conservation status for Europe.
- *National* - e.g. existing or warranting designation as a Site of Special Scientific Interest (SSSI) and/or of significant conservation status for England.
- *Regional* - e.g. habitats or species valuable at a regional level and/or of significant conservation status for the South East of England.
- *Metropolitan* - e.g. existing or warranting designation as a Site of Metropolitan Importance for Nature Conservation (SMINC) and/or of significant conservation status for London.

[2] Institute of Ecology and Environmental Management (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom* (version 7 July 2006).

- *Borough* - e.g. habitats or species of significant conservation status for London Borough of Richmond upon Thames.
- *Local* - e.g. habitats or species of significant conservation status for Twickenham.
- *Within immediate survey area only* - e.g. habitats or species of conservation status for the site and immediate surrounding lands.

2.4 SURVEY LIMITATIONS

The timing of the survey was outside of the flight period of many species associated with rough grassland, such as that alongside Challenge Court. However, as this habitat falls outside of the study area this potential limitation is not considered to impact on the aims of the assessment.

3 RESULTS

3.1 DESK STUDY

3.1.1 Designated Sites

The following designated sites have been identified in the Extended Phase 1 Habitat survey as supporting significant assemblages, populations or species of invertebrates, although further considerations are identified for site selection only those relevant to invertebrates are listed here:

- **Isleworth Ait Local Nature Reserve** - several rare beetles and two rare species of mollusc;
- **Ham Lands Local Nature Reserve** - mosaic of habitat types attracting many butterfly species;
- **River Thames and Tidal Tributaries Site of Metropolitan Importance for Nature Conservation (SMINC)** - the numerous islands present support important invertebrate communities, including several nationally important snails;
- **Mogden Sewage Works Borough 1 Site of Importance for Nature Conservation (SINC)** - the site supports the nationally rare and declining phoenix fly;
- **Duke of Northumberland's River north of Kneller Road Borough 1 SINC** - the site has improved habitat provision for wildlife including invertebrates, which includes the banded demoiselle *Calopteryx splendens*.
- **The Copse, Holly Hedge Field & Ham Avenues Borough 2 SINC** - the site supports much dead wood that provides important habitat for insects;
- **Fulwell & Twickenham Golf Courses Borough 2 SINC** - the acid grassland present within the site provides habitat for the copper butterfly *Lycaena phlaeas*.
- **Strawberry Hill Golf Course Borough 2 SINC** - The site includes a triangle to the south-east which receives little disturbance and as a result is an important area for butterflies;
- **Teddington Cemetery Local SINC** - the presence of stonecrops *Crassulaceae* on many of the graves provides a valuable source of nectrr for invertebrates;
- **Twickenham Cemetery Local SINC** - the mixture of habitats present on site provide valuable habitats for butterflies, including the common blue *Polyommatus icarus*, meadow brown *Maniola jurtina*, gatekeeper *Pyronia tithonus* and speckled wood *Pararge aegeria*.

- **Inwood Park Local SINC** - the site provides important habitat for butterflies, including orange tip *Abnthocharis cardamines*, brimstone *Gonepteryx rhamni*, speckled wood and small tortoiseshell *Aglais urticae*.

3.1.2 Species

National Biodiversity Network Database

A search of the NBN database revealed the presence of 809 invertebrate species within the 10km grid square containing the proposed scheme. This included a total of 105 ecologically significant invertebrate species that includes three endangered species, 12 rare species, seven vulnerable species, 82 nationally notable species and one priority species. The full list of ecologically significant invertebrate species is included in **Appendix 1**.

Greenspace Information for Greater London

The relevant records of legally protected and ecologically significant invertebrate species for the study area provided by Greenspace Information for Greater London (GIGL) are provided in **Table 3.1**.

Table 3.1 Legally Protected and Ecologically Significant Invertebrate Species Present within the Study Area (from GIGL)

Species	Designation	Date	Proximity
Asiraca clavicornis	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Raglius alboacuminatus	Nationally notable B	2010	1.6km
Edwardsiana ishidai	Nationally notable B	2010	1.8km
Quedius (Microsaurus) scitus	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Stag beetle *Lucanus cervus*	Hab&Spp Dir Anx 2 NERC Sect. 41 UK BAP Priority London BAP Priority Nationally notable B Local Sp. of Cons Conc	2011	650m
Hawthorn Jewel Beetle *Agrilus (Anambus) sinuatus*	Nationally notable A Local Sp. of Cons Conc	2010	1km
Dasytes plumbeus	Nationally notable B	2010	1.8km
Adonis' Ladybird *Hippodamia (Adonia) variegata*	Nationally notable B Local Sp. of Cons Conc	2010	1.6km
Ischnomera cyanea	Nationally notable B Local Sp. of Cons Conc	2010	1.8km
Phytoecia cylindrica	Nationally notable B Local Sp. of Cons Conc	2010	1.8km

Species	Designation	Date	Proximity
Mallow flea bee *Podagrica fuscicornis*	Nationally notable B	2010	1.8km
Cossonus linearis	Nationally notable A Local Sp. of Cons Conc	2010	1.8km
White ermine *Spilosoma lubricipeda*	NERC Sect. 41 UK BAP Priority London BAP Priority Local Sp. of Cons Conc	2010	1.8km
Cinnabar *Tyria jacobaeae*	NERC Sect. 41 UK BAP Priority London BAP Priority Local Sp. of Cons Conc	2012	1.3km
Volucella ianis	Nationally notable Local Sp. of Cons Conc	2010	1.8km
Mintho rufiventris	Nationally notable	2010	1km
Brown ant *Lasius brunneus*	Nationally notable A Local Sp. of Cons Conc	2010	1.8km

Friends of the River Crane Environment

The Friends of the River Crane Environment (FORCE) have identified a number of invertebrate species that are commonly present along the River Crane corridor, although detailed species surveys have not been carried out. Butterflies such as peacock, comma, brimstone, holly blue and orange tip are abundant in the area. Less familiar species include the large skipper, scorpion flies and the rose chafer beetle.

3.1.3 Local Biodiversity Action Plan

The London Borough of Richmond upon Thames BAP identifies a number of terrestrial invertebrate species whose presence in the Borough is considered to be of ecological importance. These are listed in **Table 3.2**, the priority species are identified in bold and their inclusion within the UK and London BAP identified.

Table 3.2 BAP Invertebrate Species in the London Borough of Richmond upon Thames

	UK BAP	London BAP	LBRuT BAP
Stag Beetle *Lucanus cervus*	✓	✓	✓
Bumble Bee *Apidae*	✓[3]		✓
Small Copper Butterfly *Lycaena phlaeas*			✓
Dragonflies *Odonata*			✓
Cardinal Click Beetle *Ampedus cardinalis*			✓

3.2 WALKOVER SURVEY

The walkover survey concentrated on three main habitats on site, which were:

A. the grounds of Richmond upon Thames College;

B. rough grassland alongside Challenge Court; and,

C. the margins of the amenity grassland habitat (playing fields/parkland).

A total of 155 different species were identified within the survey area. The grounds of Richmond upon Thames College supported the greatest diversity of species present (97 species) with the parkland margins and rough grassland alongside Challenge Court supporting a good diversity of species (70 and 59[4] respectively). The full results are identified in **Table 3.3** below.

Table 3.3 Invertebrate Species Identified Within the Survey Area

Species	Status	Area		
		A	B	C
Rounded snail *Discus rotundatus*	Common	1	1	1
Large black slug *Arion ater*	Common		1	
Field slug *Deroceras reticulatum*	Common	1		1
Budapest snail *Tandonia budapestensis*	Common	1	1	1
Garden snail *Helix aspera*	Common	1	1	1
Lithobius forficatus (a centipede)	Common	1	1	
Oniscus asellus (a woodlouse)	Common	1	1	1
Philoscia muscorum (a woodlouse)	Common	1	1	1
Armadillium vulgare (a pill woodlouse)	Common	1	1	1
Harpactea hombergii (a spider)	Common	1		1
Mouse spider *Scotophaeus blackwallii*	Common	1		

[3] Large Garden bumblebee, great yellow bumblebee and short-haired bumble bee only.
[4] It is noted that the survey timing did not coincide with the flight times of some species typically associated with the habitat type, and therefore a greater species diversity would be expected.

Species	Status	Area		
		A	B	C
Ero aphana (a pirate spider)	Formerly RDB2	1		
Daddy long legs spider *Pholcus phalangoides*	Common	1		
Steatoda grossa (a comb-footed spider)	Common	1		
False black widow spider *Steatoda nobilis*	Local	1		
Anelosimus vittatus (a comb-footed spider)	Common	1		1
Paidiscura pallens (a comb-footed spider)	Common	1	1	
Enoplognatha ovata (a comb-footed spider)	Common	1	1	
Theridion tinctum (a comb-footed spider)	Common	1		
Linyphia triangularis (a money spider)	Common	1		
Lephthyphantes leprosus (a money spider)	Common	1		
Tetragnatha extensa (a long-jawed orb spider)	Common			1
Metallina segmentata (a long-jawed orb spider)	Common			1
Common garden spider *Araneus diadematus*	Common	1	1	1
Nuctenea umbratica (an orb weaver)	Common	1	1	1
Araniella cucurbitina (an orb weaver)	Common			
Zygiella x-notata (an orb weaver)	Common	1		
Pardosa pullata (a wolf spider)	Common			1
Nursery tent spider *Pisaura mirabilis*	Common	1		1
Labyrinth spider *Agelena labyrinthica*	Common			
Tegenaria gigantea (a house spider)	Common	1		
Nigma walckenaeri (a mesh-webbed spider)	Notable B	1		
Amaurobius fenestralis (a lace-webbed spider)	Common			1
Amarobius similis (a lace-webbed spider)	Common	1		
Philodromus albidus (a running crab spider)	Common	1		1
Philodromus dispar (a running crab spider)	Common	1		1
Tibellus oblongus (a running crab spider)	Common		1	
Misumena vatia (a crab spider)	Common		1	
Xysticus cristatus (a crab spider)	Common			
Zebra jumping spider *Salticus scenicus*	Common	1		
Sitticus pubescens (a jumping spider)	Common	1		
Dicranocephalus ramosus (a harvestman)	Common	1	1	1
Leiobunum rotundatum (a harvestman)	Common	1		1
Paroligolophus agrestis (a harvestmand)	Common	1		1
Southern Hawker *Aeshna cyanea*	Common		1	
Common darter *Sympetrum striolatum*	Common			1
Roesel's bush-cricket *Metrioptera roeselii*	Common			1
Southern oak bush cricket *Meconema meridionale*	Recent colonist	1	1	
Speckled bush-cricket *Leptophyes punctatissima*	Common	1		
Field grasshopper *Chorhippus brunneus*	Common		1	1
Meadow grasshopper *Chorthippus parallelus*	Common		1	
Common earwig *Foficula auricularia*	Common	1	1	1
Physatocheila dumetorum (a lacebug)	Common	1		

Species	Status	Area		
		A	B	C
Ivy lacebug *Derephysia foliacea*	Local	1		
Empicoris vagabundus (a thread legged bug)	Common	1		
Blepharidopterus angulatus (a plantbug)	Common	1		1
Deraeocoris lutescens (a plantbug)	Common	1		1
Tarnished plant bug *Lygus rugilipennis*	Common			1
Liocoris tripustulatus (a plantbug)	Common		1	1
Megacoelum beckeri (a plantbug)	Local	1		
Megacoelum infusum (a plantbug)	Common			1
Orthops kalmii (a plantbug)	Local		1	
Philphorus perplexus (a plantbug)	Common	1		
Campyloneura virgula (a plantbug)	Common	1		
Pinatilus cervinus (a plantbug)	Common	1		
Phytocoris tiliae (a plantbug)	Common			1
Orthotylus caprai (a plantbug)	Recent colonist	1		
Anthocoris confusus (an anthocorid bug)	Common	1	1	1
Anthocoris nemoralis (an anthocorid bug)	Common	1	1	
Anthocoris nemorum (an anthocorid bug)	Common		1	
Orius laevigatus (an anthocorid bug)	Common	1		
Kleidocerys resedae (a seed bug)	Common	1		1
Cypress seed bug *Orsillus depressus*	Common	1		
Coreus marginatus (a squash bug)	Common	1	1	1
Juniper shield bug *Elasmostethus tristriatus*	Common	1		
Elasmostethus interstinctus (a squash bug)	Common	1		1
Tritomegas sexmaculatus (a shield bug)	Recent colonist	1		
Green shield bug *Palomena prasina*	Common	1		1
Parent bug *Elasmucha grisea*	Common	1		
Ivy hopper *Issus coleoptratus*	Common	1		1
Fieberiella florii (a froghopper)	Recent colonist	1		
Common froghopper *Philaenus spumarius*	Common	1	1	1
Eurhadina concinna (a leafhopper)	Common	1		
Idiocerus albicans (a leafhopper)	Common	1		
Acericerus hevdenii (a leafhopper)	Recent colonist	1		
Cypress hopper *Liguropia juniperi*	Recent colonist	1		
Hornbeam leafhopper *Typhlocyba bifasciata*	Local	1		
Empoasca vitis (a leafhopper)	Common	1		
Tamarisk hopper *Opsius stactogalus*	Local			1
White poplar hopper *Zygina nivea*	Recent colonist	1		
Zyginella pulchra (a hopper)	Recent colonist	1		
Cacopsylla fulgularis (a psyllid bug)	Naturalised	1		
Floria variegata (a psyllid bug)	Naturalised	1		
Fig plant bug *Homotoma ficus*	Naturalised	1		
Pemphigus spyrothecae (an aphid)	Common			1

Species	Status	Area		
		A	B	C
Crambus lathoniellus (a crambid moth)	Common		1	
Firethorn leafminer *Phyllonorhycter leucographella*	Common	1		
Large white *Pieris brassiccae*	Common			1
Small white *Pieris rapae*	Common		1	
Common blue *Polyommatus icarus*	Common		1	
Red admiral *Vanessa atalanta*	Common			1
Small tortoiseshell *Aglais urticae*	Common			1
Peacock *Inachis io*	Common		1	
Silver Y *Autographa gamma*	Common			1
Chorisops tibialis (a soldier fly)	Common	1		
Marmalade hoverfly *Episyrphus balteatus*	Common	1	1	1
Narcissus bulb fly *Merodon equestris*	Common	1		
Sphaerophoria scripta (a hoverfly)	Common		1	
Syritta pipiens (a hoverfly)	Common		1	
Syrphus ribesii (a hoverfly)	Common		1	
Anomoia purmunda (a picture winged fly)	Common	1		
Flesh fly *Sarcophaga carnaria*	Common		1	1
Eriothrix rufomaculata (a tachinid fly)	Common		1	1
Lasius niger s.s. (an ant)	Common	1	1	1
Bicolored tree ant *Lasius brunneus*	Notable A			1
Ancistrocerus gazella (a vespid wasp)	Common			
Common wasp *Vespula vulgaris*	Common			1
Lasioglossum calceatum (a bee)	Common		1	1
Osmia rufa (a bee)	Common		1	
Megachile willughbiella (a bee)	Common		1	
Bombus lapidarius (a bumblebee)	Common		1	
Bombus lucorum agg (a bumblebee)	Common	1	1	1
Bombus pascuorum (a bumblebee)	Common		1	1
Bombus pratorum (a bumblebee)	Common		1	1
Hive bee *Apis mellifera*	Domesticated	1	1	1
Parasitic wasp *Ichneumon suspiciosus*	Common	1		
Black-clock *Pterostichus madidus*	Common			1
Harpalus affinis (a ground beetle)	Common			1
Common sun beetle *Amara aenea*	Common		1	
Tachyporus chrysomelinus (a rove beetle)	Common			1
Drusilla canaliculata (a rove beetle)	Common	1	1	1
Stag beetle *Lucanus cervus*	Notable B			1
Brachypterus glaber (a pollen beetle)	Common		1	1
Meligethes aeneus (a pollen beetle)	Common		1	1
Scymnus interruptus (a ladybird)	Local	1		
Rhyzobius chrysomeloides (a ladybird)	Local	1	1	
Rhysobius litura (a ladybird)	Common			

Species	Status	Area		
		A	B	C
Harlequin ladybird *Harmonia axydris*	Naturalised	1	1	1
Nephus quadrimaculatus (a ladybird)	Formerly RDB2	1		1
2-spot ladybird *Adalia bipunctata*	Common	1	1	1
10-spot ladybird *Adalia decempunctata*	Common	1		
7-spot ladybird *Coccinella septempunctata*	Common	1	1	1
14-spot ladybird *Propylea 14-punctata*	Common	1		
Cartodere bifasciata (a lathriid beetle)	Common	1		
Cartodere nodifer (a lathriid beetle)	Common	1		
Cis bilamellatus (a lathriid beetle)	Common	1		
Dacne rufifrons (a lathriid beetle)	Local	1		
Olibrus flavicornis (a phalacrid beetle)	RDBK		1	
Hairy wanderer *Lagria hirta*	Common	1		1
Psylloides dulcamarae (a flea beetle)	Common	1		
Aspidapion radiolus (a weevil)	Common		1	1
Malvapion malvae (a weevil)	Common		1	1
Protapion fulvipes (a clover weevil)	Common		1	
Sitona lineatus (a weevil)	Common	1	1	
Nedyus quadrimaculatus (a weevil)	Common			1
Total		**97**	**50**	**64**

Five species records are considered to be of particular note, which are:

- *Nigma walckaenaeri* (a mesh-webbed spider) - Nationally Scarce B species identified within the college grounds;
- *Ero aphana* (a pirate spider) - formerly a Red Data Book 2 species that should still be considered Nationally Scarce, identified on ivy along the southern edge of the college block;
- Bicolored tree ant *Lasius brunneus* - Nationally Scarce A species, which was frequent across the survey area on a wide variety of trees;
- Stag beetle *Lucanus cervus* - Nationally Scarce B species that is not uncommon in suburban Greater London, adult female and larvae found on separate tree stumps along southern boundary; and,
- *Nephus quadrimaculatus* (a ladybird) - formerly a Red Data Book 2 species that should still be considered Nationally Scarce, present within the college grounds and park margins.

In addition to these, the presence of bumblebee *Bombus* species are of local conservation concern, as identified in both the LBRuT and UK BAPs, which also list stag beetle as a priority species along with the London BAP.

