

A47 Blofield to North Burlingham Dualling

Scheme Number: TR010040

Volume 6

6.2 Environmental Statement Appendices

Appendix 7.7 – Arboricultural Impact Assessment

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009

July 2021

Deadline 1

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009**

A47 Blofield to North Burlingham
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**ENVIRONMENTAL STATEMENT APPENDICES
APPENDIX 7.7 - ARBORICULTURAL IMPACT ASSESSMENT**

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Arboricultural Impact Assessment A47 – Blofield

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Quality Assurance

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK ADAS Ltd.

Version History

Version	Date	Amendment
A	August 2020	Initial Report
B	September 2020	Site clearance requirements updated
C	October 2020	Site clearance requirements updated
D	November 2020	References
E	November 2020	Site clearance requirements updated

1 Executive Summary

ADAS has been commissioned by Sweco, on behalf of Highways England, to assess the impact of design proposals for the A47 Blofield Scheme, which includes a redesign of the road layout including new fencing and drainage proposals. For the purpose of this report, reference to 'the site' means land encompassed by the blue site boundary line shown on the Site Plan (see DCO document 6.3 Figure 1.1: Site layout plan).

The survey was carried out by Mott MacDonald on the 1st and 2nd August 2018 in line with the requirements of 'BS5837:2012 Trees in Relation to Construction: Recommendations' (BS5837:2012).

The tree survey identified a total of 61 tree features including 21 individual trees, 33 groups of trees and seven hedgerows which have the potential to be impacted by the proposals.

In line with the recommendations contained within Table 1 of BS5837:2012, of these tree features, two individual trees were awarded a high quality A grade. 41 tree features, including 14 individual trees, 25 groups of trees and two hedgerows were awarded a moderate quality B grade. 18 tree features, including 5 individual trees, eight tree groups and five hedgerows were awarded a low quality C grade.

A number of trees and hedgerows have since been identified which were not included in the original survey. Preliminary details for these tree features have been included in Table 3, Section 3.1 of this report.

The location of the trees and their categories are shown on the Arboricultural Impact Assessment Plan contained in **Appendix 1**.

Based on the current proposals, eight individual trees, 10 groups of trees and two hedgerows will require complete removal in order to facilitate the proposed scheme. In addition, 14 tree groups and four hedgerows will require partial removal. Some special construction techniques are required to ensure other trees can be retained during the course of the works.

Broadlands District Council has confirmed that the footprint of this Scheme does not fall within a Conservation Area (CA) and that no trees are protected by a Tree Preservation Order (TPO). The nearest TPO trees are located at 105 to 109 Yarmouth Road in Blofield. These trees will not be affected by the Scheme but should be noted due to their close proximity to the design.

2 Introduction

2.1 The Author

This document has been prepared by Catherine Stent, an ADAS senior arboricultural consultant. Catherine is a professional member of the Arboricultural Association and has a BSc (Hons) in Arboriculture. Catherine has 13 years of experience within the arboricultural industry.

2.2 Client Instruction

This report was commissioned by Francesca Bell of Sweco on 6th May 2020 and is pertinent to the scheme known as 'A47 – Guyhirn Junction'.

2.3 Purpose of Report

The purpose of this document is to provide an evaluation of the effects of the proposed re-design of the junction on the existing trees on and adjacent to the site. Where necessary it will also provide recommendations to mitigate the loss or negative impact on the vegetation that the proposals may cause.

2.4 Tree Survey Methodology

An initial tree survey to establish the tree constraints on the site, was carried out by Mott MacDonald on the 1st and 2nd August 2018. ADAS have not verified the accuracy of this data. The results of the survey are contained in **Appendix 2**.

The information shown in **Table 1** below, was recorded as part of the tree survey.

Table 1: Tree Survey Schedule heading descriptions

Column Heading	Description
Tree Ref No.	All individual trees and groups of trees have been given a unique reference number. <ul style="list-style-type: none">▪ G = Group of trees▪ H = Hedgerow
Species	The English common name has been used.
Height (m)	Where possible tree heights are measured using a laser. In some instances such as in close groups of trees, one height may be measured and other nearby trees estimated from this height. Measurements are provided in metres.
Stem Diameter (mm)	S _n represents the stem number. Measurements are provided in millimetres at 1.5m above ground level for single stemmed trees.
Branch Spread (m)	Measured in metres to the four cardinal compass points (N, E, S, W).
Crown Clearance	(1) Height in metres of the first significant branch, and the direction of growth. (2) Height in metres of lowest part of crown.
Life Stage	The stage at which the tree is within its lifecycle (Y = young, SM = semi-mature, EM = early-mature, M = mature, OM = over mature, V = veteran)

Column Heading	Description
General Observations	Any relevant observations are recorded, with particular reference to structural and/or physiological condition.
Preliminary Management Recommendations	Recommendations are made where management work is required for reasons of health and safety or sound arboricultural management.
Estimated Remaining Contribution (years)	An estimation of how long the feature will contribute to its surroundings. This is recorded in bands of either <10 years, 10+ years, 20+ years and 40+ years.
Tree Quality Grading	The trees are graded to the categories prescribed within BS5837:2012 (U, A, B & C). Details of this grading system can be found in Appendix 3 .
Root Protection Area	Calculated as prescribed in section 4.6 of BS5837:2012, provided as an area (m ²) and a radius from the tree's stem (m). Further guidance on RPAs is provided in Appendix 4 .

2.5 Assumptions and Limitations

The Arboricultural Impact Assessment Plan (AIAP) contained in **Appendix 1** has been developed from the tree survey and tree location plan produced by Mott MacDonald in August 2018. ADAS has not verified the accuracy of the data. It is recommended that tree locations are verified on site prior to any works being undertaken.

This report is only intended for use by the person(s) or company named on the front cover.

This report is not a full hazard or risk assessment of trees, and should not be used as such.

Trees are living organisms and are constantly adapting to their ever changing environment. No tree is completely safe and there is no guarantee that problems or deficiencies may not arise in the future, which have not been identified in this report. Therefore this report is only valid for a period of 1 year from the date of the initial site inspection.

2.6 Legislation

2.6.1 Tree Preservation Orders and Conservation Areas

Local Planning Authorities (LPAs) have the power to preserve selected trees and woodlands through the making of Tree Preservation Orders (TPOs). Similarly, special provision is provided to trees located within Conservation Areas (CAs) which are not the subject of a TPO. The LPAs powers to do this are provided by the following Act of Parliament and its associated regulations:

- *Town and Country Planning Act 1990*
- *Town and Country Planning (Determination of Appeals by Appointed Persons) (Prescribed Classes) (Amendment) (England) Regulations 2008*
- *Town and Country Planning (Trees) (Amendment) (England) Regulations 2012*

The principal effect of a TPO is to prohibit the cutting down, uprooting, topping, lopping, wilful damage or wilful destruction of trees without first obtaining the consent of the relevant Local Authority.

Where works to trees within a CA are proposed, six weeks notification must first be given to the relevant Local Authority.

Unauthorised works to trees either protected by a TPO or those that are located within a CA, could result in an unlimited fine.

Broadlands District Council has confirmed that the footprint of this Scheme does not fall within a CA and that no trees are protected by a TPO. The nearest TPO trees are located at 105 to 109 Yarmouth Road in Blofield. These trees will not be affected by the Scheme but should be noted due to their close proximity to the design.

2.6.2 Wildlife Legislation

European protected species such as bats, dormice and great crested newts are protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. Other species that may be affected by tree works include breeding birds, badgers and reptiles which are protected under the Wildlife and Countryside Act 1981 (as amended). The design process should ensure protected species are considered during any redevelopment work. Tree work and the timing of tree work should be carefully considered.

2.7 Site Description

The Scheme is located on the outskirts of Norwich and aims to create a dual carriageway parallel to the existing single carriageway road between Blofield and Acle.

The surrounding area is predominantly open arable fields with occasional woodland and residential areas.