4 DISCUSSION AND RECOMMENDATIONS

The shrubs and plants growing on the college grounds yielded a diverse assemblage with numerous recently established naturalised species as well as local natives that are of individual conservation concern. The Cypress *Cupressocyparis lelandii* trees within the college grounds yielded the formerly scarce mired bug *Megacoelum beckeri,* which was formerly restricted to heathland pines, but appears to have adapted to life on cypress trees.

Peripheral trees along the southern edge of the site boundary supported the stag beetle and bicolored ant, both species of conservation concern. The stag beetle were associated with the rotting stumps of trees whilst the bicolored ant was associated with cavities in the trunks and braches of trees, both living and dead.

Considering the species present and the assemblage of species present in each location, the presence of terrestrial invertebrate species are considered to be of **local biodiversity value**.

Further survey of the survey area is not considered to be necessary, as the assessment has identified key areas of habitat for terrestrial invertebrates that is sufficient to inform the design and implementation of any mitigation measures through the Ecological Impact Assessment process.

APPENDIX 1

Table A1 Ecologically Significant Invertebrate Species within the 10km Grid Square containing the Scheme

Scientific Name	Common Name	Status
Abdera biflexuosa		Nationally Notable B
Abdera flexuosa		Nationally Notable B
Abdera quadrifasciata		Nationally Notable A
Abraeus granulum		Nationally Notable A
Ampedus cardinalis	Cardinal Click Beetle	Vulnerable
Anacaena bipustulata		Nationally Notable B
Anaglyptus mysticus		Nationally Notable B
Anisoxya fuscula		Nationally Notable A
Anitys rubens		Nationally Notable B
Anobium inexspectatum		Nationally Notable B
Anthocoris visci		Nationally Notable B
Auplopus carbonarius		Nationally Notable B
Cassida nobilis		Nationally Notable B
Chorisops nagatomii	Bright Four-spined Legionnaire	Nationally Notable
Chrysolina oricalcia		Nationally Notable B
Cleptes nitidulus		Nationally Notable A
Cleptes semiauratus		Nationally Notable B
Clitostethus arcuatus		Endangered
Colydium elongatum		Rare
Conopalpus testaceus		Nationally Notable B
Corticaria alleni		Nationally Notable
Cryptarcha strigata		Nationally Notable B
Ctesias serra	Cobweb Beetle	Nationally Notable B
Diodontus insidiosus		Rare
Donacia sparganii		Nationally Notable A
Dorcatoma flavicornis		Nationally Notable B
Drino lota		Nationally Notable
Elater ferrugineus		Endangered
Eledona agricola		Nationally Notable B
Enicmus brevicornis		Nationally Notable
Enicmus rugosus		Nationally Notable
Enochrus melanocephalus		Nationally Notable B
Ephemera lineata		Vulnerable
Ferdinandea ruficornis		Nationally Notable
Gonocerus acuteangulatus	Box Bug	Endangered
Gymnosoma rotundatum		Rare
Gyrinus urinator		Nationally Notable B
Hedychridium coriaceum		Rare
Hedychridium cupreum		Nationally Notable B

Scientific Name	Common Name	Status
Hedychrum niemelai		Rare
Helochares lividus		Nationally Notable B
Helochares punctatus		Nationally Notable B
Hydaticus seminiger		Nationally Notable B
Hydrochus angustatus		Nationally Notable B
Hydroglyphus geminus		Nationally Notable B
Hydrovatus clypealis		Nationally Notable A
Iassus scutellaris		Nationally Notable A
Ischnomera cyanea		Nationally Notable B
Lasius brunneus	Brown Ant	Nationally Notable A
Lucanus cervus	Stag Beetle	Nationally Notable B
Lymexylon navale		Vulnerable
Macropis europaea		Nationally Notable A
Malthinus frontalis		Nationally Notable B
Megatoma undata		Nationally Notable B
Melasis buprestoides		Nationally Notable B
Melitta tricincta		Nationally Notable B
Microdynerus exilis		Nationally Notable B
Mycetophagus piceus		Nationally Notable B
Mycetophagus quadriguttatus		Nationally Notable A
Mythimna turca	Double-line	Priority Species
Nephus quadrimaculatus		Vulnerable
Nomada flavopicta		Nationally Notable B
Nomada fucata		Nationally Notable A
Nomada fulvicornis		Rare
Nomada hirtipes		Rare
Nomada lathburiana		Rare
Nysson dimidiatus	Small Spurred Digger Wasp	Nationally Notable B
Nysson trimaculatus		Nationally Notable B
Oligota apicata		Nationally Notable
Opilo mollis		Nationally Notable B
Orchesia micans		Nationally Notable B
Oxycera morrisii	White-barred Soldier	Nationally Notable
Peltodytes caesus		Nationally Notable B
Philanthus triangulum	Bee Wolf	Vulnerable
Phloiotrya vaudoueri		Nationally Notable B
Platypus cylindrus	Pinhole Borer	Nationally Notable B
Ponera coarctata	Indolent Ant	Nationally Notable B
Prionocyphon serricornis		Nationally Notable B
Prionus coriarius	Tanner Beetle	Nationally Notable A
Prionychus ater		Nationally Notable B
Procraerus tibialis		Rare
Psenulus schencki		Nationally Notable A

Scientific Name	Common Name	Status
Psilota anthracina		Vulnerable
Pyrochroa coccinea	Black-headed Cardinal Beetle	Nationally Notable B
Scolytus mali	Large Fruit Bark Beetle	Nationally Notable B
Solva marginata	Drab Wood-soldierfly	Nationally Notable
Sphecodes crassus		Nationally Notable B
Sphecodes miniatus		Nationally Notable B
Sphecodes niger		Rare
Sphecodes reticulatus		Nationally Notable A
Sphindus dubius		Nationally Notable B
Stelis punctulatissima		Nationally Notable B
Stenelmis canaliculata		Vulnerable
Stratiomys potamida	Banded General	Nationally Notable
Stratiomys singularior	Flecked General	Nationally Notable
Synchita humeralis		Nationally Notable B
Synchita separanda		Rare
Tillus elongatus		Nationally Notable B
Tiphia minuta	Small Tiphia	Nationally Notable B
Tomoxia bucephala		Nationally Notable A
Trinodes hirtus		Rare
Tychius pusillus		Nationally Notable B
Vanoyia tenuicornis	Long-horned Soldier	Nationally Notable
Volucella inanis		Nationally Notable
Volucella zonaria		Nationally Notable

Appendix 15.4: Ecological Impact Characterisation

ECOLOGICAL IMPACT CHARACTERISATION

Site Enabling, Demolition and Construction

Predicted Effects – Designated Sites

Habitat Loss and Fragmentation

The proposed development does not fall within or immediately adjacent to any statutory or non-statutory designated site, and therefore there will be no habitat loss or fragmentation as a result. No impacts on the adjacent SLINCs are anticipated.

Habitat Deterioration

Adverse effects upon designated sites could occur as a result of habitat deterioration, reducing its suitability to support significant species or inhibit its ecological function. Habitat deterioration can occur as a result of dust generation, noise generation, lighting, the encroachment of construction activities and water quality and run-off.

The generation of noise has the potential to influence the ecological functioning of habitats associated with both the Twickenham Junction Rough SLINC and Duke of Northumberland's River south of Kneller Road Borough II SINC. However, modelling results identified in Chapter 8: Noise and Vibration identify that impacts are likely to be very small or imperceptible. Noise levels calculated in the vicinity of the Duke of Northumberland's River, at Gladstone Close on the far side to the Proposed Redevelopment, were identified as comprising a **negligible** increase in noise levels. Noise levels at the closest receptor to the Twickenham Junction Rough SLINC, on Craneford Way, show a moderate impact for the first nine months with a negligible impact for the remaining time. As a result, the impact of noise upon the Twickenham Junction Rough SLINC is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Although dust, generated during the demolition and construction phases, has the potential to adversely affect sensitive habitats, the level of deposition would need to be severe before adverse effects are realised. The Design Manual for Roads and Bridges[1] summarises the sensitivity of floral species to dust deposition, identifying that the most sensitive species appear to be affected by dust deposition at levels above 1,000mg/m^3/day. Put into context, this is a level five times greater than that at which dust deposition may start to cause a perceptible nuisance to humans and

[1] Design Manual for Roads and Bridges (2007) Volume 11, Section 3, Part 1, Air Quality. Appendix F. DMRB, May 2007.

comprises the most sensitive species, with others tolerable of a level much greater than this. The likely zone of influence of dust impacts is identified in guidance provided by the Institute on Air Quality Management[2], which identifies 50m from the boundary of the site, plus 50m from haulage routes used by construction vehicles for up to 500m from the site, is appropriate screening criteria for detailed assessment of impacts from construction and demolition sites. Therefore, the scheme has potential to impact upon Twickenham Junction Rough Local SINC and the Duke of Northumberland's River south of Kneller Road Borough II SINC. The impact of dust upon these designated sites is considered to represent a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The provision of lighting during the construction phase has the potential to adversely affect nearby designated sites where light is allowed to spill beyond the development site. Given the small extent of the proposed works, the impact is likely to be fairly limited. Therefore, the impact of lighting on designated sites is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The main drainage, both foul and surface water, connects to the Thames Water sewer located in Craneford Way. As a result, impacts associated with water quality and run-off from the main college site are not considered likely to cause adverse effects upon any of the designated sites. However, construction activities associated with the upgrade to the playing fields and footpath to the south of Craneford Way could give rise to impacts upon the River Crane at St. Margarets Borough II SINCs.The conversion of the playing fields into artificial surfaces could result in a significant area of soil being exposed alongside the River Crane. The risk of soils being washed into the adjacent River Crane is dependent upon the timing of works and period of exposure; however the discharge of significant volumes of sediment could cause adverse effects on the designated site downstream. Similarly, the risk of impact associated with a release of pollutant materials would be limitedrelatively small as the works are unlikely to require significant numbers of machinery for long-periods of time.

Works on the junction of Langhorn Drive and the A316 could also potentially give rise to discharge of sediments and pollutants to the Duke of Northumberland's River. There may also be a need to dispose of groundwater pumped out during dewatering of excavations. This could potentially cause deterioration of the River Crane at St.

[2] Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction.* IAQM, London.

Margaret's Borough II SINC and the Duke of Northumberland's River south of Kneller Road Borough II SINC and Duke of Northumberland's River north of Kneller Road Borough I SINC as a result of potential impacts to water quality.

Such pollution impacts on these borough-designated river habitats are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **borough scale** with **probable likelihood**. This equates to a **moderate adverse effect**.

Predicted Effects – Non-designated Habitat

Considering the urban context of the site, the majority of the development area comprises building and landscaping associated with the college with semi-natural habitats of greater biodiversity value typically in the adjacent habitats.

Habitat Loss and Fragmentation

Clearance of the development site will result in the loss of around 70 scattered trees, with the remainder of the potentially sensitive habitats falling outside the development boundary. The scattered trees located along the A316 (northern boundary), Marsh Farm Lane (western boundary) and Craneford Way sports pitches to the South are likely to be retained, with those located within the development boundary to be felled as part of the scheme. The trees within the development area are considered to be of lower biodiversity value, as they do not provide significant habitat for breeding birds, and are typically of amenity value to the college only. Therefore, the loss of scattered trees within the development boundary is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **minor adverse effect**.

The development will not, however, result in fragmentation of habitats. The River Crane corridor to the south and Duke of Northumberland's River to the west comprise the main ecological corridors in the local area, and no habitat loss associated with the development is anticipated in these locations as part of the scheme. The likely retention of the scattered trees along the A316 and Marsh Farm Lane will also prevent any fragmentation of habitats. Therefore, adverse effects associated with habitat fragmentation are **negligible**.

Habitat Deterioration

Adverse effects may also arise as a result of indirect deterioration of habitats, which may occur as a result of the generation of dust, noise, air quality effects, the encroachment of construction activities or water quality and run-off effects.

As previously identified, the level of deposition of dust would need to be severe before adverse effects upon floral species are realised and the IAQM guidance[3] provides guidance on the zone of influence of dust generation: 50m from the site and 50m from haulage routes for up to 500m from the site. Each of the sensitive habitats identified fall within this zone of influence: River Crane, Duke of Northumberland's River, Urban Greenspace BAP habitat, broadleaved semi-natural woodland, poor-semi-improved grassland and scattered trees. However, considering the susceptibility of floral species to dust, any such impact is considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The incursion of plant or personnel into retained habitat could result in deterioration of habitat quality. The retained trees around the periphery of the site are at greatest risk, with construction activities having the potential to cause damage through severance of roots or through collision. However, the landscaping principles set out in the Design Code submitted as part of the OPA include provision for protection of the existing trees along the A316 and Egerton Road, including protection of the root areas of the trees. The magnitude of such an impact is considered likely to be less than the habitat loss.. Incursion of plant into other sensitive habitats is considered unlikely, due to the presence of a significant boundary (e.g. the wall separating the Craneford West playing fields, and fencing along the River Crane). Consequently, retained habitat encroachment impacts from construction activities relate to scattered trees and are considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. Such effect is considered to comprise a **negligible effect**;

As previously identified, the main drainage, both foul and surface water, connects to the Thames Water sewer located in Craneford Way. Therefore, impacts associated with water quality and run-off from the main college site are not considered likely to adversely affect the identified sensitive habitats. However, upgrade of the sports pitches in Craneford Way does pose a risk to the River Crane with regards to run-off and potential pollution events, as previously discussed. The discharge of sediments through run-off are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. The discharge of pollutants into the River Crane is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **unlikely**

[3] Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*. IAQM, London.

probability. Both are considered to comprise **minor adverse effects**.

Predicted Effects – Species

Habitat Loss

The loss of scattered trees, dense scrub and amenity planting within the college grounds has the potential to impact upon the breeding bird assemblage. However, only the peripheral habitats on the College site were identified in the baseline as being of value. Most of the habitat of value to breeding birds is likely to be retained, notably the mature trees along the A316 and Marsh Farm Lane, and key habitats adjacent to the site will remain, notably the riparian habitats of the Duke of Northumberland's River, Craneford Way West playing field and Challenge Court. The loss of habitat for breeding birds within the Site is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **negligible effect**.

The development will not result in the loss of bat roosting habitat, with no active roosts identified and an absence of activity in areas supporting potential roosting structures. The main commuting routes were identified as along the row of mature trees along the A316 to the north, the Duke of Northumberland's River to the west and the River Crane/railway corridor to the south. All of these features will be retained, and therefore impacts to bats associated with habitat loss will be avoided.

However, the loss of habitat associated with the conversion of the playing fields alongside the A316 and conversion of part of Craneford Way East playing fields to artificial surfaces has the potential to impact upon the foraging resource for bats. This is considered to represent a **medium magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The loss of amenity grassland in the development area will reduce the extent of suitable foraging habitat for hedgehog and the loss of dense landscape shrub planting within the College site could result in the loss of nesting opportunities. Hedgehogs, however, can occupy overlapping home ranges of 10 to 40 hectares[4] and generally show a preference to urban green spaces with structures, over lawn without structures[5]. Consequently, the loss of habitat is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is

[4] Morris, P. A. and Reeve, N. J. (2008) Hedgehog *Erinaceus europaeus*. In: Harris, S. and Yalden, D. W. (Eds) Mammals of the British Isles: handbook. Mammal Society, Southampton.Pages 241-248

[5] Braaker, S., Moretti, M., Boesch, R., Ghazoul, J., Obrist, M. K. and Bontadina, F. (2014) Assessing habitat connectivity for ground-dwelling animals in an urban environment. *Ecological Applications* 24 (7) pp 1583 - 1595.

significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The development will result in the loss of habitat for invertebrate species, with the College grounds supporting the greatest diversity of species including three nationally scarce species and the amenity grassland margins supporting a good diversity of species including three nationally scarce species. Considering the scale of redevelopment of the site, some of the existing vegetation important for the diversity of invertebrate species and presence of significant species will be removed during vegetation clearance. The amenity grassland margins are also an important habitat for invertebrate species, supporting a good diversity and the presence of three nationally scarce species in the field to the south of the College. Although the amenity grassland areas will be subject to a loss of habitat, the margins will receive some protection, with marginal habitat along the College's northern boundary and surrounding the Craneford Way pitches likely to be retained. Significant habitat supporting stag beetle along the River Crane will also be retained. The impact of habitat loss upon the invertebrate community is considered to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The likely retention of suitable habitat within the development area for stag beetle, the bicolored tree ant and *Nephus quadrimaculatus* will prevent the loss of the species within the local area. Although the presence of *Nigma walckaenaeri* and *Ero aphana* was restricted to habitat due to be lost as a result of the development, the habitat requirements are relatively common and therefore relocation in the local area is considered likely. As a result, the impact upon these species is considered to comprise a **low magnitude**, **short-term**, **temporary**, **single-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Habitat Fragmentation

Direct impacts on species associated with habitat fragmentation are considered unlikely, as the significant linear vegetation along the A316 and River Crane and mature trees on Marsh Farm Lane are likely to be retained. Therefore, impacts upon the movement of species, including bat commuting routes, will not be fragmented as a result of the development and will be **negligible**.

Although direct impacts associated with habitat fragmentation are unlikely, lighting of the development site during the site enabling, construction and demolition phases of the scheme will have the potential to cause a fragmentation effect for certain species. The spillage of light into boundary vegetation would be of particular concern

where commuting bat activity was identified, notably the row of mature trees along the northern boundary and the River Crane along the southern boundary of the site. Although the species identified in the baseline will readily use open space habitats[6] and may be attracted to white mercury street lighting for feeding[7], it can be particularly harmful when used in areas associated with foraging or commuting bats[8]. Considering the phasing of the development, the most significant impact would occur in the preparatory works, when the site access route and upgrade of the sports pitches run concurrently. Consequently, such an effect is considered to comprise a **medium magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The fragmentation effect as a result of lighting may also be a significant effect for hedgehog, as urban green spaces are important for the movement of hedgehog[9] and persistence of a population[10,11]. The Craneford Way East playing field provides the greatest opportunity for movement of hedgehog, with suitable habitat present in Craneford Way West field, Challenge Court and along the River Crane. With construction activities in the two main amenity grassland areas occurring concurrently during the preparatory phase, impacts will be greatest at this stage, with operational impacts influencing thereafter. Consequently, the indirect fragmentation of hedgehog habitat is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Habitat Improvement

Habitat enhancement for bats is proposed through the provision of bat roosting boxes or the incorporation of enclosed bat boxes into the external brickwork of new buildings. The impact of the habitat enhancement is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **beneficial** residual effect that is significant **within the zone of influence only** with **likely probability**. This equates to a **minor beneficial** effect.

Further habitat enhancement proposed for the Site includes the provision of

[6] Altringham, J. (2003) *British Bats*. New Naturalist Publication.

[7] Rydell, J. and Racey, P. A. (1993) *Street lamps and the feeding ecology of insectivorous bats*. Recent Advances in Bat Biology. Zoological Society of London Symposium abstracts.

[8] Bat Conservation Trust (2009) Bats and Lighting in the UK. Bats and the Built Environment Series. BCT. London.

[9] Braaker, S., Moretti, M., Boesch, R., Ghazoul, J., Obrist, M. K. and Bontadina, F. (2014) Assessing habitat connectivity for ground-dwelling animals in an urban environment. *Ecological Applications* 24 (7) pp 1583 - 1595.

[10] Hodgson, J. A., Thomas, C. D., Wintle, B. A. and Moilanen, A. (2009) Climate change, connectivity and conservation decision making: back to basics. *Journal of Applied Ecology* 46 pp964 - 969.

[11] Doerr, V. A. J., Barrett, T. and Doerr, E. D. (2011) Connectivity, dispersal behaviour and conservation under climate change: a response to Hodgson *et al. Journal of Applied Ecology* 70 pp 33 - 46.

deadwood habitat or a loggery (a hole in the ground with logs upended in it) for stag beetle and other invertebrates in the south-east corner of the College playing fields alongside the River Crane. The impact of the habitat enhancement is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **beneficial** residual effect that is significant **within the zone of influence only** with **likely probability**. This equates to a **minor beneficial** effect.

Habitat Deterioration

The deterioration of habitats, as identified above, will have implications on the species utilising them. As discussed, the habitats are unlikely to be affected as a result of the deposition of dust at levels identified, and as a result impacts upon faunal species are likely to be **negligible**.

The deterioration of habitats associated with the incursion of plant or personnel has the potential to reduce the suitability of habitats to support species. Any loss of scattered trees on the edges of the development will reduce the suitability of the habitats for breeding birds, increasing competition amongst species in the remaining habitat and has the potential for adverse impacts on commuting bats as a result of any gaps created in linear features. The impact on each feature is considered to comprise:

- Breeding birds – a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.
- Bats – a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Impacts associated with the incursion of personnel into remaining habitats on the site are not considered likely to be significant, with impacts on supported species also unlikely to be significant.

Disturbance

- The breeding bird assemblage and abundance utilising peripheral habitats identified as being of value within the baseline are likely to be influenced as a result of the noise generated during the site enabling, demolition and construction phase. However, the significance of the impact is reduced as the surrounding habitat includes areas of vegetation that could support breeding bird species and are not subject to significant noise impacts. As a result, the impact of noise disturbance on breeding birds is considered to comprise **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is

significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Adverse effects from noise on bat foraging and commuting activity is not considered to be likely, as the prescribed working hours during the construction phase, as set out in Chapter 6 (Scheme for Assessment), avoids the period in which bat activity will occur. As a result, impacts on bats is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**. Similarly, adverse effects on hedgehog as a result of disturbance is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Mortality/Injury

Mortality/injury of bat species and common reptiles are considered to be unlikely, as the development site is not considered to be suitable for the presence of common reptiles and unlikely to support roosting bats. However, clearance of the site has the potential to impact upon breeding birds and hedgehog and significant invertebrate species. Although all invertebrate species within the development site are potentially at risk, the majority of the species present are not of sufficient biodiversity interest to be considered in their own right.

The removal of vegetation at certain times in the year has the potential to cause harm to or mortality of nesting birds. The clearance of trees, scrub and shrubs during the breeding season (March to August inclusive) has potential to impact nesting birds, dependent chicks or eggs. However, as the majority of the habitat within the development site that is likely to be removed is of lower value to breeding birds, the impact will be restricted to a low number of individuals. This is considered to represent a **low magnitude, medium-term, temporary, multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**. Nevertheless, such an effect would constitute a legal offence.

The removal of vegetation could impact upon hedgehog, which typically nest at the base of thick hedges, bushes, garden sheds or piles of rubbish, and are particularly sensitive between November and mid-March when they hibernate. Considering the likely home range of hedgehogs and an absence of sightings during field survey, the impact is likely to be restricted to a very low number of individuals. The impact on hedgehog is considered to comprise a **low magnitude**, **medium-term**, **temporary**, **multiple-event** and **adverse** effect that is significant **within the**

zone of influence only with **unlikely probability**. This equates to a **negligible effect**.

The removal of suitable vegetation could result in adverse impacts on significant invertebrate species, notably *Nigma walckaenaeri* and *Ero aphana*. However, as the species do not have specific habitat requirements that are not available in the wider environment, the impact upon the species are considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** effect that is **significant within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Spread of Invasive Species

Activities on the site, in particular vegetation removal as part of the demolition process, have the potential to spread invasive non-native floral species around the Site or to adjacent habitats. The risk of spreading wall cotoneaster is associated with the potential spread of seeds (red berries) or from node-rooting fragments of the plant. Although legislated, the primary concern for the species is the invasion of semi-natural habitat of high conservation value. In the urban environment, the species may provide a net benefit to the environment, as it provides a significant food resource for invertebrate and bird species. This is considered to represent a **neutral magnitude**, **long-term**, **single-event**, and **adverse effect** that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible** effect. Nevertheless, causing the species to spread or otherwise grow in the wild would constitute a legal offence.

Residual Effects – Designated Sites

Habitat Loss and Fragmentation

No impacts anticipated.

Habitat Deterioration

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat deterioration on the Twickenham Junction Rough SLINC. Therefore, the impact of habitat deterioration is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Incorporation of pollution prevention measures as identified in the mitigation measures will reduce the likelihood of sediment or pollutant discharge to the River Crane, and thus impacts on the River Crane at St. Margaret's Borough II SINCs, and

to the Duke of Northumberland's River south of Kneller Road Borough II SINC and Duke of Northumberland's River north of Kneller Road Borough I SINC. Furthermore, in the event that an incident should occur quick response as a result of the mitigation measures, such as appropriate location of spill kits and containment equipment, will reduce how much of the sediment/pollutant is discharged and therefore the magnitude of impact. As a result, the residual effect for both are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect**.

Residual Effects – Non-designated Habitats

Habitat Loss and Fragmentation

Scattered tree planting on the development site as part of the landscape design will provide some compensation for the loss of scattered trees during site clearance. As a result, the residual effect is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant **within the zone of influence only** with **certain/near-certain likelihood**. This equates to a **minor beneficial effect**.

Habitat Deterioration

By demarcating sensitive retained habitats and providing toolbox talks for site personnel, the likelihood of impacts associated with the encroachment of construction activities will be reduced. In the event that encroachment does occur, the demarcation and increased awareness should restrict the extent of encroachment and therefore magnitude of impact. As a result, the encroachment of construction activities upon all sensitive habitats are considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. Such effect is considered to comprise a **negligible effect**.

Incorporation of pollution prevention measures as identified in the mitigation measures will reduce the likelihood of sediment or pollutant discharge to the non-designated section of the River Crane. Furthermore, in the event that an incident should occur quick response as a result of the mitigation measures, such as appropriate location of spill kits and containment equipment, will reduce how much of the sediment/pollutant is discharged and therefore the magnitude of impact. As a result, the residual effect for both are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely**

probability. This equates to a **negligible effect**.

Residual Effects – Species

Habitat Loss

Scattered tree planting on the development site as part of the landscape design will provide some compensation for the loss of scattered trees during site clearance. This planting has the potential to compensate for the loss of habitat identified as being of value to breeding birds, with additional habitat provision along the River Crane potentially of greatest influence. As a result, the residual effect is considered likely to comprise a **neutral magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

The provision of suitable habitat planting within the Craneford Way East playing fields will provide some compensation for the loss of bat foraging habitat, with the aim of the planting to provide habitat for a greater diversity of invertebrate species on which bats will feed. However, the improvement here will not fully compensate for the loss of foraging habitat. As a result, the residual effect is considered likely to comprise a **low magnitude**, **long-term**, **permanent**, **single-event** and **adverse** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Further habitat enhancement for bats is proposed with the erection of bat boxes in peripheral vegetation or in buildings on the RREC site to improve roosting habitat provision locally. This will result in a residual effect that is considered likely to comprise a **low magnitude**, **medium-term**, **temporary**, **single-event** and **beneficial** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

The provision of suitable habitat planting within the development site will provide some compensation for the loss of habitat for invertebrates, with the aim of some planting to provide a diversity of floral species to attract a diversity of invertebrates. As a result, the residual effect on the invertebrate population is considered likely to comprise a **neutral magnitude**, **long-term**, **permanent**, **single-event** and **beneficial** residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

The provision of specific deadwood habitat/loggery within the development site will enhance habitat provision for stag beetle in line with the objectives of the local and regional Species Action Plans (SAPs). The residual effect of this is considered likely to comprise a **medium magnitude**, **long-term**, **permanent**, **single-event** and

beneficial residual effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor beneficial effect**.

Habitat Fragmentation

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat fragmentation upon bats. By ensuring the mature trees along the northern boundary remain unlit and ensuring periods of darkness are provided, commuting activity associated with these features will be able to continue. Therefore, the impact of fragmentation is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Similarly, the impact of lighting on the fragmentation of habitats for hedgehog is reduced by following best practice guidance. Therefore, such an effect is considered to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event**, and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Habitat Deterioration

By demarcating sensitive habitats and providing toolbox talks for site personnel, the likelihood of impacts associated with the encroachment of construction activities will be reduced. In the event that encroachment does occur, the demarcation and increased awareness should restrict the extent of encroachment and therefore magnitude of impact. As a result, the encroachment of construction activities upon all breeding birds and bats are considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. Such effect is considered to comprise a **negligible effect**.

Disturbance

The inclusion of mitigation measures will reduce the noise levels generated on site during all phases of the scheme, as demonstrated in Chapter 8: Noise and Vibration. As a result, the areas of habitat in which impacts are negligible are significantly increased, providing 'havens' in which bird species can continue breeding activity. As a result, the impact on breeding birds is considered to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Mortality/Injury

Control measures implemented through the CEMP will reduce the likelihood of impact associated with vegetation removal, by either avoiding key sensitive periods or undertaking the clearance in a specified manner. As a result, mortality/injury of breeding birds and hedgehog are considered likely to comprise a **low magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect** that is not significant.

The impact on significant invertebrates remains as predicted, with a **negligible effect**.

Spread of Invasive Species

Control measures implemented through the CEMP will prevent the spread of invasive non-native species around the site. As a result, the residual effect is considered likely to comprise a **neutral magnitude**, **short-term**, **temporary**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **very unlikely probability**. This equates to a **negligible effect** t.

Operation

Predicted Effects – Designated Sites

Habitat Deterioration

Lighting of the proposed development will have a relatively small zone of influence, with designated sites separated from the development site considered unlikely to be affected by such changes. However, given the proximity of the Twickenham Junction Rough Local SINC to the development site, changes to lighting levels could impact upon the designated site.

The increase in the educational and residential population within the Site could affect designated sites through use of the footpaths for commuting or recreational use. The number of staff and students at the College will be similar to those currently present, but the change in access arrangements with the REEC development (restriction on egress from the east side of college) and the opportunity to use a new footpath to the station through Twickenham Rough may alter current pedestrian routes.

The Duke of Northumberland's River south of Kneller Road Borough II SINC is located alongside a local footpath utilised for activities such as dog walking. In addition, a new footpath is to be built, by others and independent of this application, passing through the designated SLINC in Twickenham Rough. The approved

Twickenham Junction Rough scheme (ref: 13/1147/FUL) incorporating the footpath, did not consider it likely that increased recreational use would have a significant adverse impact on the SLINC. Pedestrian flows heading south / south east / south west (towards Twickenham Rough) or north / northeast (towards the Duke of Northumberland's River) from the REEC are summarised in the table below.

Estimated Footpath Use From REEC Development

Source	College		Secondary School		SEN School		Residential	
Time period	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)	AM (0800-0900)	PM (1600-1700)
Pedestrians (S/SE/SW)	778	195	245	53	12	4	63	49
% assumed likely to use Twickenham Rough footpath	50%		20%		20%		20%	
Numbers likely to use Twickenham Rough footpath	389	97	51	11	2	1	13	10
Pedestrians (N/NW)	216	54	57	12	2	1	15	12
% assumed likely to use Duke of Northumberland's River footpath	50%		50%		50%		50%	
Numbers likely to use Duke of Northumberland's River footpath	108	27	29	6	1	0	8	6

From this, it is estimated that approximately 455 people might use the footpath through Twickenham Rough in the AM peak and approximately 119 in the PM peak. The PM peak is less busy because of staggered finish times for schools, college students and residents.

The Twickenham Rough application for the footpath was approved by LBRuT in the knowledge that students from the existing college would be able use it to access Twickenham and the station[12], and this footfall would therefore have been taken into account. However, the altered access arrangements for REEC (no egress from the east side of the college grounds) will change the desire lines and may slightly increase the flows. It is not considered likely that this small potential increase over the numbers considered for the scheme (ref: 13/1147/FUL) would materially change the likely impact on Twickenham Rough.

It is estimated that approximately 146 people might use the footpath along the Duke of Northumberland's River in the AM peak and 39 in the PM peak. Figures for usage

[12] Subject to other developments being approved and completed

may be higher in summer in good weather and lower in winter. Students from the existing college are currently able to utilise these paths so the predicted increase may represent an overestimate On inspection in May 2015, the footpath along the river south of the A316 was overgrown and did not appear to be heavily used, suggesting that there is some capacity for additional recreational use.

Although it is likely that there will be increased numbers using the footpaths adjacent to or within the designated sites, this is unlikely to affect the integrity of designated features. The Duke of Northumberland's River is designated for aquatic and marginal vegetation habitats which are not directly connected to the footpath and therefore are unlikely to be impacted by the increased footfall. Twickenham Rough is designated for rough grassland, tall herbs, scrub and young woodland and whilst these may be adversely impacted by the construction of the footpath, the increased use as a result of the RECC development is unlikely to result in an increased adverse impact on these habitats.

There remains likelihood that designated sites may experience some impact from increased use, primarily due to the potential for increased littering. This is considered likely to comprise an *adverse* residual effect that is significant at the *local scale* with *probable likelihood*, equating to a **minor adverse** effect.

Predicted Effects – Non-designated Habitats

Habitat Deterioration

Changes to the lighting associated with the development is only considered likely to have a small zone of influence, with the footpaths surrounding the River Crane remaining unlit. As a result, the changes in light provision will not affect the River Crane or the Duke of Northumberland's River. The broadleaved semi-natural woodland and Urban Greenspace BAP habitats are not considered to be sensitive to the changes identified.

The increase in the local resident population associated with the provision of 180 residential units compromising an additional population of 416 is likely to result in an increase in recreational pressure on local resources. As a result, the non-designated section of the River Crane, and other habitats on the Site may be subject to impact through trampling of the riparian habitat or an increase in littering from adjacent habitats. However the increase in pressure due to trampling is unlikely to have a significant effect. Consequently, such an effect is considered to comprise a **low magnitude**, **long-term, temporary**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

There remains a likelihood that the riparian habitats associated with the non-designated section of the River Crane may experience some impact from increased littering. This is considered likely to comprise an *adverse* residual effect that is significant at the *local scale* with *probable likelihood*, equating to a **minor adverse** effect. The other habitats on site may also experience some impact from increased littering however this is considered to comprise an *adverse* effect that is significant *within the zone of influence only* with *probable likelihood*. This equates to a **negligible** effect**.**

Predicted Effects – Species

Habitat Fragmentation

Although changes to the lighting associated with the development are only considered likely to have a small zone of influence, this can have an influence on the movement of faunal species associated with the site.

Lighting of the access road and car parking along the northern boundary of the site is likely to impact upon bat commuting activity, with the southern side of the tree line likely to be important due to lighting currently provided on the A316. Although lighting could provide opportunistic feeding opportunities, with invertebrates attracted to the light, it can have an adverse impact on commuting bats due to an increased predation risk. As a result, provision of lighting along the access road has the potential to preclude commuting bats along this habitat. The fragmentation of habitats for bats as a result of lighting is considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

Similarly, the provision of lighting along the northern and southern boundaries has the potential to impact upon the movement of hedgehogs. Lighting of the northern access road, in light of the habitat loss at construction phase, may preclude the movement of hedgehog in this area as they become more vulnerable to predation. Therefore, the fragmentation of habitats for hedgehog as a result of lighting is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect.**

Habitat Deterioration

Changes to the provision of lighting as a result of the changes to site layout could result in deterioration of the habitat present and its ability to support breeding birds and bats.

The provision of lighting on the site could impact upon the breeding bird assemblage where mitigation is unable to prevent spill into peripheral vegetation on or adjacent to the site. The light spill will make this habitat less suitable for nesting, for example as a result of increased predation risk. The habitat along the northern access route and Marsh Farm Lane are likely to be influenced, impacting upon a relatively significant proportion of the breeding bird habitat present. Consequently, such an impact is considered to comprise a **medium magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** effect that is significant at the **local scale** with **probable likelihood**. This equates to a **minor adverse effect**.

The provision of lighting may provide some opportunistic feeding opportunities for the bat species commonly present, as a result of the attraction of insects to the light, which can benefit the pipistrelle, serotine and *Nyctalus* species. Consequently, the impact of lighting on habitat provision is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **beneficial** effect that is significant **within the zone of influence only** with **probable likelihood**. This equates to a **negligible effect**.

Residual Effects – Designated Sites

Habitat Deterioration

Incorporation of best practice guidelines in the design and provision of lighting around the site to minimise light spill will reduce the impact on the Twickenham Junction Rough Local SINC. As a result, the impact of lighting on the designated site is considered to comprise a **low magnitude**, **long-term**, **permanent, multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Residual Effects – Species

Habitat Fragmentation

Incorporation of best practice guidelines to minimise light spill beyond the construction boundary will limit the impact of habitat fragmentation upon bats. By ensuring the mature trees along the northern boundary remain unlit and periods of darkness are provided, commuting activity associated with these features will be able to continue. Therefore, the impact of lighting on habitat fragmentation is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Similarly, the impact of lighting on the fragmentation of habitats for hedgehog is

reduced by following best practice guidance. Therefore, such an effect is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event**, and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Habitat Deterioration

The impact of light spill on breeding birds will be minimised though implementation of best practice guidelines in the design and specification of scheme lighting. As a result, key habitats along the northern access route and Marsh Farm Lane will be protected. As a result, the residual effect is considered to comprise a **low magnitude**, **long-term**, **permanent**, **multiple-event** and **adverse** residual effect that is significant **within the zone of influence only** with **unlikely probability**. This equates to a **negligible effect**.