The majority of trees surveyed were small linear groups along field boundaries and the border of the existing A47. The trees are generally of moderate landscape value as they are beneficial for screening purposes, but with moderate to low arboricultural value.

There were two Category A (high retention value) trees surveyed on site, both mature common oaks. These were located at the eastern reach of the Scheme, bordering the private residential properties known as the Whitehouse and the Coach House.

The most important trees on site from a landscape perspective are groups G29, G30, G31, G32, G33 which collectively form the boundaries of the existing A47.

3 Arboricultural Impact Assessment

3.1 Overview

The tree stock has been assessed under the following categories and the findings summarised in **Table 2**:

- *Trees proposed for removal. This includes trees:*
 - *that are under the footprint of the proposed development*
 - *who's RPA's are heavily affected by the development*
 - *which are to be removed for reasons of sound arboricultural management.*
- *Retained trees that are at risk of damage through disturbance of RPAs or require extra protection due to their proximity to proposed work areas*
- *Retained trees which are unaffected by the development proposals*

Table 2: Arboricultural Impact Assessment

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
1	Oak	C	No	No	Fell - Earthworks adjacent to tree stem
2	Common Oak	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
3	Common Oak	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
4	Common Oak	B	No	No	Fell - Earthworks and drainage ditch
5	Hybrid Black Poplar	B	No	No	Fell - New fence through centre of canopy
6	Hybrid Black Poplar	B	No	No	Fell - Beneath footprint of construction
7	Common Oak	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
8	Common Oak	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
9	Common Ash	C	No	No	Fell - Beneath turning head
10	Hybrid Black Poplar	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
11	Common Oak	B	No	No	Fell - Beneath footprint of construction
12	Common Oak	C	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
13	Apple	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
14	Common Oak	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
15	Common Oak	B	No	No	Fell - Beneath footprint of construction
16	Common Oak	C	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
17	Common Oak	C	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
18	Sweet Chestnut	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
19	Hybrid Black Poplar	B	No	No	Fell – Within working space buffer
20	Common Oak	A	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
21	Common Oak	A	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G1	Italian Alder and Sycamore	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 22% of group retained.
G2	Mixed Native and Ornamental	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 60% of group retained. Special design measures needed - New permanent fencing within RPA
G3	Hawthorn and self-set Sycamore and Cherry	C	No	No	Fell - Beneath footprint of construction
G4	Self-set trees	C	No	No	Fell – Within working space buffer
G5	Oak and Ash	B	No	No	Fell - Beneath footprint of construction
G6	Mixed Native	C	No	No	Special design measures needed - New permanent fencing within RPA
G7	Ash / Mixed	B	No	No	Fell - Beneath footprint of construction

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
G8	Mixed native and ornamental	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G9	Mixed Native and naturalized	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G10	Ash and hybrid black poplar	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 44% of group retained.
G11	Mixed Native and naturalised	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 82% of group retained.
G12	Mixed native and naturalised	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 96% of group retained.
G13	Mixed Native and naturalised	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 83% of group retained.
G14	Mixed Native	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 66% of group retained.
G15	Mixed Native and naturalized	B	No	No	Fell - Beneath footprint of construction
G16	Black Pine	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 70% of group retained.
G17	Blackthorn and sycamore	C	No	No	Fell - Beneath footprint of construction
G18	Hybrid Black Poplar and Common Oak	B	No	No	Fell – Beneath footprint of construction
G19	Hybrid Black Poplar and Common Oak	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 68% of group retained. Special design measures needed - New permanent fencing within RPA
G20	Mixed group	B	No	No	Special design measures needed - New fence in RPA

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
G21	Mixed group	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 79% of group retained.
G22	Mixed group	C	No	No	Fell - Beneath footprint of construction
G23	Mixed group	C	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G24	Balsam poplar and white willow	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 91% of group retained.
G25	Hawthorn	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 85% of group retained.
G26	Mixed Highways planting	C	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G27	Mixed Ornamental	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G28	Mixed native and naturalized	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G29	Mixed native and naturalized	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
G30	Mixed group	B	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 49% of group retained. Special design measures needed - New hard surfacing in RPA
G31	Balsam poplar	B	No	No	Fell – Within working space buffer
G32	Mixed Highways planting	C	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 49% of group retained.
G33	Leylandii	B	No	No	Fell – Within working space buffer
H1	Hawthorn	B	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
H2	Hawthorn and alder	C	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 98% of group retained.
H3	Hawthorn	C	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 59% of group retained.
H4	Hawthorn	C	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 87% of group retained.
H5	Bramble	C	No	No	Fell - Beneath footprint of construction
H6	Hawthorn	C	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012. 72% of group retained.
H7	Hawthorn	B	No	No	Fell - Beneath footprint of construction

A number of trees have been identified that were not included in original survey. These trees have not been included in the arboricultural impact assessment in Section 3.2 below due to the absence of essential details to inform an assessment. However, they have been marked on the AIAP, and recorded in Table 3 below for guidance. It is strongly recommended that these tree locations are verified on site prior to any works being undertaken. Where trees have been assessed as unaffected by the works, ADAS have been assured that no works will take place within 15m of the trees, which is the maximum RPA set within BS5837.

Table 3: Additional trees with potential to be impacted but not included in BS5837 survey

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
T53a	Unknown	Unknown	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
T67a	Unknown	Unknown	No	No	Unaffected - Retain and protect with temporary barrier in accordance with BS5837:2012
H68a	Unknown	Unknown	No	No	Fell – Beneath footprint of development
H69a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
G70a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.
T71a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
T72a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
H73a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.
G74a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
G75a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
H76a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
H77a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
G78a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
G79a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.
H80a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.
H81a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
G82a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
H83a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012

Tree ref	Species	BS5837 category	TPO	CA	Impact and Recommended Actions
H84a	Unknown	Unknown	No	No	Fell section in conflict Scheme and protect remainder with temporary barriers in accordance with BS5837:2012.
H85a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012
T86a	Unknown	Unknown	No	No	Unaffected – Retain and protect with temporary barrier in accordance with BS5837:2012

3.2 Tree Removal

In order to facilitate the construction of the current Scheme design, eight individual trees, 10 groups of trees and two hedgerows will require complete removal in order to facilitate the proposed scheme (see Table 4). In addition, 14 tree groups and four hedgerows will require partial removal (see Table 5). Note that unsurveyed trees recorded in Table 3 above have not been included in this assessment.

The layout shown on the AIA is indicative only, and ADAS have been assured that the layout will be amended to allow the retention of all trees recorded as unaffected in Tables 2 and 3 above.

Table 4: Tree features requiring complete removal

Tree type	Tree Quality Assessment Category Grading				Totals
	A	B	C	U	
Individual trees	None	4, 5, 6, 11, 15, 19	1, 9	None	8
Groups of trees	None	G5, G7, G15, G18, G33	G3, G4, G17, G22, G32	None	10
Hedgerows	None	H7	H5	None	2
	Total = 0	Total = 13	Total = 8	Total = 0	20

Table 5: Tree Groups requiring partial removal

Group number	BS5837 category	Total area of group (m ²)	Area of group to be retained (m ²)	Area of group to be retained (%)
G1	B	3445	774	22
G2	B	1452	865	60
G10	B	765	337	44
G11	B	11169	9203	82
G12	B	3726	3582	96

Group number	BS5837 category	Total area of group (m ²)	Area of group to be retained (m ²)	Area of group to be retained (%)
G13	B	7557	6300	83
G14	B	1847	1217	66
G16	B	2034	1422	70
G19	B	2408	1637	68
G21	B	2739	2166	79
G24	B	2896	2630	91
G25	B	5837	4967	85
G31	B	1006	372	37
G32	C	3241	1593	49
H2	C	1814	1786	98
H3	C	579	343	59
H4	C	190	166	87
H6	C	869	632	72

3.3 Trees Requiring Further Consideration

It is advised that stem locations are plotted and new stem diameter measurements taken on site to determine the full extent of any impact within the RPA of retained trees. This applies to all tree groups proposed for part retention as identified in Table 5 above.