Appendix 15.5: Arboricultural Impact Assessment

Note: This assessment was completed prior to a minor amendment to the application boundary along the River Crane. This boundary change did not have any implications for the AIA as all trees along the River Crane remain within the boundary.

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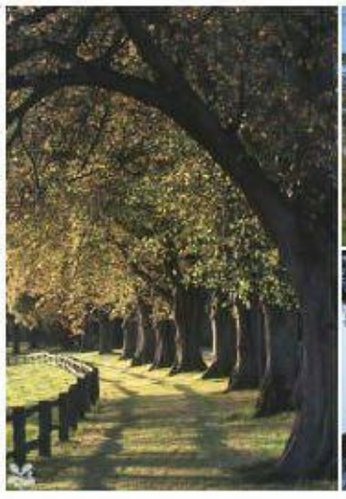

Arboricultural Report

Richmond upon Thames College
c/o Cascade Consulting (Environment and Planning) Ltd

Richmond upon Thames College, Richmond upon Thames

Ref: 14-1758/3376/02

Version: 7

Date: June 2015

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Purpose of Document

This report has been commissioned to provide an assessment of the trees at Richmond upon Thames College in accordance with the guidelines provided by BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations.*

It consists of:

- A **Tree Survey** that records all relevant information about the trees on or adjacent to the site that may be impacted by the proposals. This includes a **Tree Constraints Plan** that shows the location of the trees on the site irrespective of any development considerations.
- An **Arboricultural Impact Assessment** to consider the impact that the development proposal may have on the trees. It provides details of how any adverse impact will be mitigated (including indicative protection measures) and includes an **Arboricultural Impact Plan**. This shows the location of the trees in relation to the proposed development and the above and below ground constraints posed by the trees.
- A **Draft Arboricultural Method Statement** to provide details on how the retained trees will be protected and managed during the development process. This includes a **Draft Tree Protection Plan** that provides illustrative guidance on the tree protection measures.

The purpose of this report is to demonstrate how the tree constraints have been considered in the design and layout of the site. It also provides the local authority (London Borough of Richmond upon Thames) with the necessary information to assess the tree issues associated with the planning application.

The aim is to present the information in a manner that can easily be understood by people without specific knowledge of tree related matters.

Executive Summary

The development proposal at Richmond College is for the demolition of the existing college buildings and comprehensive redevelopment of the entire site. The development will require the removal of 71 trees located internally to the site. 23 of these trees would be recommended for removal irrespective of the development due to poor structural and physiological condition. The remaining trees will require removal in order for the proposed development to be constructed. The overall proposal is not considered to have a long-term negative impact on the wider community. Where practicable, key trees will be retained and protected throughout the development process and these are to be supplemented by replacement planting, which will provide a net gain in canopy cover, aesthetic value and biodiversity benefits throughout the site.

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Table of Contents

Attachments:

Document/Plan	Ref	Version
Tree Schedule	14-1189	V3
Tree Constraints Plan	D14-1291	V3
Arboricultural Impacts Plan	D14-1756	V5
Draft Tree Protection Plan	D14-2956	V5

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1. SITE AND TREE SURVEY

Site Description

1.1. The site is located adjacent to Chertsey Road and is made up of buildings that form Richmond upon Thames College. The northern boundary consists of Chertsey Road. The eastern boundary is comprised of offsite residential properties. The southern boundary is the River Crane and the western boundary is a public footpath known as Marsh Farm Lane.

1.2. The southern part of the site is separated from the north by Craneford Way and comprises open amenity grassland.

1.3. The majority of the arboricultural features are located on the boundaries of the site, with several trees located internally between the built structures.

Tree Survey

1.4. The assessment of the trees has been carried out in accordance with the guidance provided in Annexe C of BS5837. In summary this requires that any tree on the site with a stem diameter of over 75mm at 1.5m above ground level is recorded.

1.5. All observations were made from ground level, without detailed investigation with regard to the general condition of the tree.

1.6. Trees that are located outside of the site have been considered as part of this survey, and have been annotated on the accompanying plan as such.

1.7. Stem diameter measurements were taken using a girthing tape and in accordance with Annexe D of BS5837. Where access to the base of the tree was not possible for any reason, the diameter has been estimated.

1.8. Height, crown spread and canopy clearance measurements are recorded in accordance with the measurement convention detailed in paragraph 4.4.2.6 of BS5837.

1.9. A copy of the schedule of trees is attached to the report (ref: 14-1189). The location of the trees has been plotted on the attached Tree Constraints Plan (TCP ref: D14-1291).

1.10. The trees are categorised in an order defined in Table 1 of BS5837, a copy of which can be seen in Appendix 2, but which can be summarised as:

A Category Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years

B Category Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years

C Category Trees of low quality and value currently in adequate condition able to remain until new planting can be established. These trees are expected to remain for a minimum of 10 years. It also includes young trees with a stem diameter less than 150mm measured at 1.5 metres above ground level.

U Category Trees in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural or forestry management.

1.11. Additionally, BS5837:2012 provides subcategories 1-3 within the category system outlined above which indicate the area(s) in which a tree or group retention value lies.

1. Mainly arboricultural.
2. Mainly landscape.
3. Mainly cultural, including conservation.

1.12. A summary of my assessment of the quality of these trees is shown in Table 1

Table 1 - An overview of tree quality within the surveyed area

	Category A	Category B	Category C	Category U	Total
Trees	3	32	51	17	**103**
Hedges	0	0	2	0	**2**
Groups	0	8	18	6	**32**
Total	**3**	**40**	**71**	**23**	**137**

Since conducting the survey the application boundary has been altered and a total of 40 trees are now outside the scope of this application. These have therefore not been considered within this report and have been omitted from the associated plans and attached tree schedule. My assessment of the 40 trees that have been omitted are presented in Table 2. A full list of these trees can be found in Appendix 4.

Table 1 - Surveyed trees that have been omitted from this report

	Category A	Category B	Category C	Category U	Total
Trees	2	6	15	8	**31**
Groups	0	2	6	1	**9**
Total	**2**	**8**	**21**	**9**	**40**

1.13. The location of the trees has been plotted on the TCP and can be identified through the colour coding detailed in the BS5837. To assist in identification of the tree category when printing in monochrome the following symbols have been used.


Category A


Category B


Category C


Category U

Constraints Posed by Existing Trees

1.14. Development proposals can impact on trees by causing them to be removed either immediately or in the future. It does this by adversely affecting their potential for retention either through disturbance to the Root Protection Area (RPA) or through the need for pruning.

1.15. Illustrative guidance of the constraints posed by the trees to the site can be seen on the attached TCP.

Above Ground Constraints & Proximity of Trees to Structures

1.16. Where the current and/or ultimate height of a Category A, B or C tree will cause an obstruction to the proposed development, this must be considered as a constraint. This is usually considered in terms of issues relating to shade and light.

1.17. Consideration is also given to species characteristics such as:

Deciduous or evergreen;

Density of foliage;

1.18. The tree canopies are marked on the attached TCP as a continuous line around each individual tree.

Below Ground Constraints

1.19. The below ground constraints are defined as the likely spread and disposition of the root system of the tree and are plotted on the attached TCP as a magenta circle around each tree with the text RPA inscribed in the line.

1.20. The RPA is defined as the minimum area (in m2) around the tree that is 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.

1.21. Section 4.6.2 & 4.6.3 of BS5837 allows for the shape of the RPA to be changed for the likely spread of the roots, taking into account factors such as:

Past or existing site conditions;

Soil type and structure;

Topography and drainage.

1.22. The total area of the RPA cannot be changed during any adjustment to the likely root spread.

1.23. No RPAs have been adjusted on this site.

2. ARBORICULTURAL IMPACT ASSESSMENT

Development Proposal

2.1. The proposal is for the demolition of the existing college buildings, site clearance and groundworks together with comprehensive redevelopment to provide:

A new campus for education and enterprise;

Upgrading of existing Craneford Way Playing Fields for use by the College, school and the local community;

Alterations to existing means of access for vehicles, pedestrians and cyclists from longhorn Drive and from Egerton Road;

Provision of on-site parking, open space and landscaping; and

New residential units together with associated parking, open space and landscaping.

2.2. The proposals submitted within this report have been guided by the constraints posed by the trees as indicated on the TCP.

2.3. Where feasible, tree retention has been a key consideration in the overall site design and layout. Tree removal has been limited to those that are necessary to enable the development proposal to proceed.

2.4. The proposed layout of the development is shown on the attached Arboricultural Impact Plan (AIP) (ref: D14-1756).

Summary of Impact of the Proposal

2.5. My assessment of the impact of this proposal on the trees is summarised in Table 3.

Table 3 - Summary of trees that will be affected by the proposed development

Impact	Reason	A	B	C	U	Total
Trees to be removed	To enable the proposed development to take place and for access to the site by vehicles	T68	G1, T17, T18, T21, T22, T33, G53, T54, T55, G56, G70, T74, T75 & G155	G2, G10, H14, G15, T16, G20, T24, T25, T27, T31, T32, H40, T41, G49, T63, T64, T65, T66, G67, T69, T71, T72, T73, G76, G77, G78, T79, T93, T116, T117, T118, G172 & T175	None	**48**
Retained trees that will potentially be affected through disturbance to RPAs	To enable the proposed construction to take place	T154 & T170	G9, T35, T58, T59, T60, T113, T153, T156, T157 & T173	T12, T13 & G50	None	**15**

Impact	Reason	A	B	C	U	Total
Trees to be removed irrespective of the development proposal	Poor condition or structural defects.	None	None	None	T5, T6, T11, T19, G23, T29, T30, G38, T48, T51, T52, T57, T95, T98, T104, T105, G110, T111, G112, T128, G159 & G174	**23**
No Impact	Retained trees unaffected by the proposals	None	G7, T8, T28, T42, G43, T61, T103, T107, T126, T127, T151, T158, T160, T162, T171 & T177	T3, T4, T26, T34, G36, T37, T39, T44, G45, G46, G47, T62, T94, T96, T100, T101, G102, T106, T108, T109, T114, T115, T119, T120, T121, T152, T161, T163, T164, G165, T166, G167, T168, T169 & T176	None	**51**
Total		**3**	**40**	**71**	**23**	**137**

Detailed Impact Appraisal

2.6. There are a total of 137 trees, and groups of trees, on this site, excluding 40 trees that are detailed in Section 1.11 of this report as now being omitted. Of this 137, 51 will not be impacted by the development proposals provided they are protected through the use of fencing. This fencing will be fit for the purpose of excluding construction activity and will remain in place throughout the duration of the development.

2.7. The remaining trees on site will be directly affected by the development proposals, either through direct loss or as a consequence of the disturbance to the rooting environment or remedial works to the tree canopy. The details of these impacts are considered in the following sections.

Trees to be removed

2.8. The design proposal for this development requires that 71 trees and groups of trees are removed.

2.9. Of the 71 a total of 23 trees or groups of trees would be recommended for removal irrespective of this design proposal due to poor structural and physiological condition. Therefore these are not considered further within this assessment.

2.10. Section 5.1.1 of BS5837:2012 recognises that the competing needs of development mean that trees are only one factor requiring consideration. It also states that misplaced tree retention can be detrimental on a site where it will cause excessive pressure on those trees being retained if those trees then require removal in the future.

2.11. A detailed assessment of the tree removals is presented in Table 4:

Table 4 - Detailed Impact Assessment of tree removals

Tree No	Reason for Removal	Evaluation of Impact	Proposed Mitigation
G1, G2, H14, T27, T32, T33, H40, T41, G49, G53, T54, T55, G56, T63, T64, T65, T66, G67, T68, T69, G70, T71, T72, T73, T74, T75, G76, G77, G78 & T79	These trees are located within the footprint of the proposed demolition and development of the central part of the site.	The majority of these trees are only visible internally to the site and therefore removal will not have a negative effect on the wider community. However, the removal of those trees that are visible to the wider community will have a negative impact on the aesthetics of the site.	Replacement planting internally to the site, and at boundary peripheries, will have a positive impact on the wider community. Further, it will provide a net gain in canopy cover across the site.
G10, G15, T16, T17, T18, G20, T21, T22, T25 & T24	These trees are located within the footprint of the proposed shared access route along the western boundary.	These trees are visible to members of the public that use the existing public footpath. The removal of these trees will have a negative impact on the wider community.	Replacement planting of better quality specimens will provide a net gain in canopy cover and will have a positive impact on members of the public using the proposed footpath.
G172 & T175	These trees are located within the footprint of the proposed sports pitches.	These trees are only partially visible externally to the site and therefore their removal will have a minor negative impact on the wider community.	The retention of key arboricultural features adjacent to the sports pitches is considered suitable mitigation for the loss of these low quality trees.
T116, T117 & T118	These trees are located within the footprint of the proposed access route on the western boundary.	These trees are all young specimens and, although visible to members of the public, due to their size and stature their removal will have no negative impact on the wider community.	Replacement planting throughout the site is considered suitable mitigation for the loss of these trees.

T93	This tree is located within the footprint of the proposed junction realignment off of Langhorn Drive.	This tree is a young specimen and due to its size and stature removal will have no negative impact on the wider community.	Replacement planting throughout the site is considered suitable mitigation for the loss of this tree.

2.12. Trees that have been identified for removal have been marked on the attached Draft TPP by a red dashed line.

Retained trees that will be affected by the development proposal

2.13. Section 5.3 (a) of BS5837 requires that any encroachment of the RPA by the proposed development must be justified and it must be demonstrated that the tree can remain viable. The area lost to encroachment must be compensated for elsewhere, contiguous with its RPA.

G9 - Various

2.14. This category B group is located on the northern boundary of the site. The RPA of this group is marginally encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 40m^2. This equates to 2.5% of the total RPA of this group.

2.15. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation, the proposal will not have an effect on the sustainability of this group.

T12 - Hornbeam

2.16. This category C tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 22m^2. This equates to 33% of the total RPA of this tree.

2.17. The area to the north and south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T13 - Alder

2.18. This category C tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 43m^2. This equates to 20% of the total RPA of this tree.

2.19. The area to the north and south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross

hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T35 - Sycamore

2.20. This category B tree is located on the southern boundary of the site. The RPA of this tree is marginally encroached by the proposed development of residential properties. The installation of these properties would encroach the RPA by approximately 16m^2. This equates to 5.5% of the total RPA of this tree.

2.21. The area directly south of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Based on this area it is considered that this encroachment into the RPA will not have an adverse effect on the sustainability of this tree. Protective fencing will be used to ensure that the impact on the RPA of this tree is minimal.

G50 - Various

2.22. This category C group is located on the eastern boundary of the site within the rear garden of existing offsite properties. The RPA of this group is marginally encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 32m^2. This equates to 15.5% of the total RPA of this group.

2.23. The area to the east of this group consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T58 - Lime

2.24. This category B tree is located centrally to the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 8m^2. This equates to 16% of the total RPA of this tree.

2.25. The area to the north and south of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T59 - Horse Chestnut

2.26. This category B tree is located on the northern boundary of the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 8.5m^2. This equates to 4% of the total RPA of this tree.

2.27. The area to the north of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected

through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T60 - Horse Chestnut

2.28. This category B tree is located on the northern boundary of the site. The RPA of this tree is encroached by the proposed installation of car parking spaces. The installation of these car parking spaces would encroach the RPA by approximately 31m^2. This equates to 15.5% of the total RPA of this tree.

2.29. The area to the north of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected through the use of protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this group.

T113 - Ash

2.30. This category B tree is located on the western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 20m^2. This equates to 33% of the total RPA of this tree.

2.31. The tree is newly established in a designated tree pit and the area to the west of this tree consists of open ground, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T153 - Lime

2.32. This category B tree is located on the south western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 31m^2. This equates to 13% of the total RPA of this tree.

2.33. The area to the east of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T154 - False Acacia

2.34. This category B tree is located on the south western boundary of the site. The RPA of this tree is encroached by the proposed installation of a new footpath. The installation of this footpath would encroach the RPA by approximately 95m^2. This equates to 28% of the total RPA of this tree.

2.35. The area to the north and east of this tree consists of open amenity grass, which provides suitable future potential rooting environment. Furthermore, this encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. This has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and future rooting environment the proposal will not have an effect on the sustainability of this tree.

T156 - Lime

2.36. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 69m^2. This equates to 25% of the total RPA of this tree.

2.37. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation the proposal will not have an effect on the sustainability of this tree.

T157 - Lombardy Poplar

2.38. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 56m^2. This equates to 8% of the total RPA of this tree.

2.39. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The area directly to the east and west of this tree consists of open amenity grass and provides suitable future potential for rooting and the remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation, and future rooting environment, the proposal will not have an effect on the sustainability of this tree.

T170 - Oak

2.40. This category A tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new access route into the site. The installation of this access would encroach the RPA by approximately 91m^2. This equates to 30% of the total RPA of this tree.

2.41. This tree has grown with an existing access point in close proximity to its base. The surface is made up of compacted aggregate and it is suspected that this will have allowed the filtration of water and nutrients to the rooting system of this tree. It is anticipated that this access will need to be removed and new instated, and that the encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA. The new surface will need to consist of a porous surface in order to continue to allow the filtration of water and nutrients.

2.42. The permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report. The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation and the current growing environment the proposal will not have an effect on the sustainability of this tree.

T173 - Horse Chestnut

2.43. This category B tree is located on the boundary of the southern part of site. The RPA of this tree is encroached by the proposed installation of a new synthetic pitch. The installation of this access would encroach the RPA by approximately 141m^2. This equates to 32% of the total RPA of this tree.

2.44. This encroachment will require a 'no-dig' solution in order to sufficiently protect the RPA and the synthetic pitch will need to be constructed so as to allow the filtration of water and nutrients to the rooting environment of this tree. The area for permanent ground protection has been marked on the draft TPP with dark green cross hatching. Further details are provided in the Section 4 of this report.

The remainder of the RPA will be protected using protective fencing. Given the specific protection measures for installation the proposal will not have an effect on the sustainability of this tree.

Proposal to Mitigate any Impact

Protection of retained trees

2.45. The successful retention of those trees that will remain on the site will be dependent upon the quality and maintenance of any protection system that is put in place. Indicative tree protection measures have been considered within this report.

2.46. The primary form of protection will be through the use of fencing. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the protected area. The Heras 151 system of fencing is commonly used to provide this level of protection.

2.47. The Heras fence panels should be joined using a coupling system such as the Heraslock Anti-tamper coupler, using a minimum of two clamps per panel side, and separated vertically by a distance of 1m. The panels should be secured to the ground using bracing poles or some other suitable form of support that ensures that they are fit for the purpose of excluding site traffic from the protected area and remain rigid and complete.

2.48. It is anticipated that an Arboricultural Method Statement will be required as a condition of any planning consent to provide detail of how the necessary tree protection can be implemented.

2.49. The processes of construction are highly unlikely to have a detrimental effect upon the health of the retained trees assuming recommendations made in this report are adhered to at all times by the contractors.

Summary of the Impact on Local Amenity and Character

2.50. The development proposal at Richmond College is for the demolition of the existing college buildings and comprehensive redevelopment of the entire site. The development will require the removal of 71 trees located internally to the site. 23 of these trees would be recommended for removal irrespective of the development due to poor structural and physiological condition. The remaining trees will require removal in order for the proposed development to be constructed. The overall proposal is not considered to have a long-term negative impact on the wider community. Where practicable, key trees will be retained and protected throughout the development process and these are to be supplemented by replacement planting, which will provide a net gain in canopy cover, aesthetic value and biodiversity benefits throughout the site.

3. DRAFT ARBORICULTURAL METHOD STATEMENT

Overview

3.1. The following explanations relate specifically to this site and they should be read in conjunction with the indicative Tree Protection Plan (TPP).

3.2. A copy of this report must be kept on site and be permanently available of the duration of the development. It can be:

- Included in the tender documents to identify and quantify the tree protection and management requirements;
- Used to plan the timing of site operations to minimise the impact on trees, and;
- Referenced on site for practical guidance on how to protect trees.

Arboricultural Supervision

3.3. An Arboricultural Clerk of Works (ACoW) will be appointed by the developer to advise on the tree management for the site and to attend:

- The pre-commencement meeting before any works start
- Regular supervision visits every two to four weeks, or as otherwise agreed; and
- As needed to oversee specific works that could affect trees

3.4. Additionally the consultant will have a supervisory input into the following operations:

- Site preparation, including tree works
- Installation, maintenance and removal of barriers
- Installation, maintenance and removal of ground protection
- Installation of new structures

Sequencing and Timing

3.5. Effective tree protection relies upon following a logical sequence of events and arboricultural inspection/supervision.

3.6. The retained ACoW's initial role is to liaise with the developer and LPA to ensure the tree protection measures are fit for purpose and in place before any works commence on the site. Once the site is working that role will switch to monitoring compliance with arboricultural planning conditions and advising on any tree problems that arise or modifications that become necessary.

3.7. It is the developer's responsibility to ensure that details of this Arboricultural Method Statement (AMS) and any agreed amendments are known and understood by all site personnel.

3.8. The final details of supervision and the frequency of inspection visits will be agreed at the pre-commencement meeting. The supervision arrangement will be sufficiently flexible to allow the supervision of all sensitive works as they occur.

3.9. The ACoW will make a record of the visits and these will be attached to the site copy of the AMS for inspection. A further copy will be sent to the LPA. The purpose of these written records is firstly to provide proof of compliance that will allow the developer to robustly demonstrate adherence to best practice in the event of any dispute. Secondly it will help the LPA efficiently discharge the relevant planning conditions. Appendix 5 gives a sample copy of a site inspection record.

Table 1 - Sequencing and Supervision

Stage	Action	Arboricultural Input Required
1	Pre-commencement meeting	Attend
2	Tree Removal and Tree Works	Inspect
3	Tree Protective Fencing	Supervise
4	Construction of special surfaces	Supervise
5	Specific tree protection measures	N/A
6	Demolition	Supervise
8	Development Phase	Inspect
9	Remove temporary surfaces	N/A
10	Remove tree protective fencing	Supervise
11	Landscaping & replacement planting	Inspect

Pre-commencing meeting

3.10. A pre-commencement site meeting involving the land owner, representative of the development company, ACoW, contractors and engineers (as appropriate), and relevant LPA officers will be held to ensure that all aspects of the tree protection processes are understood and agreed.

3.11. The meeting is where the details of the programme of tree protection will be agreed and finalised, which will then form the basis of any supervision arrangements between the ACoW and the developer

3.12. The ACoW will send a record of the meeting to all parties.

Tree Removal

3.13. Trees for removal have been noted on the TPP with a dashed red circle around each location. The following trees are scheduled for removal:

Table 2 - Trees for removal

Category A	Category B	Category C	Category U	Total
T68	G1, T17, T18, T21, T22, T33, G53, T54, T55, G56, G70, T74, T75 & G155	G2, G10, H14, G15, T16, G20, T24, T25, T27, T31, T32, H40, T41, G49, T63, T64, T65, T66, G67, T69, T71, T72, T73, G76, G77, G78, T79, T109, T116, T117, T118, G172 & T175	T5, T6, T11, T19, G23, T29, T30, G38, T48, T51, T52, T57, T95, T98, T104, T105, G110, T111, G112, T128, G159 & G174	**71**

Tree works

3.14. The details of tree works have been set out in the schedule attached to this report (ref: 14-1189). Obvious pruning to allow the installation of the structure has been listed, but additional minor pruning may be necessary to address unanticipated local problems with individual branches. Any additional works will be assessed and authorised as necessary by the retained ACoW. Where necessary, the LPA tree officer will be notified of any additional tree works.

Barriers and Ground Protection

The Construction Exclusion Zone

3.15. The primary means of protecting the Root Protection Area (RPA) of trees and Future Landscape Areas (FLA) is through the use of barriers formed by protective fencing. The enclosed area is the Construction Exclusion Zone (CEZ). The CEZ has been marked on the TPP by orange diagonal hatching.

3.16. The CEZs are to be afforded protection at all times and will be protected by fencing. The type of fencing is detailed in section 3.18, below.

3.17. No works will be undertaken within any CEZ that causes compaction to the soil or severance of tree roots.

Tree Protective Fencing

3.18. A protective fence will be erected around the trees, prior to the commencement of any site works i.e. before any materials or machinery are brought on site, development or the stripping of soil commences.

3.19. The fence is to be sited in accordance with the TPP enclosed with this method statement. This is shown as a black dotted line with diagonal orange hatching indicating the enclosed CEZ. Details of minimum distances for the barriers from the trees can be seen in Appendix 4. These figures are based on a perfect circle for the RPA around the tree. Where the RPA has been offset the parameters for the fencing have been marked on the TPP. The location of these fences is indicative only and further detail will be provided once planning consent has been obtained.

3.20. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, the Heras 151 system of fencing will provide the necessary protection to the CEZ. Details of this fencing can be seen in Appendix 6.

3.21. All Heras fence panels will be joined using a coupling system such as the Heraslock Anti-tamper coupler, using a minimum of two clamps per panel side. Each panel will be fitted securely to a rubberised foot that will in turn be pinned to the ground using metal stakes driven a minimum of 500mm into the ground.

3.22. The fence will have signs attached to it stating that it defines a CEZ and that no works are permitted within the fence. No notice boards, cables or other services will be attached to any tree. An example of a fencing sign is provided in Appendix 7.

3.23. The protective fencing may only be removed following completion of all construction works.

Construction of Special Surfaces

3.24. Where, due to site constraints, construction activity cannot be excluded through the use of fencing, appropriate ground protection must be installed to protect the rooting environment during the construction process.

Temporary Ground Protection

3.25. **No trees on this site require temporary protective ground protection measures**. However, if temporary access is required to a CEZ then access may only be gained after consultation with the Local Planning Authority and following placement of materials that will spread the weight of any vehicular load and prevent compaction to the soil

3.26. For pedestrian movements within any CEZ then a single thickness scaffold board on top of a compressible layer (e.g. wood chip mulch) laid onto a geotextile fabric may be acceptable.

Permanent hard surfaces within the RPA

3.27. Where permanent hard surfaces are required within the RPA, there must be no excavation into the soil, either through the lowering of levels and/or scraping, other than the removal of turf or other surface vegetation. All such works shall be carried out using hand tools only.

3.28. 15 trees or groups of trees (G9, T12, T13, G50, T58, T59, T60, T113, T153, T154, T156, T157, T170, T173 & T174) will require permanent protection.

3.29. In order to protect the RPA of these trees a three-dimensional cellular confinement system will be installed. This is a load bearing system which protects roots from the effects of compaction from regular vehicular movement. The recommended product for this solution is CellWeb but whatever system is used, the end result must be that the underlying soil (rooting environment) remains undisturbed and retains the capacity to support existing and new roots.

3.30. The areas to be protected by the Cellweb have been marked on the TPP by the dark green cross-hatching.

3.31. The CellWeb will be pinned in place and backfilled with Type 1 MOT and finished with a metalled wearing surface. The edgings of the finished surface are to be installed on top of the CellWeb and will comprise of timber boards staked in place and backfilled with the wearing layer as previously described.

3.32. Details of Cellweb are included in Appendix 8, and a methodology for installation given in Appendix 9. This methodology has been provided by the manufacturer and it will be the responsibility of the contractor to ensure that whatever system is used, it is installed in accordance with the latest guidelines provided by the manufacturer.

Additional precautions outside the exclusion zone

3.33. Any risk from activities outside RPAs but close enough to have an impact will be assessed during the day-to-day running of the site, and appropriate precautions put in place to reduce that risk.

3.34. It is a presumption of this report that all RPAs that have been identified for protection but which lie outside of the protective fencing, will be protected from soil degradation at all times during construction activity.

3.35. Further details for working within the RPA are also provided in Appendix 10.

Specific Tree Protection Measures

3.36. No specific tree protection measures are required for any tree on this site other than those detailed in this AMS and defined on the TPP.

Inspection and Supervision

3.37. After the protective fencing and temporary ground protection has been erected, the retained ACoW will visit the site. The purpose of the visit will be to check that the fencing has been correctly installed so as to provide protection to the trees. The local authority tree officer will also be invited to inspect the tree protection measures prior to any works commencing.

3.38. The retained ACoW will provide a written report confirming satisfactory completion of this task. A copy of this report will be sent to the local planning authority.

Demolition

3.39. No demolition works will take place within the RPA of any retained tree on this site.

Development

3.40. Once all tree works and protective fencing have been completed, the developer can commence the on-site preparation works and construction can begin.

Site Storage, Cement Mixing and Washing Points

3.41. No storage of materials will take place within a CEZ.

3.42. No mixing or storage of materials will take place up a slope where they may leak into a CEZ. Where contours of the site create a risk of polluted water running into RPAs, precautionary measures of using heavy duty plastic sheeting and sandbags with the ability to contain accidental spillage will be put in place to prevent contamination.

Contractors Parking

3.43. Contractors parking will not be within or in close proximity to a CEZ.

Utility Services

3.44. There is no requirement for an service to be installed within a CEZ or RPA of any retained tree on this site.

Fires

3.45. No fires will be lit on this site.

Site Gradient

3.46. There will be no changes to any levels on this site within or in close proximity to the RPA of any retained tree on this site.

Use of Herbicides

3.47. There is no requirement of any herbicide to be used on this site.

Use of Sub-contractors

3.48. The main contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any tree on site.

Contingency planning

3.49. Water will be kept readily available on site and will be used to flush split materials through the soil and avoid contamination of tree roots.

3.50. At the time of any spillage the main contractor will contact the retained ACoW for advice.

Post Development

Removal of temporary surfaces

3.51. Any temporary surfaces will remain in place until all construction activity is finished and there is no realistic risk of damage.

3.52. The temporary ground protective measures will be removed progressively, starting at the furthest point from the temporary access road, and working backwards. All operations will take place from on top of the existing temporary surface. This will need to be done carefully to ensure that there is no excavation in the original surface level and there will be no damage to trees.

3.53. Once this material has been removed there will be no vehicular access to the site by this route.

Landscaping within the tree canopies

3.54. The final tidying up and reinstatement can only be carried out when all the protective measures have been removed. This means great care is required by the contractors to observe tree protection measures.

3.55. No machines can be used within the RPAs, which specifically excludes rotavators.

3.56. All new planting and soil level variations must be agreed and supervised by the retained ACoW.

Responsibilities

3.57. It is the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regards to tree protection is adopted on site.

3.58. The main contractor will be responsible for contacting the Local Planning Authority at any time issues are raised related to the trees on site.

3.59. If at any time pruning works are required permission must be sought from the Local Planning Authority first and then carried out in accordance with BS3998:2010 *Tree Works – Recommendations* and industry best practice.

3.60. The main contractor will ensure the build sequence is appropriate to ensure that no damage occurs to the trees during the construction processes. Protective fences will remain in position until completion of ALL construction works on the site.

3.61. The fencing and signs must be maintained in position at all times and checked on a regular basis by an on-site person designated that responsibility.

Completion Meeting

3.62. Upon completion of all works specified above and all procedures detailed, the ACoW will invite the LPA tree officer to meet on site to discuss the process and agree any final remedial works which may be required.

Contacts

3.63. Shows a list of all relevant contacts for this development:

Title	Name	Contact Number	Email
Landowner/Developer			
Agent			
LPA Case Officer			
LPA Tree Officer			
Site Manager			
ACoW			
Tree Surgeon			

THIS AMS IS NOT A CONTRACT. THE RETENTION OF A QUALFIIED ARBORICULTURIST FOR SUPERVISION AND MONITORING MUST BE AGREED PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.

Stephen Westmore MSc BSc (Hons) MArborA

Assistant Arboricultural Consultant

03 June 2015

Appendix 1: Administrative Background

Instruction

Written instruction was received on 29 July 2014 from Claire Pitcher of Cascade Consulting Ltd to carry out a survey of the trees at Richmond upon Thames College.

The survey was to be carried out in accordance with the recommendations laid down by BS5837: Trees in relation to construction, and to assist in the preparation of a report to accompany a planning application. The report was to include:

- A schedule of the relevant trees to include basis data and condition assessment
- An appraisal of the impact that the proposed development may have on the trees, and the resulting impact this may have on the local amenity.
- An arboricultural method statement dealing with protection and the management of the trees to be retained.

Documents Provided

The plan is derived from the following provided information:

- Topographical survey (07404-01B) prepared by 3Sixty Measurement in February 2008.
- Layout drawing (RCF-HOK-AR-Site-20150106-7) prepared by HOK, received by email on 02 June 2015.

Limitations of this report

The following limitations apply to this report:

Statutory Protection: The existence of tree preservation order or conservation area protection does not automatically mean trees are worthy of being a material constraint in a planning context. Trees can be formally protected but be in poor structural condition or in declining health, which means they are unsuitable for retention or influencing the future use of the site. Furthermore a planning consent automatically takes precedent over these forms of protection, which makes them of secondary importance. For these reasons, I do not check statutory protection as a matter of course in the process of preparing this report. However if any tree works are proposed before a planning consent is given, then the existence of any statutory protection must be checked with the local authority.

Ecology and Archaeology: Although trees can be a valuable ecological habitat and can grow in archeologically sensitive areas, I have no specialist expertise in these disciplines and this report does not consider those aspects.

Tree Safety: While every effort has been made to ensure that comments relating to the tree surveyed are accurate, it must be noted that no tree have been climbed, no internal inspections carried out and no excavation of root areas has taken place. As such this report should not be taken to mean or imply that any of the inspected trees should be considered safe. No tree can be guaranteed to be 100% safe as some defects are not detectable by visual non-climbed, non-invasive inspection. Failure of an apparently healthy tree, either in part or totally may occur as a result of physical or physiological stress.

Soil Assessment: A soil assessment should be undertaken by a suitably qualified person to assess soil structure, soil composition and soil pH. The purpose of this is to provide guidance in any decisions relating to:

- The root protection area
- Tree protection;
- New planting design; and
- Foundation design

No details of a soil survey have been provided for submission with this report.

Technical References

The arboricultural method statement is based purely on the following technical references:

- British Standards Institute (2012) BS5837: Trees in relation to design, demolition and construction – recommendations

Qualifications and Experience

This report is based on my site observations and the provided information.

I have 3 years arboricultural and forestry experience working in the public and private sector. I have undertaken work on a variety of projects on behalf of private and commercial clients.

I have an MSc in Arboriculture and Urban Forestry, awarded by Myerscough College and University of Central Lancashire. I also have a BSc in Countryside Management, awarded by Harper Adams University College.

I am a Professional member of the Arboricultural Association and an Associate member of the Institute of Chartered Foresters.

Support and guidance with this report has been provided by Rob Davidson, Senior Arboricultural Consultant for Lockhart Garratt Ltd.