There are trees present that were not included in the original survey but may be impacted by the proposals. These trees have not been surveyed and impact cannot be assessed. It is recommended that these trees are surveyed and included in the arboricultural impact assessment.

3.4 Construction of new hard surfaces within RPA of retained trees

A new footway will be constructed within the RPA of B grade tree group G30. In order to maintain a growing environment which is able to support the long term growth of the retained trees, where new hard-surfacing is proposed within their RPAs, certain precautions will be followed. Of key importance is the need to avoid severing roots and also to avoid compacting the soil to such a degree that the tree roots are no longer able to penetrate the soil and that air and moisture are no longer able to enter and move through the soil. In addition, it is important that the new hard surface does not block the movement of air and moisture into and out of the soil.

The new hard surfaces will therefore be built on top of existing ground levels and their construction should be engineer designed. Providing surface water is not liable to be contaminated by salt or toxic run-off from oil or petrol, a permeable surface and sub-base will be employed. In order to avoid compaction of the

existing soil it may be necessary to incorporate a load suspension system such as a 3D cellular confinement system.

The Site Supervisor shall ensure the prepared surface meets the necessary strength requirements prior to installation.

The Site Supervisor shall provide the setting out of any edging requirements.

The soil surface will not be skimmed to establish new hard surfaces at the former ground level, as this has the potential to cause root damage. Therefore, loose organic matter and/or turf will be removed carefully using either hand tools or pedestrian operated machinery (such as a turf stripper), and the new surface established above the former ground level, using a granular fill where required.

If ground levels are to be raised within the RPA such as to accommodate dips and level changes in the existing ground levels, or to create the sub-base for the hard-surface, this should be achieved by the use of a granular material which does not inhibit vertical gaseous diffusion. Examples of suitable granular materials include, no-fines gravel, washed aggregate, or cobbles.

Excess water in the RPA should be avoided, particularly on clay soils where water logging can occur. In these cases, the hard surface should slope away from the tree to avoid ponding.

The excavation needed for the placement of kerbs, edgings and their associated foundations and haunching can damage tree roots. This should be avoided within the RPA, either by the use of alternative methods of edge support. Suitable edge supports may consist of but are not limited to:

- Peg and board edging
- Sleepers pinned to the ground
- Gabions
- Other proprietary structures

Consideration will be given to the placing of drainage gullies and these will be located outside of the RPAs of the retained trees.

3.5 Fence lines and access gates constructed within RPA of retained trees

New permanent fencing is proposed within unsurveyed hedgerow H84a and the RPA of moderate quality B grade tree groups G2, G19, G20, and within the RPA of low quality C grade tree group G6. A new access gate is proposed within the RPA of B grade tree G28.

There is a potential for causing damage to the roots of these trees during installation of fencing and supporting posts. In order to avoid damage to the roots, or crown of these trees, it is important that the installation is carefully planned.

The following recommendations will be followed:

Supporting posts will be designed to require minimal excavations. Any posts to be positioned below ground will be kept as small as possible and will be located to avoid significant roots. Where possible hand-dug trial excavations will be carried out in the locations of the proposed posts. These excavations will be to a depth of 500mm or to the proposed depth of the post and footing if this is shallower. The excavations should be undertaken under the supervision of the retained Arboricultural Consultant. If significant roots are exposed the position of the post should be altered to avoid these roots.

If concrete or any other phyto-toxic material is to be used for the foundations a sheath / protective barrier will be used to prevent leaching into the soil.

Any machinery used, including piling rigs, will be as small as possible and will work from existing hard surfacing or suitable ground protection as specified in Section 3.8 below. Where the work is below the crowns of retained trees, consideration will also be given to required working space for any machine.

3.6 Facilitation Pruning

Facilitation pruning may be required to allow installation of permanent fencing beneath the canopies of trees within G2, G6, G19 and G20. Canopies will need to be pruned to a height of 3m above the proposed fence line.

3.7 Utility Connections

The location worst case scenario for underground services has been duly considered within the arboricultural impact assessment and associated recommendations.

The red line boundary has been amended since the initial tree survey was conducted. Consequently several affected trees were not included in the scope of the original tree survey and are not included in this assessment. Further surveys and an assessment of impact may be required.

In order to avoid damage to retained trees, excavations for any additional services will avoid the RPAs of retained trees, including but not limited to:

- *Foul and surface water drains*
- *Land drains*
- *Soakaways*
- *Gas*
- *Oil*
- *Electricity*
- *Telephone*
- *Lighting*
- *Signage*

If additional services must unavoidably be installed within the RPAs around retained trees, the locations of these will be chosen in consultation with the retained arboricultural consultant.

Where possible the works will be carried out using trenchless techniques such as moling, laser guided boring and/or in accordance with advice contained within National Joint Utilities Group (NJUG) document Volume 4 Issue 2.

3.8 Ground Protection

Should access be required for machinery or pedestrians within the RPAs of any retained trees, ground protection will be installed.

This ground protection will be required to avoid direct damage to the roots of the trees as well as preventing compaction of the soil. In accordance with section 6.2.3 of BS5837:2012 this ground protection will need to be fit for the purpose of supporting any traffic entering the RPA without causing compaction of the soil below.

For pedestrian traffic, a single layer of scaffold or 19mm ply boards laid on top of driven scaffold framework or laid onto a compressible layer of sharp sand or woodchip on a geotextile membrane should be adequate.

If access is required within the RPAs of retained trees for plant and machinery, the level of ground protection may need to be increased to proprietary inter-locking boards on a compressible layer.

3.9 Tree Protection Fencing

Tree protection fencing should be installed around the perimeter of the tree line and around the RPAs of all retained trees.

In line with Section 6.2.2 of BS 5837:2012, which requires that the tree protection barriers be fit for the purpose of excluding construction activity and that they provide adequate protection to the trees and hedge, it is proposed that they will consist of 2m tall welded mesh panels supported by upright poles driven into the ground. Each panel will be secured to its neighbour with a minimum of 2 anti-tamper couplers secured so that they can only be undone from inside the CEZ. The panels will be further supported by stabilizer struts which will be pinned to the ground. Inside the CEZ the following prohibitions will be complied with:

- *No excavations, including by hand;*
- *No storage of machinery;*
- *No storage or handling of building materials, fuel, chemicals or spoil;*
- *No fires;*
- *No vehicular access;*

- *No pedestrian access;*
- *No alteration, increase or decrease, to existing ground levels;*
- *No excavation or installation of services.*

3.10 Arboricultural Monitoring

The developer should appoint an Arboricultural Consultant to monitor the tree protection measures on site. The purpose of this is to ensure the protection measures remain in situ and continue to provide sufficient protection to the trees.

This role will initially entail the Arboricultural Consultant liaising with the developer to ensure the recommended protection measures are suitably installed. Once the tree protection measures have been installed, and construction activity commences, the arboricultural consultant should monitor any works taking place within the RPA of retained trees.

A formal record of these supervisory visits should be recorded and kept on file; a copy should also be circulated to all relevant parties.

4 Conclusions

The tree survey undertaken by Mott MacDonald on the 1st and 2nd August 2018 identified a total of 61 tree features including 21 individual trees, 33 groups of trees and seven hedgerows which have the potential to be impacted by the proposals.

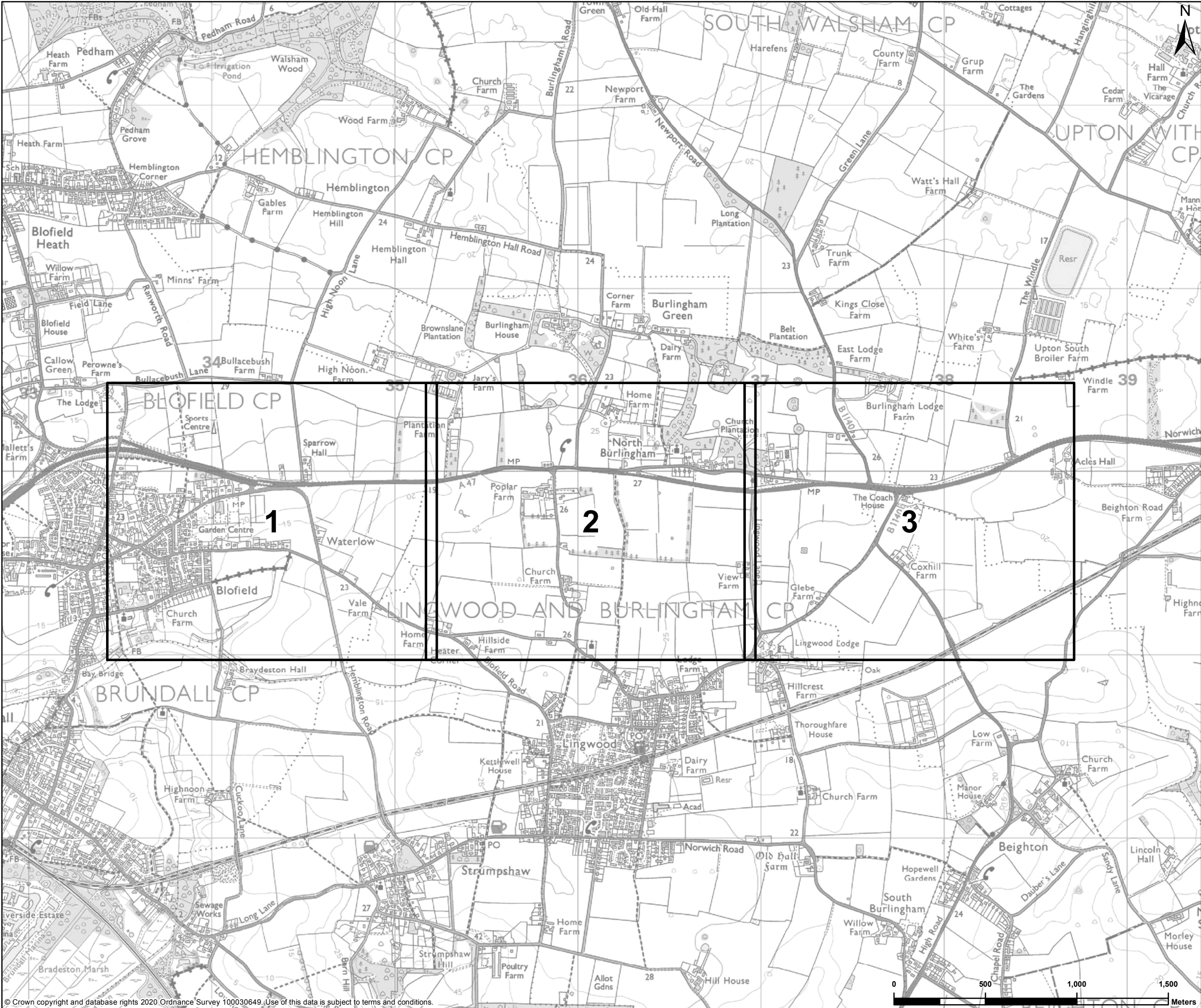
In line with the recommendations contained within Table 1 of BS5837:2012, of these tree features, two individual trees were awarded a high quality A grade. 41 tree features, including 14 individual trees, 25 groups of trees and two hedgerows were awarded a moderate quality B grade. 18 tree features, including 5 individual trees, eight tree groups and five hedgerows were awarded a low quality C grade.

Of these 61 tree features, eight individual trees, 10 groups of trees and two hedgerows will require complete removal in order to facilitate the proposed scheme. In addition, 14 tree groups and four hedgerows will require partial removal. Some special construction techniques are required to ensure other trees can be retained during the course of the works.

It is strongly advised that stem locations within tree groups are plotted through topographical survey, and new stem diameter measurements taken on site to determine the full extent of any impact within the RPA of retained trees.

Appendix 1: Arboricultural Impact Assessment Plan

See following page.



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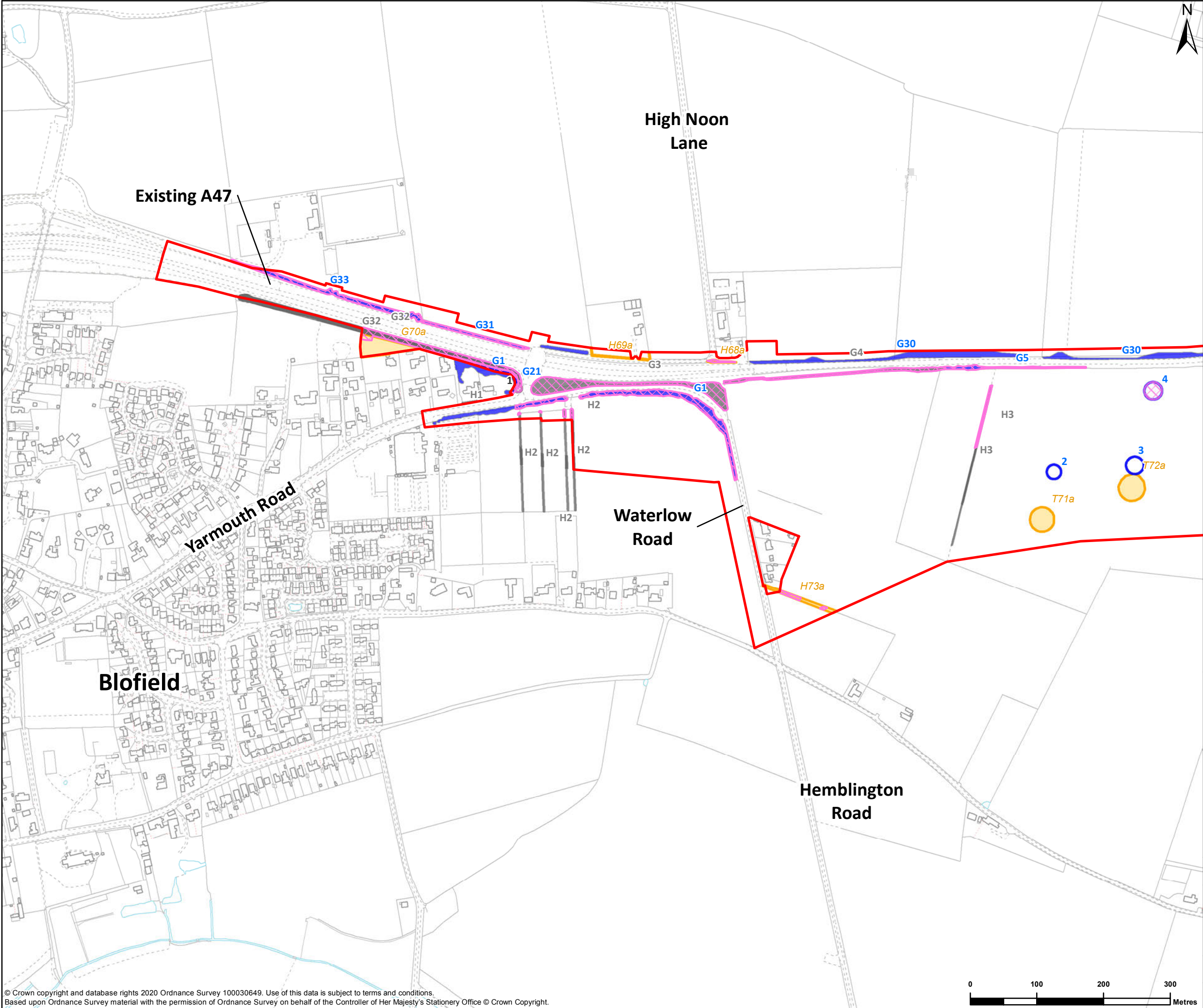
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Sheet extent