Appendix 2: BS5837 Cascade Chart

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
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; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

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Appendix 3: Tree Constraints Data

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
3	Red Horse Chestnut	430	5.2	84	9	4.6
4	Horse Chestnut	650	7.8	191	14	6.9
7	Red Horse Chestnut	600	7.2	163	13	6.4
8	Sycamore	660	7.9	197	14	7.0
9	Various	750	9.0	254	16	8.0
12	Hornbeam	385	4.6	67	8	4.1
13	Alder	680	8.2	209	14	7.2
26	Elder	160	1.9	12	3	1.7
28	Birch	270	3.2	33	6	2.9
34	Sycamore	250	3.0	28	5	2.7
35	Sycamore	810	9.7	297	17	8.6
36	Various	300	3.6	41	6	3.2
37	Sycamore	424	5.1	81	9	4.5
39	Sycamore	600	7.2	163	13	6.4
42	Alder	520	6.2	122	11	5.5
43	Prunus (Group)	400	4.8	72	9	4.3
44	Locust Tree / False Acacia (golden cultivar)	260	3.1	31	6	2.8
45	Cypress (Group)	300	3.6	41	6	3.2
46	Cypress (Group)	360	4.3	59	8	3.8
47	Western Red Cedar	300	3.6	41	6	3.2
50	Various	450	5.4	92	10	4.8

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
58	Lime	330	4.0	49	7	3.5
59	Horse Chestnut	700	8.4	222	15	7.4
60	Horse Chestnut	660	7.9	197	14	7.0
61	Red Horse Chestnut	300	3.6	41	6	3.2
62	Prunus	210	2.5	20	4	2.2
93	Ash (Common)	170	2.0	13	4	1.8
94	Ash (Common)	160	1.9	12	3	1.7
96	Ash (Common)	130	1.6	8	3	1.4
97	Ash (Common)	120	1.4	7	3	1.3
100	Ash (Common)	190	2.3	16	4	2.0
101	Ash (Common)	190	2.3	16	4	2.0
102	Ash (Common)	200	2.4	18	4	2.1
103	Ash (Common)	200	2.4	18	4	2.1
106	Ash (Common)	140	1.7	9	3	1.5
107	Alder (Common)	160	1.9	12	3	1.7
108	Alder (Common)	80	1.0	3	2	0.9
113	Ash (Common)	370	4.4	62	8	3.9
114	Alder (Common)	100	1.2	5	2	1.1
115	Alder (Common)	120	1.4	7	3	1.3
119	Prunus	160	1.9	12	3	1.7
120	Alder (Common)	164	2.0	12	3	1.7
121	Oak	80	1.0	3	2	0.9
126	Norway Maple	210	2.5	20	4	2.2
127	Oak	240	2.9	26	5	2.6
151	Lime	590	7.1	157	13	6.3
152	Red Horse	540	6.5	132	11	5.7

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
	Chestnut					
153	Lime	760	9.1	261	16	8.1
154	Locust Tree / False Acacia	880	10.6	350	19	9.4
156	Lime	790	9.5	282	17	8.4
157	Lombardy Poplar	1,900	22.8	1633	40	20.2
158	Norway Maple	390	4.7	69	8	4.1
160	Oak (Common)	328	3.9	49	7	3.5
161	Hawthorn	400	4.8	72	9	4.3
162	Oak (Common)	270	3.2	33	6	2.9
163	Sycamore	300	3.6	41	6	3.2
164	Sycamore	100	1.2	5	2	1.1
165	Sycamore	150	1.8	10	3	1.6
166	Sycamore	160	1.9	12	3	1.7
167	Sycamore	140	1.7	9	3	1.5
168	Whitebeam	430	5.2	84	9	4.6
169	Prunus	160	1.9	12	3	1.7
170	Oak (Common)	800	9.6	290	17	8.5
171	Sycamore	480	5.8	104	10	5.1
173	Horse Chestnut	970	11.6	426	21	10.3
176	Purple Plum	350	4.2	55	7	3.7
177	Lime	810	9.7	297	17	8.6

LOCKHART GARRATT

Explanatory Notes

General: The basic data listed in the first two columns is identical to that listed in the schedule in the attached tree schedule. The data in columns 3-5 are derived from the stem diameter by a simple calculation as described in BS5837.

Circle Radius: The circle radius has been calculated by obtaining the stem diameter (measured at 1.5m above the ground) in millimetres and multiplying it by 12. Where the tree is multi-stemmed, an average stem diameter is calculated by the following formula specified in section 4.6.1 (a) & (b) of BS5837:

For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter 1})^2 + (\text{stem diameter 2})^2 \ldots + (\text{stem diameter 5})^2}$$

For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

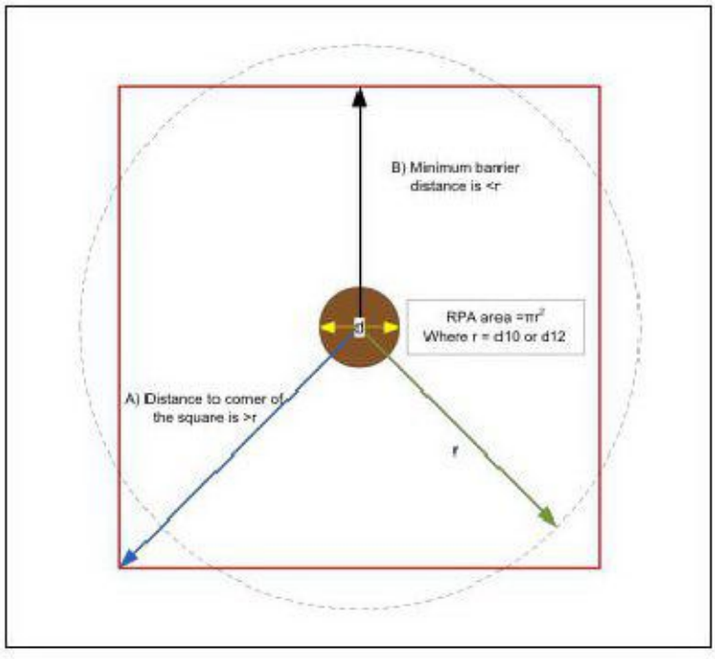
This total is then divided by 1000 to provide a circle radius in metres.

RPA Areas: The RPA has been assessed according to the recommendations set out in section 4.6 of BS5837. It is calculated by multiplying the radius squared by 3.142 (π)

Length of sides of a square: Section 5.5.3 of BS5837 recommends that the ground protection and barriers should be shown as a polygon surrounding the stem of the tree. With a circle, the distance from the edge of the circle to the centre will remain constant, but with a square, the distance from the centre of the tree to the sides of the square is less than the distance to the corner of the square. The area of the square must remain the same as the area of the circle. In order to ensure that it is the case, the length of side of the square is calculated at the square root of the RPA area.

Minimum barrier distance: This is the closest point that a side of the square can be to the centre of the tree. Figure 1 graphically illustrates the differences between a square and a circle in area. Where the distance from the centre of the tree to the corner of the square (A) is greater than the radius of the circle (r), but the distance from the centre of the tree to the side of the square (B) is greater than the radius of the circle (r), the total area will remain the same. The minimum barrier distance from the tree is calculated by taking the length of the side and dividing it by two.

Figure 1 - Graphical explanation for calculating the RPA



Clarification note on the RPA radius: The RPA radius is not the automatic minimum distance of the tree protection. It is a notional figure for use as a means of calculating the actual area of the RPA. BS5837 clarifies this at:

3.7 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 trees viability, and where the protection of the roots and soil structure is treated as a priority.

Appendix 4: Omitted tree data

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
80	Horse Chestnut	200	2.4	18	4	2.1
81	Ash (Common)	600	7.2	163	13	6.4
82	Horse Chestnut	190	2.3	16	4	2.0
83	Ash (Common)	161	1.9	12	3	1.7
84	Ash (Common)	450	5.4	92	10	4.8
85	Ash (Common)	410	4.9	76	9	4.4
86	Ash (Common)	600	7.2	163	13	6.4
87	Alder (Common)	230	2.8	24	5	2.4
88	Oak	450	5.4	92	10	4.8
89	Alder (Common)	210	2.5	20	4	2.2
90	Unidentified Broadleaf	200	2.4	18	4	2.1
91	Oak	950	11.4	408	20	10.1
92	Oak	80	1.0	3	2	0.9
122	Mixed species	300	3.6	41	6	3.2
123	Horse Chestnut	300	3.6	41	6	3.2
124	Cypress (Group)	200	2.4	18	4	2.1
129	White Willow	600	7.2	163	13	6.4
130	Locust Tree / False Acacia	290	3.5	38	6	3.1
131	White Willow	900	10.8	366	19	9.6
132	Mixed species	200	2.4	18	4	2.1
133	Horse Chestnut	200	2.4	18	4	2.1
134	Scots Pine	150	1.8	10	3	1.6
135	Scots Pine	400	4.8	72	9	4.3
136	Oak	170	2.0	13	4	1.8

Tree No	Species	Stem Diameter (mm)	Circle Radius (m)	RPA (m^2)	Length of sides of a square (m)	Minimum barrier distance (m)
137	Unidentified Broadleaf	600	7.2	163	13	6.4
138	Oak	380	4.6	65	8	4.0
139	Mixed species	300	3.6	41	6	3.2
140	Elder	460	5.5	96	10	4.9
141	Oak	164	2.0	12	3	1.7
142	Elder	385	4.6	67	8	4.1
143	Goat Willow	300	3.6	41	6	3.2
144	Oak	160	1.9	12	3	1.7
145	Ash	140	1.7	9	3	1.5
146	Field maple	100	1.2	5	2	1.1
147	Raywood Ash	140	1.7	9	3	1.5
148	Field maple	170	2.0	13	4	1.8
149	Field maple	100	1.2	5	2	1.1
150	Norway Maple	160	1.9	12	3	1.7

Appendix 5: Sample Site Inspection Record

Site		Date	
		Surveyor	
Ref No:		Planning Application No.	
Developer			
Site Agent		Contact No:	

Was all tree protective fencing in place?			
Details			
Action			
Was CEZ to agreed dimensions?			
Details			
Action			
Was debris/storage/groundwork evident within CEZ?			
Details			
Action			
Was there any evidence of damage to trees?			
Details			
Action			
Are any special works scheduled for coming build period?			
Details			
Action			
Additional Comments			

Any amendments proposed to plan?		
Details		
Action		

Signed:	
Name:	
Position:	

Circulation:				
Name	**Position**	**Company**	**Email**	**Phone**

Appendix 6: Tree Protective Fencing

Appendix 7: Example of Protective Fencing Signage

(Lockhart Garratt is able to provide useable, weather-proof copies of this sign if required, for attaching to the protective fencing. If required, please contact us for further details).

Appendix 8: Permanent Ground Protection

CellWeb™

Tree Root Protection System

The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.

Potential loss of existing tree due to poor construction techniques

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.

Glynebourne Wood.

Pedestrian path to recreational wood and built using a CellWeb™ foundation which was covered with Duoblock and then filled with woodchip to create a porous surface.

Product features

CellWeb™ comprises an expandable cellular mattress that is then filled with a clean stone sub-base and above a Treetex T300 Geotextile.

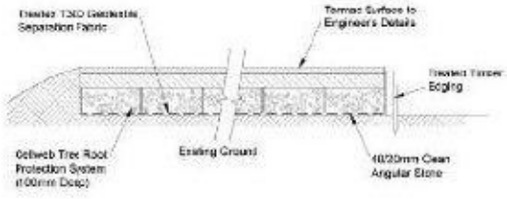
The honeycomb-like structure is made of robust high-density polyethylene (HDPE) that is simply stretched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CellWeb™ this is achieved without compaction and without reduction in permeability.

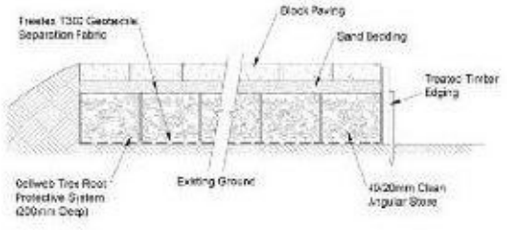
Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to nearby tree roots. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CellWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CellWeb™ significantly reduces surface rutting, increasing the long-term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CellWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CellWeb's green credentials.

- No excavation – Soil structure remains undisturbed; risk of root damage minimised.
- Porous infill – Allows tree roots to conduct moisture and gas exchange.
- No compaction – No need to compact the infill to achieve a load-bearing structure.
- Lateral stability – Structure remains rigid to vertical loads.





Please call
01455 617 139
or email sales@geosyr.co.uk
for further information.

Wide product range

Large stock holding

Next day delivery

Appendix 9: Example Methodology for Construction of Surface

(This document has been produced by Geosynthetics Ltd for the installation of the Cellweb Tree Root Protection System – it does not apply to other products which may serve a similar purpose).

When considering damage to tree roots, in applications of vehicular access and parking, the risk of oxygen depletion caused by compaction of subsoil's, site clearance damaging the root source and type of reinforcement are areas which need to be given due consideration.

Other risk factors are:

• Creating an impermeable surface	
• Causing a rise in the water table due to construction	
• Increasing ground level	
• Contamination of subsoil's	
1. Compaction	
When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting traffic to be proposed:	
• Californian Bearing ratio (CBR) – Standard test method for measuring soil strength	
• Soil types	
• Water table	
• Maximum load (vehicles)	
• Acceptable rut depth	
• Reinforcement type	Cellweb Cellular Confinement 150mm deep

Type and Depth of engineered infill material	Clean, angular. Usually 40mm to 20mm.
2. Dig (site strip)	
Site stripping does damage some root structure prior to construction; however, the use of no-dig construction elevates the access road requiring edge protection.	
3. No dig	
3.1. Remove surface vegetation	Use a suitable herbicide suitable for the specific vegetation and not harmful to the tree root system
3.2. Place geotextile separation filtration layer	Use a Treetex T300 non woven Goetextile over the prepared sub-grade. Overlap dry joints by 300mm.
	The three dimensional cell structure, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system
3.4. Edge restraint	A treated timber edging is usually acceptable.
4. Cellular Confinement and Backfill Material.	

Expand the Cellweb 2.56m wide panels to the full 8.1 metre length. Pin the Cellweb panels with staking pins to anchor open the cells and staple adjacent panels together to create a continuous mattress. Infill the Cellweb with a no fines angular granular fill (typically 4-20mm) within each open cell. The use of cellular confinement reduces the bearing pressure on the subsoil by stabilising aggregate surfaces against rutting under wheel loads. Comparisons between cellular confinement and traditional aggregate and geogrid-reinforced structures demonstrate a 50% reduction in construction thickness of the granular material.

5. Surfacing Options
Block Paving: 5.1. Lay second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections 5.2. Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth. 5.3. Place block pavers as per manufacturers instructions.
Tarmac: Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.
Loose Gravel: 5.4. Ensure Cellweb is completely filled. 5.5. Place decorative aggregate to required depth NOTE: A treated timber edge should be provided to restrict gravel movement.
Grass Blocks: 5.6. Place second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections 5.7. Place 50/50 rootzone bedding layer to the required depth 5.8. Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix. 5.9. Seed as per architects instructions. (Alternatively the Grass Blocks may be infilled with gravel.) Concrete Slab 6.0 Lay Cellweb as previous and place second layer of Treetex Geotextile directly over the filled panels. Pour concrete base as specified.

If you have any queries about installation please contact Geosynthetics Ltd on 01455 617139.

Appendix 10: Site Guidance for working in the RPA

General Guidance for Working in RPAs

a) **What is the purpose of this guidance?**

This guidance sets out the general principle that must be followed when working in the RPA. Where more detail is required, it will be supplemented by illustrative specifications in other appendices to this document. Before work starts on site, the purpose of this guidance is to demonstrate to the LPA that tree protection issues have been properly considered and to provide a written record of how they will be implemented.

Once the site work has started, this guidance is specifically for the site personnel to help them understand what has been agreed and explain what is required to fully meet their obligations to protect trees. All personnel working in the RPA must be properly briefed about their responsibilities towards important trees based on this guidance.

b) **What are the RPAs?**

RPAs are the areas surrounding important trees where disturbance must be minimised if they are to be successfully retained. All RPAs close to the construction area are identified on the Tree Protection Plan attached to this report. Damage to roots re degradation of the soil through compaction and/or excavation within the RPA will damage the tree. Any work operations within the RPA must be carried out with great care if trees are to be successfully retained.

c) **When should this guidance be followed?**

Anyone entering a RPA must follow this guidance if the trees are to be retained unharmed. Anyone working in a RPA must take care to minimise excavation into existing soil levels and limit any fill or covering that may affect soil permeability. There are two main scenarios where this guidance must be followed when entering and working within a RPA:

i. Removal of existing surfaces/structures and replacement with new surfaces, structures or landscaping

ii. Preparation and installation of new surfacing structures and/or landscaping.

d) **Where does this guidance apply?**

This guidance should always be read in conjunction with the site plans illustrating the areas where specific precautions are necessary. Each area where precautions are required is annotated on the plans as identified on their keys. All plans are illustrative and are intended to be interpreted in the context of the site conditions when the work commences. All protective measures should be installed according to the prevailing site conditions and agreed as satisfactory by the appropriate supervising officer before any demolition or construction works commence.

e) **What references is this guidance based on?**

This guidance is based in the assumption that the minimum general standards for development issues are those set out in BS5837 (2012): Trees in relation to design, demolition and construction – Recommendations, and the NJUG Vol.4 Issue 1: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees.

f) **Preventing adverse impact to the RPA beyond the immediate work area**

Any part of the RPA beyond the agreed work area must be isolated from the work operations by protective barriers or ground protection to at least the minimum standard described in BS5837 for the duration of the work.

g) **Excavation and dealing with roots**

All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.

If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 10-20cm behind the final face of the excavation.

Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots 2.5-10cm in diameter should only be cut in exceptional circumstances. Roots greater than 10cm in diameter should only be cut after consultation with the appropriate supervisory officer.

h) **Arboricultural supervision**

Any work within the RPA requires a high level of care. Qualified arboricultural supervision is essential to minimise the risk of misunderstanding and misinterpretation. Site personnel must be properly briefed before any works commence.

Ongoing work must be inspected regularly, and on completion, the work must be signed off by the arboriculturist to confirm compliance by the contractor. In the context of this guidance, an appropriate supervising officer would be an arboriculturist.

Installation of new surfaces in RPAs

a) **Basic Principles**

New surfacing is potentially damaging to trees because it may require changes to existing ground levels. This can result in damage to the soil structure affect the efficient exchange of water and gases in and out of the soil. Mature and over mature trees are much more likely to suffer as a result of these changes. These impacts can be minimised by reducing the extent of changes within the RPA. The most suitable surface will be one that is permeable (allowing the movement of water and gas), load bearing (to avoid compaction) and requires little or no excavation (to limit root damage). The actual specification is an engineering issue that needs to be addressed by a suitably qualified professional, and is beyond the scope of this report.

b) **Establish the depth of excavation and surface gradient**

The precise location and depth of roots within the soil is unpredictable and can only be established once digging has commenced. Ideally, all RPAs should be no-dig, but this is often not possible on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted. Some limited excavation may be required to achieve this, and this is not necessarily damaging to trees if it is done carefully and no large roots are cut. The top 5mm of soil on grass surfaces is unlikely

to contain any tree roots and therefore the removal of this will not impact the tree. It may be possible to dig deeper than this depending on local conditions, but this would need to be assessed by the retained ACoW.