REFERENCE MAP

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CONTRACTOR					
<div><div></div><div>GallifordTry</div></div>					
CLIENT					
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PROJECT TITLE					
A47 BLOFIELD TO NORTH BURLINGHAM					
PROJECT STAGE					
PCF STAGE 3					
DRAWING TITLE					
ARBORICULTURAL IMPACT ASSESSMENT KEY PLAN TR010040/APP/6.3					
SUITABILITY					
FOR INFORMATION					
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DRAWING NUMBER					
HE551490-GTY-EGN-000-DR-GI-30024					



LEGEND

Order limits

Root protection area

Trees and groups potentially to be removed

BS5837 Survey:

Tree Group Hedgerow

Colour codes:

Category A

Category B

Category C

Identified (not BS5837)

REFERENCE MAP

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P01	05/07/2021	FIRST EDITION	PC	MM	MM
REV	DATE	REVISION NOTE	ORG	CHKD	APPD

DESIGNER

SWECO

CONTRACTOR

GallifordTry

CLIENT

**highways
england**

PROJECT TITLE

A47 BLOFIELD TO NORTH BURLINGHAM

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

ARBORICULTURAL IMPACT ASSESSMENT PLAN
SHEET 1 OF 3
TR010040/APP/6.3

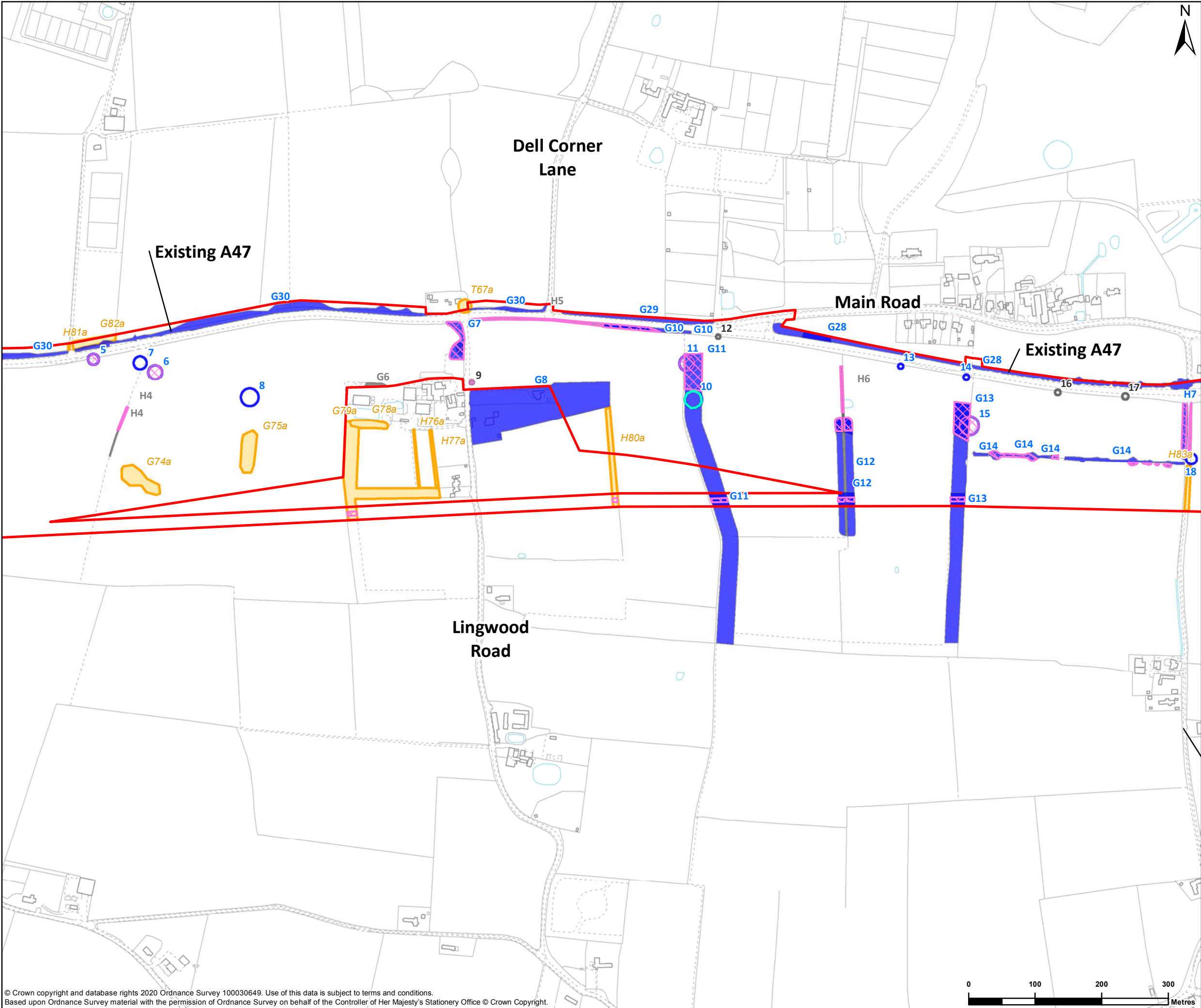
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FOR INFORMATION

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DRAWING NUMBER

HE551490-GTY-EGN-000-DR-GI-30025



Order limits

Root protection area

Trees and groups potentially to be removed

BS5837 Survey:

Tree

Group

Hedgerow

Colour codes:

Category A

Category B

Category C

Identified (not BS5837)

REFERENCE MAP

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P01	05/07/2021	FIRST EDITION	PC	MM	MM
REV	DATE	REVISION NOTE	ORG	CHKD	APPD

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CONTRACTOR

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PROJECT TITLE

A47 BLOFIELD TO NORTH BURLINGHAM

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

ARBORICULTURAL IMPACT ASSESSMENT PLAN
SHEET 2 OF 3
TR010040/APP/6.3

SUITABILITY

FOR INFORMATION

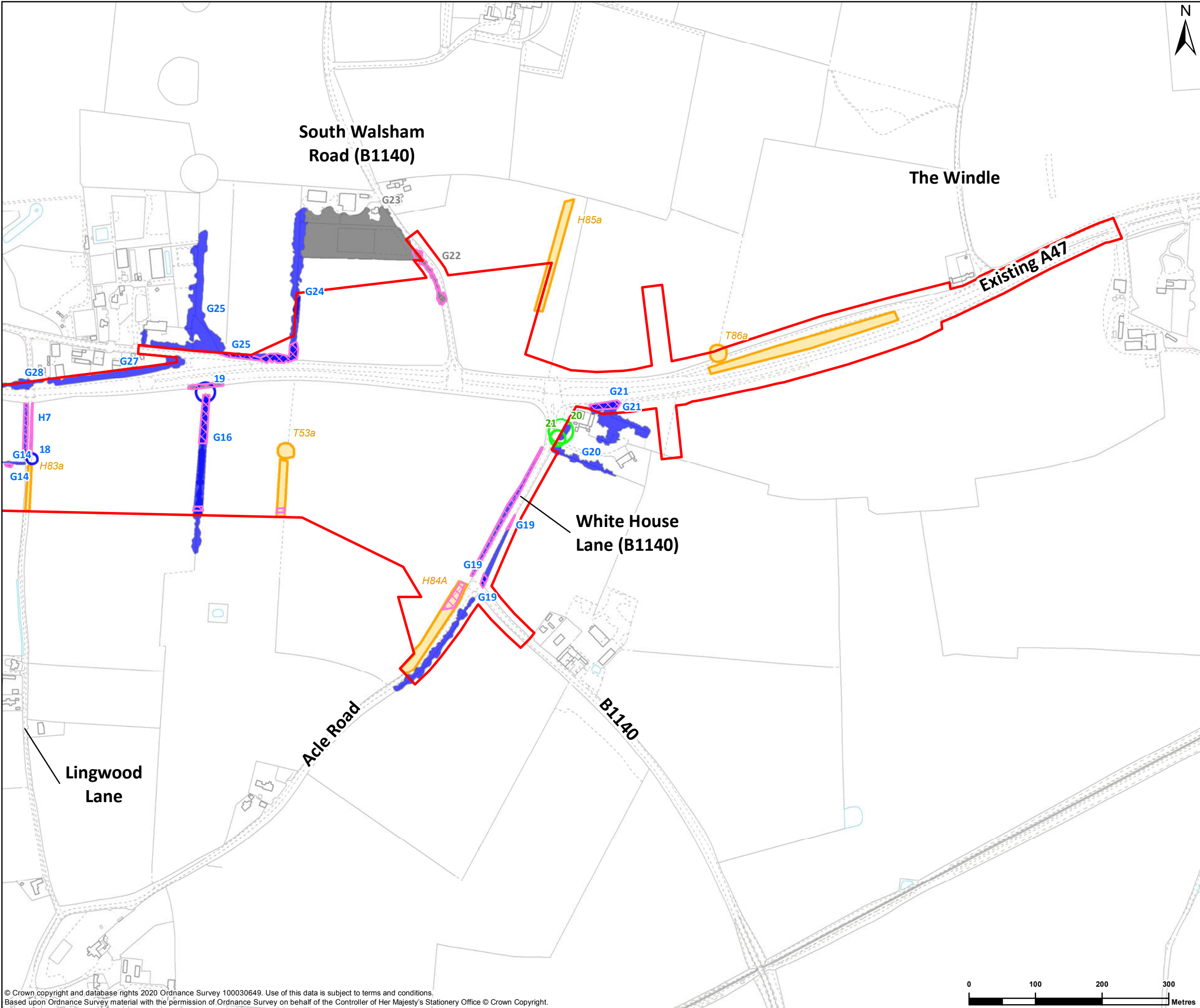
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LEGEND

Order limits

Root protection area

Trees and groups potentially to be removed

BS5837 Survey:

Tree Group Hedgerow

Colour codes:

Category A

Category B

Category C

Identified (not BS5837)

REFERENCE MAP

P01	05/07/2021	FIRST EDITION	PC	MM	MM
REV	DATE	REVISION NOTE	ORG	CHKD	APPD

DESIGNER

SWECO

CONTRACTOR

GallifordTry

CLIENT

**highways
england**

PROJECT TITLE

A47 BLOFIELD TO NORTH BURLINGHAM

PROJECT STAGE

PCF STAGE 3

DRAWING TITLE

ARBORICULTURAL IMPACT ASSESSMENT PLAN
SHEET 3 OF 3
TR010040/APP/6.3

SUITABILITY

FOR INFORMATION

SHEET SIZE	A3	SCALE	1:5,500	STATUS	S2
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DRAWING NUMBER

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Appendix 2: Tree Survey

See following page.

Tag No	Tree Type	Life Stage	Height (m)	Crown spread (m)				Height / direction 1st significant branch	Crown Height (m)				No. of stems / trees	Stem Diameter (mm)	RPA Radius (m)	RPA area (m2)	Crown	Stem	Basal Area	General Physical	BS5837 Category		Estimated remaining contribution (years)	Comments
				N	E	S	W		N	E	S	W									Category	Sub-Category		
1	Oak	Semi Mature	18	2	7	6	4	3s	4	2	0.1	0.1	1	450	5.4	91.6	Fair	Fair	Good	Good	C	2	40+	On corner of junction. Poor unbalanced form.
2	Common Oak	Early Mature	10	5	5	5	5	4	4	4	4	4	1	890	10.7	358.4	Fair	Good	Poor	Fair	B	1;2	40+	Tree not on topo, position plotted with handheld GPS. Open grown oak in wheat field. Heavy ploughing damage has decreased crown vigour. Minor stag heading.
3	Common Oak	Over mature	8	6	6	6	6	2s	3	3	3	3	1	1110	13.3	557.5	Fair	Fair	Fair	Fair	B	1;2	40+	Tree not on topo position plotted with handheld GPS. Open grown mature oak. Tree trunk snapped out at 4m and crown re-grown. Ganoderma infection and ploughing damage. Good arb, ecological and visual value though.
4	Common Oak	Early mature	14	4	6	5	4	2w	2	2	2	2	1	1100	13.2	547.5	Good	Fair	Poor	Fair	B	1;2	40+	Tree not on topo position plotted with handheld GPS. Open grown mature oak, good form and structure. historic snapped limbs in crown. Ploughing damage to the basal area.
5	Hybrid Black Poplar	Semi mature	19	5	6	8	6	5n	6	2	3	6	1	680	8.2	209.2	Fair	Good	Fair	Good	B	2	20+	Tree not on topo position plotted with handheld GPS. Borders existing A47. Has landscape value.
6	Hybrid Black Poplar	Early mature	26	7	10	8	7	4	6	1	3	2	2	610/620	10.4	342.5	Good	Fair	Fair	Good	B	2	20+	Tree not on topo position plotted with handheld GPS. Borders existing A47. Has landscape value.
7	Common Oak	Mature	11	4	4	5	5	1s	1	1	1	1	1	820	9.8	304.2	Fair	Good	Fair	Fair	B	2	40+	Tree not on topo position plotted with handheld GPS.
8	Common Oak	Mature	12	5	9	7	8	1s	1	1	1	1	1	1100	13.2	547.5	Good	Good	Good	Good	B	2	40+	Tree not on topo position plotted with handheld GPS. Heavy ivy cover so DBM estimated
9	Common Ash	Young	6	4	4	4	4	2n	2	2	2	2	1	250	3	28.3	Good	Good	Good	Good	C	2	20+	Between minor road and field, opposite farm entrance
10	Hybrid Black Poplar	Mature	25	10	9	7	8	5	4	4	4	4	1	1060	12.7	508.4	Good	Good	Good	Good	B	1;2	20+	Tree not on topo position plotted with handheld GPS. Excellent form and structure, borderline category A tree.
11	Common Oak	Early mature	9	5	5	6	5	2	2	2	2	2	1	940	11.3	399.8	Fair	Fair	Fair	Good	B	1	40+	Tree not on topo position plotted with handheld GPS. Oak on field boundary, older than surrounding group.
12	Common Oak	Young	5	2	3	0.1	0.1	0.5e	1	1	1	1	1	280	3.4	35.5	Good	Good	Good	Good	C	2	40+	Tree not on topo position plotted with handheld GPS. Borders existing A47. Young and easily replaceable with mitigation planting
13	Apple	Semi mature	5	3	5	4	5	0.5	0.3	0.3	0.3	0.3	1	320	3.8	46.3	Good	Fair	Good	Good	B	2	20+	Tree not on topo position plotted with handheld GPS. Borders existing A47.
14	Common Oak	Semi mature	8	5	5	5	5	2	5	2	1	1	1	360	4.3	58.6	Good	Good	Good	Good	B	2	40+	Tree not on topo position plotted with handheld GPS. Borders A47.
15	Common Oak	Mature	17	7	6	7	8	2.5n	2	4	2	2	1	1200	14.4	651.5	Fair	Fair	Fair	Fair	B	1;2	40+	Tree not on topo position plotted with handheld GPS. Ivy covered stem, diameter estimated. Decay in trunk and stag heading in crown. still very good ecological and arb value.
16	Common Oak	Semi mature	7	4	5	5	5	2	4	2	2	2	1	350	4.2	55.4	Good	Good	Fair	Good	C	2	40+	Tree not on topo position plotted with handheld GPS. Tree on boundary of A47
17	Common Oak	Semi mature	7	3	5	6	5	2	5	1	5	2	1	380	4.6	65.3	Good	Good	Fair	Good	C	2	40+	Tree not on topo position plotted with handheld GPS. Borders A47.
18	Sweet Chestnut	Early mature	12	7	6	6	4	4	3	3	3	4	1	670	8	203.1	Fair	Fair	Fair	Good	B	2	40+	Tree not on topo position plotted with handheld GPS. Set within hawthorn hedge.
19	Hybrid Black Poplar	Mature	22	8	9	7	5	5	2	5	2	8	1	1180	14.2	630	Fair	Good	Fair	Good	B	2	20+	Tree not on topo position plotted with handheld GPS. Ploughing damage too roots. otherwise good structure and form.
20	Common Oak	Over mature	20	6	8	7	7	3	2	2	2	2	1	1500	15	707	Fair	Fair	Fair	Fair	A	1	40+	Tree not on topo position plotted with handheld GPS. Very old oak, beginning natural die back, several cavities. Ivy covered, stem diameter estimated.
21	Common Oak	Mature	12	6	6	6	6	2	2	2	2	2	1	970	11.6	425.7	Fair	Fair	Fair	Fair	A	1;2	40+	Tree not on topo position plotted with handheld GPS. Snapped out trunk, in crown.
G1	Italian Alder and Balsam Poplar	Semi Mature	11	3	3	3	3	2	3	3	3	3	10+ trees	250av	3	28.3	Fair	Good	Fair	Good	B	2	40+	Boundary group of Italian alder (in the western half) and Balsam poplar (in the eastern half) planted for screening garden centre, allotments and field.