On undulating surfaces, finished gradients/levels must be planned with sufficient flexibility so as to allow changes to occur if the excavation of high points reveals unexpected large roots. If roots are less than 25mm in diameter, it would normally be acceptable to cut these. However, for roots over 25mm diameter, cutting them may cause damage to the tree and further excavation may not be possible. In this case, the surrounding levels must be adjusted to take account of these high points, by filling with suitable material. If this is not possible and it is necessary to cut larger roots, discussions should be held with the retained ACoW before any final decision is made.

c) **Base and finish layer**

Once the sub-base layer is finished, the load-spreading surface is installed on top, without compaction. Generally, the load-spreading surface will normally be cellular and filled with crushed stone – care must to be taken as different products produce different results, and the detail must be confirmed prior to installation. Suitable finishes included washed gravel, permeable tarmac or permeable block paving. For lightly loaded surfaces such as pedestrian footpaths, preformed concrete slabs may be appropriate if the sub base is prepared as detailed above.

d) **Edge Retention**

Conventional kerb retention set in concrete trenches is likely to cause damage to the roots and should be avoided. Effective edge retention within the RPA must be custom designed to avoid significant excavation in to existing soil surfaces. Generally, the use of pre-formed edging secured by metal pins or wooden pegs will be sufficient to ensure minimal impact on the trees.

e) **Installing new surfacing on top of existing surfacing**

It may be possible/preferable in some instances to use existing surfaces as the base for a new surface. This will not normally result in any significant excavation that could damage the roots, so no special precautions are required. However, if large roots appear above the existing surface, then the precautions and procedures detailed above must be followed.

Client:	Cascade Consulting Ltd		Reference: 14-1189/3376/02 u1
Site:	Richmond College	Surveyor: Robert Davidson / Stephen Westmore	Date of survey: 10/09/2014

Key to Notations

		Age Class		Definition	Category Grading				
Stem Dia	Stem diameter (mm) at 1.5m above ground level	Y	Young	1st 1/3rd of life expectancy	Category		ULE	Sub category	
C.C.	Height of crown clearance above ground level	EM	Early Mature	2nd 1/3rd of life expectancy	A	High Quality & Value	40+	1	Mainly arboricultural value
L.B.	Lowest branch height in metres	M	Mature	Final 1/3rd of life expectancy	B	Moderate Quality & Value	20-40	2	Mainly landscape value
U.L.B.	Direction of Lowest Branch	OM	Over Mature	Beyond life expectancy & in natural decline	C	Low Quality & Value	10-20	3	Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	Great age & good high conservation value	U	Dead, dying or dangerous	<10		
Physiological condition	Good	No significant health problems	Fair	Symptoms of health that can be remediated	Poor	Significant ill health			
Structural condition	Good	No significant defects	Fair	Significant defects that can be remediated	Poor	Significant defects with no remedy			

Tree No.	Tag Ref	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LE (m)	CLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
1	G1	Various	Various sp	9	400	1	6	6	4	4	1	1	South	EM	Good	Good	Prominent group consisting of 2 ash and 1 norway maple	None	20-40	B2	72	5
2	G2	Ash	Fraxinus sp	11	450	1	6	6	7	6	1	2	South	M	Good	Poor	Base damage Group of 3 with thin foliage, deadwood and poor unions	None	10-20	C2	113	6
3	T3	Red Horse Chestnut	Aesculus x carnea	12	430	1	4	4	4	4	1	2	East	M	Fair	Poor	Canker on main stem. Supressed canopy east. Off-site	None	10-20	C1	82	5
4	T4	Horse Chestnut	Aesculus hippocastanum	14	660	1	6	6	4	4	1	1	South	EM	Good	Good	Prominent group consisting of 2 ash and 1 norway maple	None	10-20	C1	191	8
5	T5	Horse Chestnut	Aesculus hippocastanum	12	700	1	6	6	6	6	2	3	West	OM	Poor	Poor	Large cavity on south of main stem	None	>10	U	222	8
6	T6	Cypress	Chamaecyparis sp	6	200	6	3	3	3	3	-	1	South	OM	Poor	Poor	Poor quality tree providing limited screening	None	>10	U	18	2
7	G7	Red Horse Chestnut	Aesculus carnea	13	600	1	6	6	6	6	3	3	North	M	Good	Fair	Group of 2 off-site trees	None	20-40	B2	163	7
8	T8	Sycamore	Acer pseudoplatanus	16	660	1	8	8	8	8	2	2	North	M	Good	Good	Off-site	None	20-40	B1	191	8
9	G9	Various	Various sp	16	750	1	7	7	7	7	2	2	North	M	Fair	Fair	Large off-site prominent group consisting of sycamore and horse chestnut	None	20-40	B2	254	9
10	G10	Various	Various sp	8	200	1	3	3	4	4	-	1	South	EM	Fair	Fair	Poor species group of young/early mature trees	None	20-40	C2	18	2
11	T11	Alder	Alnus sp	16	550	1	6	6	6	4	1	1	North	M	Fair	Poor	Poor union with significant inclusion between 2 main stems	Fe	>10	U	165	7
12	T12	Hornbeam	Carpinus betulus	9	300	2	7	6	6	6	1	-	South	M	Fair	Poor	Main stem leans to north	None	10-20	C1	64	5
13	T13	Alder	Alnus sp	16	650	1	6	7	7	7	1	3	East	M	Good	Fair	Poor form. Multiple stems from 3m	None	10-20	C1	206	8
14	H14	Cypress	Chamaecyparis sp	2.5	50	1	1	1	1	1	-	-	South	M	Fair	Fair	Maintained hedge providing low value screening	None	10-20	C2	8	1
15	G15	Various	Various sp	8	400	1	4	4	4	4	2	2	South	M	Fair	Fair	Poor form. Hornbeam and cherry	None	10-20	C2	72	5
16	T16	Pinus	Pinus sp	12	600	1	5	5	5	4	2	3	South	M	Good	Fair	None	None	10-20	C1	163	7
17	T17	Pinus	Pinus sp	8	400	1	4	5	4	4	2	3	North	M	Fair	Fair	Poor form	None	20-40	B1	72	5
18	T18	Pinus	Pinus sp	10	350	1	4	5	4	4	2	3	North	EM	Good	Good	None	None	20-40	B1	55	4
19	T19	Pinus	Pinus sp	8	250	1	-	-	-	-	-	-	North	OM	Poor	Poor	Dead	Fe	>10	U	55	4
20	G20	Poplar	Populus sp	12	300	1	4	4	4	4	2	1	North	EM	Fair	Fair	Group of 5 poor quality poplar	None	20-40	C2	41	4
21	T21	Hornbeam	Carpinus betulus	8	430	1	5	5	4	3	1	2	North	EM	Good	Good	Poor form. Epicormic growth at base	None	20-40	B1	82	5
22	T22	plums	Prunus sp	10	410	1	5	5	4	4	2	2	South	M	Good	Fair	None	None	20-40	B1	72	5
23	G23	Poplar	Populus sp	12	550	1	5	5	5	5	2	-	South	OM	Poor	Poor	Poor quality. Off-site group	None	>10	U	137	7
24	T24	Birch	Betula sp	12	410	1	5	5	5	5	2	4	North	M	Fair	Poor	Base damage	None	10-20	C1	72	5
25	T25	Sycamore	Acer pseudoplatanus	10	600	4	4	5	5	5	-	-	North	M	Fair	Poor	Multiple raised stems on/off site	None	10-20	C1	163	7
26	T26	Alder	Sambucus nigra	3	150	4	2	2	2	2	2	-	North	M	Fair	Fair	None	None	10-20	C1	10	2
27	T27	Apple	Malus sp	6	150	1	3	2	2	3	2	2	South	EM	Fair	Fair	Twin stem at 1.5m	None	10-20	C1	14	2
28	T28	Birch	Betula sp	11	270	1	4	3	4	4	1	3	North	M	Good	Good	None	None	20-40	B2	34	3
29	T29	Apple	Malus sp	6	280	2	5	3	2	5	1	1	North	M	Fair	Poor	Supressed canopy. Poor union	Fe	>10	U	34	3
30	T30	Pripe Plum	Prunus cerasifera 'Pissardii'	6	550	1	5	5	4	5	2	2	West	OM	Fair	Poor	Ganoderma at base	Fe. Remove stump	>10	U	137	7
31	T31	Apple	Malus sp	3	175	3	4	4	2	3	2	1	North	EM	Fair	Fair	Easy trip cable in the short term	None	20-40	C1	14	2
32	T32	Apple	Malus sp	3	90	1	2	2	2	2	1	2	East	Y	Good	Good	Easy trip cable in the short term	None	20-40	C1	5	1
33	T33	Cedar	Cedrus sp	17	650	1	7	7	6	6	1	2	South	M	Good	Good	Prominent tree. Leans to south east	None	20-40	B1	206	8
34	T34	Sycamore	Acer pseudoplatanus	11	250	1	4	2	4	5	3	2	North	EM	Fair	Fair	Twin stem. Off site	None	40+	C1	28	3
35	T35	Sycamore	Acer pseudoplatanus	15	510	1	7	7	7	8	4	2	North	M	Fair	Fair	Prominent tree. Canopy pruned to south	None	20-40	B1	259	10

Key to Notations

Stem Dia	Stem diameter (mm) at 1.5m above ground level		Age Class		Definition		Category Grading		ULE	Sub category	
C.C.	Height of crown clearance above ground level		EM	Early Mature	2nd Third of life expectancy		A	High Quality & Value	40+	1	Mainly arboricultural value
L.H.	Lowest branch height in metres		M	Mature	Final Third of life expectancy		B	Moderate Quality & Value	20-40	2	Mainly landscape value
L.U.B.	Direction of Lowest Branch		OM	Over Mature	Beyond life expectancy & in natural decline		C	Low Quality & Value	10-20	3	Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years		V	Veteran	Great age & possible high conservation value		U	Dead, dying or dangerous	<10		
Physiological condition		Good	No significant health problems		Fair	Symptoms of health that can be remediated		Poor	Significant ill health		
Structural condition		Good	No significant defects		Fair	Significant defects that can be remediated		Poor	Significant defects with no remedy		

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LE (m)	CLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat.	RPA (m2)	RPA Radial distance (m)
36	G36	Various	Various sp	6	300	1	3	3	3	3	-	-	North	M	Fair	Fair	Pulpe pium belle sycamore cypress and elder. Provides screening to property beyond	None	10-20	C2	41	4
37	T37	Sycamore	Acer pseudoplatanus	16	424	2	4	3	4	4	2	-	North	EM	Fair	Poor	Twin stem. Ivy on base to 1.5m. Off-site	None	20-40	C1	82	5
38	G38	Cherry Laurel	Prunus laurocerasus	7	300	1	4	4	4	4	-	-	South	M	Fair	Poor	Significantly reduced to stem. New bud	Fell	>10	U	41	4
39	T39	Sycamore	Acer pseudoplatanus	12	600	1	3	3	3	3	1	3	West	M	Fair	Fair	Heavy pruned. Unlikely to recover	None	10-20	C1	163	7
40	H40	Cherry Laurel	Prunus laurocerasus	2.5	130	1	1	1	1	1	-	-	North	M	-	-	Boundary hedge	None	10-20	C2	7	2
41	T41	Sycamore	Acer pseudoplatanus	9	450	6	4	4	4	4	4	2	West	EM	Fair	Fair	Multiple stems	None	10-20	C2	113	6
42	T42	Alder	Alnus sp	10	520	1	4	4	4	4	2	2	West	M	Good	Good	None	None	20-40	B1	123	6
43	G43	Prunus (Group)	Prunus spp	7	400	1	6	6	6	6	2	2	South	M	Fair	Fair	Prom ment group of 3	None	20-40	B2	72	5
44	T44	Locust Tree / False Acacia (goden or tual)	Robinia pseudoacacia 'Frisia'	14	260	1	2	3	4	3	3	2	North	EM	Good	Fair	Twin stem with inclusion	None	10-20	C1	28	3
45	G45	Cypress (Group)	Chamaecyparis spp	5	300	1	4	4	4	4	1	1	North	M	Fair	Fair	Group of 3 on boundary edge providing screening	None	10-20	C2	41	4
46	G46	Cypress (Group)	Chamaecyparis spp	5	300	1	4	4	4	4	1	1	North	M	Fair	Fair	Group of 3 on boundary edge providing screening	None	10-20	C2	66	4
47	G47	Western Red Cedar	Thuja plicata	10	300	1	4	4	4	4	1	1	North	M	Fair	Fair	Group of 3 on boundary edge providing screening	None	10-20	C2	41	4
48	T48	Pinus	Pinus sp	6	400	1	6	6	6	6	2	2	East	M	Fair	Poor	Ganoderma at base	Fell. Remove stump	>10	U	72	5
49	G49	Cypress (Group)	Chamaecyparis spp	12	250	1	2	2	2	2	-	3	East	M	Fair	Fair	Group in limited rooting environment against existing building	None	10-20	C2	28	3
50	G50	Various	Various sp	8	450	1	4	4	4	4	-	4	East	M	Fair	Fair	Off-site group of cherry laurel and cypress	None	10-20	C2	52	5
51	T51	Snowy Mesp	Amelanchier sp	6	214	3	3	2	3	2	2	1	West	M	Fair	Poor	Heavy pruned to stem. Semi-mature. Unlikely to recover	Fell	>10	U	23	3
52	T52	Hawthorn	Crataegus sp	3	250	1	-	-	-	-	-	-	North	OM	Poor	Poor	Dead	Fell	>10	U	41	4
53	G53	Various	Various sp	14	450	1	4	4	4	4	-	1	East	M	Good	Good	Group of 3 at end of lane	None	20-40	B2	52	5
54	T54	Lime	Tilia sp	7	330	1	4	4	4	4	1	2	South	EM	Good	Good	None	None	20-40	B1	46	4
55	T55	Pine	Pinus sp	7	450	1	4	4	4	3	1	2	North	M	Good	Good	Stem damage. Root exposure	None	20-40	B1	52	5
56	G56	Various	Various sp	8	250	1	4	4	4	4	1	1	West	EM	Good	Good	Linear group of 2 cypress, 2 cherry and 1 lime	None	20-40	B2	28	3
57	T57	Oak	Quercus sp	11	600	1	4	4	4	5	2	4	West	OM	Poor	Poor	Heavy pruned. Unlikely to recover	Fell or create 3-4m habitat mound with Monitor as arm in arm	>10	U	259	10
58	T58	Lime	Tilia sp	5	330	1	3	4	4	3	2	2	West	EM	Good	Good	None	None	20-40	B1	46	4
59	T59	Horse Chestnut	Aesculus hippocastanum	13	700	1	6	6	6	6	2	2	North	M	Fair	Good	Significant arm wise damage. Off-site	None	20-40	B1	222	8
60	T60	Horse Chestnut	Aesculus hippocastanum	13	660	1	7	7	7	8	2	3	West	M	Fair	Good	Significant arm wise damage. Off-site	None	20-40	B1	191	8
61	T61	Red Horse Chestnut	Aesculus carnea	7	300	1	4	4	4	3	2	2	North	EM	Good	Good	Multiple stems from 1.5m	None	20-40	B1	41	4
62	T62	Prunus	Prunus sp	5	210	1	3	3	3	4	-	1	West	EM	Good	Fair	Easily replaceable in the short term	None	10-20	C1	16	2
63	T63	Birch (cultivar)	Betula sp cv	5	150	1	3	2	2	2	2	2	West	EM	Good	Good	Easily replaceable in the short term	None	20-40	C1	7	2
64	T64	Maple (cultivar)	Acer sp cv	6	80	1	3	3	3	3	1	1	North	EM	Good	Fair	Easily replaceable in the short term. Included unions	None	10-20	C1	3	1
65	T65	Birch	Betula sp	5	150	1	4	6	2	4	1	2	West	EM	Good	Fair	Easily replaceable in the short term	None	10-20	C1	16	2
66	T66	Prunus	Prunus sp	11	380	1	6	6	6	6	2	2	North	M	Good	Fair	Pollarded in raised cracked planter	None	10-20	C1	64	5
67	G67	Snowy Mesp (Group)	Amelanchier spp	6	170	1	4	4	4	4	1	-	East	M	Fair	Fair	Little arboricultural significance	None	10-20	C2	14	2

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Key to Notations									
		Age Class		Definition	Category Grading				
					Category		ULE	Sub category	
Stem Dia	Stem diameter (mm) at 1.5m above ground level	Y	Young	1st 1/3rd of life expectancy	A	High Quality & Value	40+	1	Mainly arboricultural value
C.C.	Height of crown clearance above ground level	EM	Early Mature	2nd 1/3rd of life expectancy	B	Moderate Quality & Value	20-40	2	Mainly landscape value
L.B.	Lowest branch height in metres	M	Mature	Final 1/3rd of life expectancy	C	Low Quality & Value	10-20	3	Mainly cultural value
D.L.B.	Direction of Lowest Branch	OM	Over Mature	Beyond life expectancy & in natural decline	U	Dead, dying or dangerous	<10		
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	Great age & poss. high conservation value					
Physiological condition	Good	No significant health problems	Fair	Symptoms of health that can be remediated	Poor	Significant ill health			
Structural condition	Good	No significant defects	Fair	Significant defects that can be remediated	Poor	Significant defects with no remedy			