Tag No	Tree Type	Life Stage	Height (m)	Crown spread (m)				Height / direction 1st significant branch	Crown Height (m)				No. of stems / trees	Stem Diameter (mm)	RPA Radius (m)	RPA area (m2)	Crown	Stem	Basal Area	General Physical	BS5837 Category		Estimated remaining contribution (years)	Comments
				N	E	S	W		N	E	S	W									Category	Sub-Category		
G2	Mixed Native and Ornamental	Semi Mature	15	3	3	3	3	1	2	2	2	2	10+ trees	300av	3.6	40.7	Fair	Good	Good	Good	B	1;2	20+	Pruned in hedge at south east edge due to powerline. Well established and good health.
G3	Hawthorn, Sycamore and Cherry	Young	6	3	3	3	3	0.1	0.1	0.1	0.1	0.1	10+ trees	150av	1.8	10.2	good	good	good	Good	C	2	40+	Boundary group between A47 and side road. Predominantly hawthorn in the west with more blackthorn and cherry occurring to the east, occasional oak. Has some screening value.
G4	Self-set trees	Young	3	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	100av	1.2	4.5	Poor	Fair	Fair	Fair	C	2	10+	Scrub boundary to A47, occasional grey willow, sycamore, hawthorn set within bramble and scrub.
G5	Common Oak and Common Ash	mature	12	5	6	5	5	3e	3	3	3	3	5 trees	480av	5.8	104.2	Good	Good	Good	Good	B	2	40+	Sporadic oak and ash trees along the boundary between A47 and farmland.
G6	Mixed native	Young	4	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	150av	1.8	10.2	Good	Good	Good	Good	C	2	20+	Field maple, holly, hawthorn, elder. Small group between barnyard and field has screening value
G7	Common Ash / Mixed	semi-mature	10	6	4	4	5	2n	2	2	2	2	10+ trees	300av	3.6	40.7	Good	Fair	Good	Fair	B	2	20+	Ash, elm, crack willow, hawthorn understory around dried up pond and surrounded by scrub.
G8	Mixed Native and Ornamental	Semi mature	15	3	3	3	3	0.1	2	2	2	2	10+ trees	300av	3.6	40.7	Good	Good	Fair	Good	B	2	20+	Private gardens, surveyed at distance. Hawthorn, blackthorn, Willow, Apple, ash, Lawson cypress, Leyland cypress, yew, cherry laurel, tree of heaven, box elder,
G9	Mixed Native and Naturalized	Semi mature	8	3	3	3	3	1	0.3	0.3	0.3	0.3	10+ trees	250av	3	28.3	Good	Good	Good	Good	B	2	40+	Small semi natural woodland, hawthorn, field maple, hazel, cherry, oak, grey willow, silver birch,
G10	Ash and Hybrid Black Poplar	Semi mature	18	5	5	5	5	3	6	4	0.1	0.1	10+ trees	400av	4.8	72.4	Good	Good	Fair	Good	B	2	40+	Linear group of ash and hybrid black poplar bordering A47. Some amenity and screening value.
G11	Mixed Native and Naturalised	Young	6	3	3	3	3	0.1	0.1	0.1	0.1	0.1	10+ trees	140av	1.7	8.9	Good	Good	Good	Good	B	2	40+	Boundary between fields. Planted woodland group. Hawthorn, apple, field maple, hazel, sweet chestnut.
G12	Mixed native and Naturalised	Early mature	18	7	7	7	7	3	2	2	2	2	8	850av	10.2	326.9	Good	Good	Fair	Good	B	2	20+	Group not on topo position plotted with handheld GPS. Hybrid black poplar, sycamore and ash with hawthorn hedge (H6) beneath. large and well formed trees.
G13	Mixed Native and Naturalised	Young	6	3	3	3	3	0.1	0.1	0.1	0.1	0.1	10+ trees	140av	1.7	8.9	Good	Good	Good	Good	B	2	40+	Boundary between fields. Planted woodland group. Hawthorn, apple, field maple, hazel, sweet chestnut.
G14	Mixed Native	Early mature	16	5	5	5	5	3	2	2	2	2	10+ trees	850av	10.2	326.9	Good	Good	Fair	Good	B	2	40+	Mature oak with hawthorn hedge row. Large and fairly good form.
G15	Mixed Native and Naturalized	Early mature	20	6	6	6	6	2	3	3	3	3	4 trees	750av	9	254.5	Fair	Good	Fair	Good	B	2	40+	Group not on topo position plotted with handheld GPS. ×2 Hybrid black poplar, 1 sycamore, 1 ash set within semi mature hawthorn bushes
G16	Black Pine	Semi mature	12	5	5	5	5	4	4	4	4	4	10+ trees	550av	6.6	136.9	Good	Good	Good	Good	B	2	40+	Field boundary, linear group of semi mature black pine trees.
G17	Blackthorn and Sycamore	Young	4	2	2	2	2	3	0.3	0.3	0.3	0.3	10+ trees	120av	1.4	6.5	Fair	Fair	Fair	Fair	C	2	10+	Self-set trees on A47 boundary. Young, low value and easily replaced with mitigation planting
G18	Hybrid Black Poplar and Common Oak	Early mature	17	6	6	6	6	2	4	4	4	4	10+ trees	600av	7.2	162.9	Good	Good	Fair	Good	B	2	20+	Trees not on topo position plotted with handheld GPS. Early mature hybrid black poplar with occasional young oak. Some ploughing damage.
G19	Hybrid Black Poplar and Common Oak	Early mature	16	5	5	5	5	2	4	4	4	4	10+ trees	500av	6	113.1	Good	Good	Fair	Good	B	2	20+	Trees not on topo position plotted with handheld GPS. Early mature hybrid black poplar with occasional young oak, ash and elder. Some ploughing damage
G20	Mixed	Early mature	18	6	6	6	6	2	3	3	3	3	10+ trees	550av	6.6	136.9	Good	Good	Fair	Good	B	1;2	40+	Boundary group containing oak, false acacia, hawthorn, plum, cherry, whitebeam,
G21	Mixed	Early mature	15	5	5	5	5	1	1	1	1	1	10+ trees	550av	6.6	136.9	Good	Good	Good	Good	B	1;2	40+	Mixed group of early mature oak and hawthorn, occasional horse chestnut, merges into garden trees. Screens residential houses from A47.