Tree No.	Tag Ref	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LE (m)	DLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
68	T68	Swamp Cypress	Taxodium distichum	20	670	1	6	6	6	6	2	3	East	M	Good	Good	Prominent tree in excellent health. Numerous surface roots. Retention problematic due to proximity of existing buildings	None	40+	A1	206	8
69	T69	Eucalyptus	Eucalyptus globulus	14	550	1	4	6	6	6	2	4	East	M	Fair	Fair	Prolific ivy. Twin stem from 5m. Possibly a B grade following further investigation after ivy removal	Strip ivy and re-inspect	20-40	C1	137	7
70	G70	Hornbeam	Carpinus betulus	16	500	1	6	6	6	6	2	1	North	M	Good	Fair	Group of 2. Minor deadwood. One tree poorly pruned on north side	None	20-40	B2	113	6
71	T71	Fig	Ficus carica	5	140	1	-	2	3	3	-	-	South	M	Fair	Poor	Leader stem failure	None	10-20	C1	10	2
72	T72	Cypress	Chamaecyparis sp	15	341	4	2	2	2	2	-	1	-	M	Fair	Fair	Fastigiate form	None	10-20	C1	53	4
73	T73	Pinus	Pinus sp	8	350	2	4	4	4	4	2	1	East	M	Fair	Poor	Twin stem included from 0.5m	None	10-20	C1	55	4
74	T74	Ash cultivar	Fraxinus sp cv	15	370	1	6	4	6	5	2	3	North	M	Good	Good	None	None	20-40	B1	64	5
75	T75	Persian Ironwood	Parrotia persica	13	523	6	3	7	6	6	2	1	North	M	Good	Fair	Prominent tree	None	20-40	B1	124	6
76	G76	Sycamore	Acer pseudoplatanus	12	350	1	4	4	4	4	3	2	South	M	Fair	Fair	Group of 3. Prolific ivy. Positioned close to wall	None	20-40	C2	55	4
77	G77	Sycamore	Acer pseudoplatanus	22	350	1	6	6	6	6	2	2	South	M	Fair	Fair	Group of 2 multistem trees	None	20-40	C2	55	4
78	G78	Goat Willow	Salix caprea	7	225	1	4	4	4	4	1	1	South	M	Fair	Fair	Little arboricultural significance	None	10-20	C2	23	3
79	T79	Pinus	Pinus sp	18	637	2	7	8	7	8	2	-	North	M	Good	Good	Large prominent tree with limited useful life remaining. Braced poorly. Twin stem from base	None	10-20	C1	177	8
93	T93	Ash (Common)	Fraxinus excelsior	5	170	1	3	3	3	3	2	2	North	Y	Good	Good	Limited rooting environment	None	10-20	C1	14	2
94	T94	Ash (Common)	Fraxinus excelsior	6	150	1	4	4	3	3	2	2	West	Y	Good	Good	Limited rooting environment	None	10-21	C1	10	2
95	T95	Ash (Common)	Fraxinus excelsior	7	170	1	4	3	4	3	2	2	South	Y	Fair	Poor	Stem damage. Root girdling	None	<10	U	14	2
96	T96	Ash (Common)	Fraxinus excelsior	7	130	1	3	3	3	3	2	3	North	Y	Fair	Fair	Limited rooting environment	None	10-20	C1	7	2
97	T97	Ash (Common)	Fraxinus excelsior	6	120	1	3	2	2	1	2	2	South	Y	Poor	Poor	Poor vigour	None	<10	U	7	2
98	T98	Ash (Common)	Fraxinus excelsior	5	140	1	2	2	2	2	3	3	North	Y	Poor	Poor	Poor rooting environment. Poor vigour. Stem decay	None	<10	U	10	2
100	T100	Ash (Common)	Fraxinus excelsior	7	190	1	4	4	4	3	2	2	South	EM	Good	Fair	Limited rooting environment	None	10-20	C1	16	2
101	T101	Ash (Common)	Fraxinus excelsior	7	190	1	4	4	4	4	1	-	South	EM	Fair	Fair	Open crack at included union. Limited useful life	None	10-20	C1	16	2
102	G102	Ash (Common)	Fraxinus excelsior	8	200	1	3	3	3	3	-	1	South	EM	Fair	Fair	Linear group providing screening to playing fields	None	10-20	C2	18	2
103	T103	Ash (Common)	Fraxinus excelsior	8	200	1	3	3	4	2	3	2	East	EM	Good	Fair	Recently worked on. Good form	None	20-40	B1	18	2
104	T104	Ash (Common)	Fraxinus excelsior	5	124	3	2	2	3	2	2	-	East	Y	Poor	Poor	Twin stem from base	None	<10	U	7	2
105	T105	Ash (Common)	Fraxinus excelsior	6	150	1	3	2	2	2	2	2	South	Y	Poor	Fair	Limited rooting environment	None	<10	U	10	2
106	T106	Ash (Common)	Fraxinus excelsior	6	140	1	3	3	3	2	-	1	South	EM	Fair	Poor	Poor form	None	10-20	C1	10	2
107	T107	Alder (Common)	Alnus glutinosa	5	150	1	2	3	3	2	-	2	South	EM	Fair	Fair	None	None	20-40	B1	10	2
108	T108	Alder (Common)	Alnus glutinosa	3.5	80	1	2	2	2	2	-	1	North	Y	Fair	Fair	None	None	10-20	C1	3	1
109	T109	Alder (Common)	Alnus glutinosa	3	90	1	1	2	1	1	-	1	West	Y	Fair	Fair	None	None	10-20	C1	5	1
110	G110	Ash (Common)	Fraxinus excelsior	4	100	1	2	2	2	2	2	1	West	Y	Poor	Poor	Group of 2 poor quality trees	None	<10	U	5	1

Key to Notations

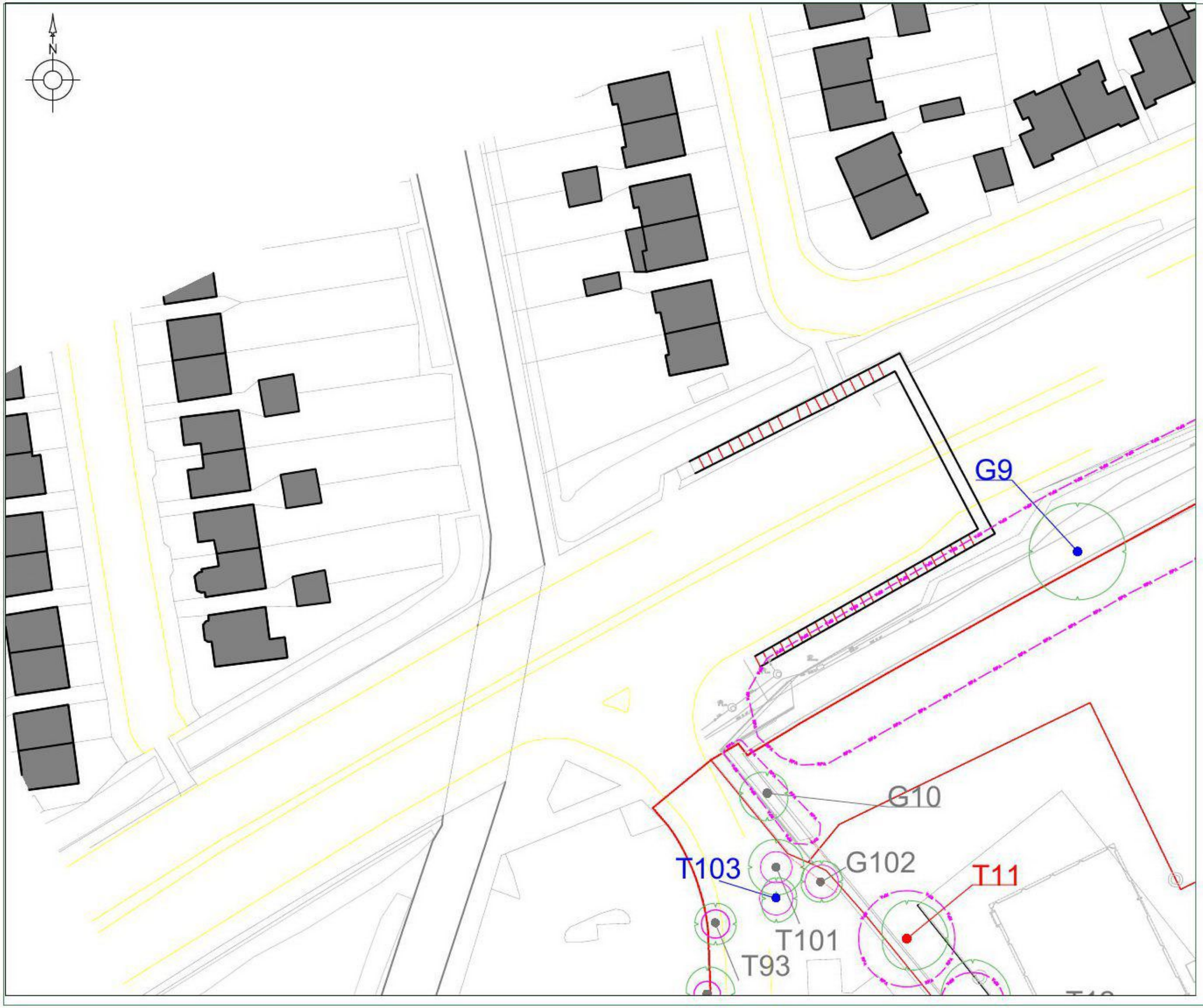
Stem Dia	Stem diameter (mm) at 1.5m above ground level		Age Class		Definition		Category Grading			ULE	Sub category
C.C.	Height of crown clearance above ground level		EM	Early Mature	2nd Third of life expectancy		A	High Quality & Value		40+	1 Mainly arboricultural value
L.H.	Lowest branch height in metres		M	Mature	Final Third of life expectancy		B	Moderate Quality & Value		20-40	2 Mainly landscape value
U.L.B.	Direction of Lowest Branch		OM	Over Mature	Beyond life expectancy & in natural decline		C	Low Quality & Value		10-20	3 Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years		V	Veteran	Great age & poss high conservation value		U	Dead, dying or dangerous		<10	
Physiological condition		Good	No significant health problems		Fair	Symptoms of health that can be remediated		Poor	Significant ill health		
Structural condition		Good	No significant defects		Fair	Significant defects that can be remediated		Poor	Significant defects with no remedy		

Tree No.	Tag Ref.	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m) N	E	S	W	CC (m)	LE (m)	CLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat.	RPA (m2)	RPA Radial distance (m)
111	T111	Horse Chestnut	Aesculus hippocastanum	4	230	1	3	4	3	3	-	1	West	EM	Poor	Poor	Stem decay	None	<10	U	23	3
112	G112	Ash (Common)	Fraxinus excelsior	6	150	1	3	3	3	3	-	1	West	EM	Fair	Poor	Self seeded on edge of retaining wall	None	<10	U	10	2
113	T113	Ash (Common)	Fraxinus excelsior	10	370	1	6	4	6	6	2	2	West	EM	Good	Fair	Good form end of linear group G102	None	20-40	B1	64	5
114	T114	Alder (Common)	Alnus glutinosa	3.5	100	1	2	2	2	2	1	2	West	Y	Fair	Fair	None	None	10-20	C1	6	1
115	T115	Alder (Common)	Alnus glutinosa	3.5	120	1	2	2	2	2	1	2	North	Y	Fair	Fair	None	None	10-20	C1	7	2
116	T116	Alder (Common)	Alnus glutinosa	2.5	100	1	1	1	1	1	1	1	East	Y	Fair	Fair	None	None	10-20	C1	6	1
117	T117	Alder (Common)	Alnus glutinosa	3	130	1	1	1	1	1	1	1	East	Y	Fair	Fair	None	None	10-20	C1	7	2
118	T118	Horse Chestnut	Aesculus hippocastanum	3.5	110	1	2	2	2	2	2	2	North	Y	Fair	Fair	None	None	10-20	C1	6	1
119	T119	Prunus	Prunus sp	4	150	1	4	4	4	3	2	2	South	EM	Poor	Fair	Poor quality	None	10-20	C1	10	2
120	T120	Alder (Common)	Alnus glutinosa	6	160	2	2	3	2	3	1	2	West	Y	Fair	Fair	Two stem	None	10-20	C1	14	2
121	T121	Oak	Quercus sp	6	60	1	1	1	1	1	2	2	West	Y	Good	Good	None	None	20-40	C1	3	1
126	T126	Norway Maple	Acer platanoides	7	210	1	4	3	3	5	2	2	North	EM	Fair	Fair	None	None	20-40	B1	16	2
127	T127	Oak	Quercus sp	8	240	1	6	4	5	5	1	2	East	EM	Good	Fair	None	None	20-40	B1	26	3
128	T128	White Willow	Salix alba	12	650	2	4	5	4	4	1	1	East	OM	Fair	Poor	Old coppice stem decay	None	<10	U	222	8
151	T151	Lime	Tilia sp	18	550	1	6	6	7	6	1	2	North	M	Good	Good	None	None	20-40	B1	163	7
152	T152	Red Horse Chestnut	Aesculus carnea	13	640	1	6	7	6	6	1	2	West	M	Fair	Fair	Stem decay/Canker	None	10-20	C1	137	7
153	T153	Lime	Tilia sp	21	760	1	7	8	7	7	2	2	North	M	Good	Good	Minor deadwood Lean east	None	20-40	B1	254	9
154	T154	Locust Tree / False Acacia	Robinia pseudoacacia	16	880	1	9	9	7	7	2	2	East	M	Good	Good	Excellent example of species	None	40+	A1	346	11
155	G155	Locust Tree / False Acacia	Robinia pseudoacacia	12	260	1	3	3	3	3	1	2	South	EM	Good	Good	Amenity woodland group Acacia dominant	None	20-40	B2	28	3
156	T156	Lime	Tilia sp	20	750	1	6	6	6	6	2	2	North	M	Good	Good	None	None	20-40	B1	256	10
157	T157	Lombardy Poplar	Populus nigra 'Italica'	25	1500	1	4	4	4	4	2	2	West	M	Good	Good	Excellent example of species	None	20-40	B1	1633	23
158	T158	Norway Maple	Acer platanoides	10	350	1	4	4	5	5	2	2	South	EM	Good	Good	Rooting ridging	None	40+	B1	72	5
159	G159	Locust Tree / False Acacia	Robinia pseudoacacia	16	1150	1	10	7	7	6	2	2	West	OM	Good	Fair	Stem decay Group of 2 Fungal fruiting bodies on main stem Major deadwood	None	<10	U	658	14
160	T160	Oak (Common)	Quercus robur	6	320	2	3	4	3	3	1	-	South	EM	Good	Fair	Two stem from ground	None	20-40	B1	46	4
161	T161	Hawthorn	Crataegus sp	6	400	1	1	1	1	1	2	2	East	M	Fair	Fair	Poor form	None	10-20	C1	72	5
162	T162	Oak (Common)	Quercus robur	8	270	1	3	3	3	3	-	1	South	EM	Good	Good	Good prospect	None	40+	B1	34	3
163	T163	Sycamore	Acer pseudoplatanus	5	300	1	3	3	3	3	-	1	South	M	Fair	Fair	Off site	None	10-20	C1	41	4
164	T164	Sycamore	Acer pseudoplatanus	4	100	1	2	2	2	2	-	1	South	Y	Fair	Poor	Self set in fence No arboricultural significance	None	10-20	C1	6	1
165	G165	Sycamore	Acer pseudoplatanus	4	150	1	2	2	2	2	-	1	North	Y	Fair	Poor	Self seeded in fence	None	10-20	C1	10	2
166	T166	Sycamore	Acer pseudoplatanus	6	160	1	2	2	2	2	-	-	North	Y	Fair	Poor	Self seeded in fence	None	10-20	C1	10	2
167	G167	Sycamore	Acer pseudoplatanus	6	140	1	2	2	2	2	-	-	North	Y	Fair	Poor	Group of 2 self seeded in fence	None	10-20	C1	10	2
168	T168	Wild Service Tree	Sorbus aria	7	420	1	4	4	3	5	2	2	West	M	Fair	Fair	Lean to road	None	10-20	C1	82	5
169	T169	Prunus	Prunus sp	4.5	160	1	2	3	3	2	1	2	East	M	Fair	Fair	None	None	10-20	C1	10	2
170	T170	Oak (Common)	Quercus robur	14	800	1	10	8	9	9	2	3	West	M	Good	Good	Excellent example of species	None	40+	A1	290	10
171	T171	Sycamore	Acer pseudoplatanus	11	480	1	6	6	8	6	2	2	West	M	Good	Good	None	None	20-40	B1	103	6
172	G172	Sycamore	Acer pseudoplatanus	12	400	1	2	2	2	2	-	1	South	M	Fair	Fair	Group of 3 Poor form	None	20-40	C2	72	5

BS5837: 2012 Tree Survey

Key to Notations											
		Age Class		Definition		Category Grading			ULE	Sub category	
Stem Dia	Stem diameter (mm) at 1.5m above ground level	Y	Young	1st 1/3rd of life expectancy		Category					
C.C.	Height of crown clearance above ground level	EM	Early Mature	2nd 1/3rd of life expectancy		A	High Quality & Value		40+	1	Mainly arboricultural value
Lat.	Lowest branch height in metres	M	Mature	Final 1/3rd of life expectancy		B	Moderate Quality & Value		20-40	2	Mainly landscape value
U.L.B.	Direction of Lowest Branch	OM	Over Mature	Beyond life expectancy & in natural decline		C	Low Quality & Value		10-20	3	Mainly cultural value
U.L.E.	Useful Life Expectancy of tree in years	V	Veteran	Great age & poss high conservation value		U	Dead, dying or dangerous		<10		
Physiological condition	Good	No significant health problems		Fair	Symptoms of health that can be remediated	Poor	Significant ill health				
Structural condition	Good	No significant defects		Fair	Significant defects that can be remediated	Poor	Significant defects with no remedy				

Tree No.	Tag Ref	Species	Botanical Name	H (m)	Stem Dia.	No of Stems	Branch Spread (m)				CC (m)	LE (m)	CLE (m)	Age	PC	SC	Comments	Recommendations	ULE	Cat	RPA (m2)	RPA Radial distance (m)
							N	E	S	W												
173	T173	Horse Chestnut	Aesculus hippocastanum	18	570	1	8	8	7	7	2	2	West	M	Fair	Good	None	None	20-40	B1	430	12
174	G174	Elder	Sambucus nigra	4	200	1	2	2	2	2	1	1	West	OM	Poor	Poor	Group of 2. Poor quality	None	<10	U	18	2
175	T175	Pinus	Pinus sp	5	240	1	3	3	3	3	1	2	West	M	Good	Good	None	None	10-20	C1	28	3
176	T176	Purple Plum	Prunus cerasifera 'Pissardii'	6	350	1	4	6	4	1	1	2	West	M	Fair	Fair	None	None	10-20	C1	66	4
177	T177	Lime	Tilia sp	20	810	1	10	8	8	5	-	3	North	M	Good	Good	Prominent tree	None	20-40	B1	250	10



LEGEND

- Category A trees — T1
- Category B trees — T1
- Category C trees — T1
- Category U trees — T1
- Root Protection Area
- Indicative Site Boundary

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TITLE: Tree Constraints Plan - Plan 1	
PROJECT/SITE: Richmond College	
CLIENT: Cascade Consulting Ltd	
MAP REF: 3376/02/D14-1291	
REVISION: 2	
DATE: 26/11/14	SCALE: 1:500@A3
APPROVED BY: NB	PRODUCED BY: RD

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