Tag No	Tree Type	Life Stage	Height (m)	Crown spread (m)				Height / direction 1st significant branch	Crown Height (m)				No. of stems / trees	Stem Diameter (mm)	RPA Radius (m)	RPA area (m2)	Crown	Stem	Basal Area	General Physical	BS5837 Category		Estimated remaining contribution (years)	Comments
				N	E	S	W		N	E	S	W									Category	Sub-Category		
G22	Mixed	Early mature	20	6	6	6	6	4	3	3	3	3	10+ trees	540av	6.5	131.9	Fair	Fair	Poor	Fair	C	2	20+	3 large hybrid black poplar interspersed with young oak, ash, sycamore, crack willow, goat willow. Flanked by road and ploughed field causing root damage and corresponding stress in the crown.
G23	Mixed	Young	5	3	3	3	3	0.5	0.3	0.3	0.3	0.3	10+ trees	150av	1.8	10.2	Fair	Good	Good	Good	C	2	40+	Planted area. Southern side flanked by Lawson cypress shelter belt changing to native hedge in the west. Inside of group - mainly fruit trees, apples, plums, hazel. Young and fairly easy to replace with mitigation planting.
G24	Balsam Poplar / White Willow	Early mature	26	4	4	4	4	1	2	2	2	2	10+ trees	450av	5.4	91.6	Good	Good	Good	Good	B	2	20+	Shelter belt of fast growing, tall, Balsam poplar and white willow. Well established landscape feature but low arb value
G25	Hawthorn	Semi mature	6	3	3	3	3	0.1	0.1	0.1	0.1	0.1	10+ trees	200av	2.4	18.1	Good	Good	Good	Good	B	2	40+	Hawthorn boundary hedge, screens private field from A47. occasional greengage and elder within hedge.
G26	Mixed	Semi mature	10	3	3	3	3	0.3	0.1	0.1	0.1	0.1	10+ trees	250av	3	28.3	Fair	Fair	Fair	Fair	C	2	40+	Group separating A47 from layby. Young to semi mature, easily replaceable with mitigation planting. Contains hybrid black poplar, oak, hawthorn, blackthorn, elder, ash, alder,
G27	Mixed Ornamental	Semi mature	9	4	4	4	4	1	2	2	2	2	10+ trees	300av	3.6	40.7	Good	Good	Good	Good	B	2	40+	Boundary group of third party planting screening business from the A47. Planting includes semi mature, well established tree. London plane, hornbeam, whitebeam, ash, hawthorn,
G28	Mixed Native and Naturalized	Semi mature	12	4	4	4	4	1	0.3	0.3	0.3	0.3	10+ trees	300av	3.6	40.7	Fair	Fair	Fair	Good	B	2	40+	Boundary group flanking A47 and screening fields and residential properties. Well established, ash, Hybrid black poplar, goat willow, field maple, oak, hawthorn, blackthorn.
G29	Mixed Native and Naturalized	Early mature	18	5	5	5	5	0.1	0.1	0.1	0.1	0.1	10+ trees	450av	5.4	91.6	Fair	Fair	Fair	Good	B	2	40+	Boundary group bordering A47. Hawthorn hedge of approx. 3m height interspersed with early mature hybrid black poplar, ash and oak. Has screening value.
G30	Mixed	Semi mature	18	5	5	5	5	1	0.5	0.5	0.5	0.5	10+ trees	350av	4.2	55.4	Good	Good	Good	Good	B	2	40+	Boundary trees and hedges bordering A47. Sporadic early mature hybrid black poplar, ash and oak. Hawthorn, blackthorn and bramble as occasional understory. Has screening value for fields and residential properties.
G31	Balsam Poplar	Semi mature	20	5	5	5	5	2	2	2	5	2	10+ trees	550av	6.6	136.9	Fair	Good	Fair	Fair	B	2	20+	Tall and well established balsam poplar acting as a wind break and screening. Occasional ash, hawthorn and blackthorn as understory
G32	Highways Planting	Semi mature	8	3	3	3	3	1	0.5	0.5	0.5	0.5	10+ trees	200av	2.4	18.1	Fair	Fair	Fair	Fair	C	2	40+	Highways planting on A47 boundary, screens property but is easily replaceable with mitigation planting. Ash, hawthorn, Balsam poplar, field maple, oak.
G33	Leylandii	Early mature	18	5	5	5	5	1	0.5	0.5	0.5	0.5	10+ trees	450av	5.4	91.6	Fair	Fair	Fair	Good	B	2	20+	Large linear leylandii group screening fields and property from A47. Low arb value but useful landscape function.
H1	Hawthorn	Semi Mature	3	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	150av	1.8	10.2	Good	Good	Good	Good	B	2	40+	Boundary hedge for private garden. Good screening value.
H2	Hawthorn and Alder	Young	2	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	100av	1.2	4.5	Fair	Fair	Fair	Fair	C	2	40+	Hedges of hawthorn and Italian alder sub dividing allotment plots. Has some landscape value otherwise low value and easily replaceable
H3	Hawthorn	Young	2	1	1	1	1	0.1	0.1	0.1	0.1	0.1	10+ trees	100av	1.2	4.5	Good	Good	Good	Good	C	2	40+	Hawthorn boundary hedge. low value and easily replaced with mitigation planting
H4	Hawthorn	Young	2	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	100av	1.2	4.5	Good	Good	Good	Good	C	2	20+	Field boundary
H5	Bramble	Young	2	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10+ trees	100av	1.2	4.5	Good	Good	Good	Good	C	2	20+	Hedge comprised of just bramble / scrubby area.
H6	Hawthorn	Young	3	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10	120av	1.4	6.5	Good	Good	Fair	Good	C	2	40+	Hedge not on topo position plotted with handheld GPS. Boundary hedge, hawthorn with occasional hazel, field maple, elder. Young and easily replaceable with mitigation planting

Tag No	Tree Type	Life Stage	Height (m)	Crown spread (m)				Height / direction 1st significant branch	Crown Height (m)				No. of stems / trees	Stem Diameter (mm)	RPA Radius (m)	RPA area (m2)	Crown	Stem	Basal Area	General Physical	BS5837 Category		Estimated remaining contribution (years)	Comments
				N	E	S	W		N	E	S	W									Category	Sub-Category		
H7	Hawthorn	Semi mature	2	2	2	2	2	0.1	0.1	0.1	0.1	0.1	10	150av	1.8	10.2	Good	Good	Good	Good	B	2	40+	Hedge not on topo position plotted with handheld GPS. Field boundary hawthorn hedge, occasional damsons and golden plum bushes.

Source: Mott MacDonald 2018

Appendix 3: Cascade Chart for Tree Quality Assessment

See following page.

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	<ul style="list-style-type: none">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 declineTrees 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 <p><i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i></p>			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

Appendix 4: RPA Guidance

The Root Protection Area (RPA) is calculated from the stem diameter of the tree, in accordance with the guidance contained in section 4.6 of BS 5837:2012.

These areas are normally sacrosanct, and should not be entered, by traffic or foot, during construction, or used to store materials, fuel or chemicals.

Protective fencing should be erected along the edge of the RPA, before construction begins, and should not be moved until after all construction has finished and vacated the site. The type of fencing used should be fit for purpose, and ordinarily conform to the recommendations given in section 6.2.2 of BS 5837:2012 and be erected similar to the example shown in Figure 2 of the same standard.

Where underground services cannot be routed outside the RPA, these should be installed by trenchless technology, such as a directional drill. Where this technology is used the underground channel created should be no less than 600mm below normal ground level, or the base of the tree. Also, the starting and receiving excavations should not be within the RPA. Drill channel lubricant should be avoided, other than water, unless precautions are taken to prevent contamination of soil and possibly water. Hand digging may be an alternative to trenchless excavation, but this is less desirable, and not always practical.

When determining the workable space around the RPA of a tree or trees, it is also important to maintain a working zone of one metre (which is usually sufficient) between the edge of construction and the protective fencing.