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Report Verification

Report Version	Date	Completed by:	Checked & Approved by:
Final	25/10/2023	Duncan Smith BSc (Hons) MArborA Arboricultural Manager	Luke Webb BSc (Hons) MArborA Senior Arboricultural Consultant

Declaration of Compliance

This study has been undertaken in accordance with British Standard 5837:2012 '*Trees in Relation to Design, Demolition and Construction – Recommendations*'.

Disclaimer

Middlemarch accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared. It should be noted that, whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Validity of Data

The findings of this study are valid for a period of 12 months from the date of survey. If works have not commenced by this date, an updated site visit should be carried out by a suitably qualified and experienced arboriculturist to assess any changes to the trees, groups, and hedgerows on site and to inform a review of the conclusions and recommendations made.

It should be noted that trees are dynamic living organisms that are subject to natural changes as they age or are influenced by changes in their environment. As such following any significant meteorological event or changes in the growing environment of the trees they should be re-assessed by a suitably qualified and experienced arboriculturist.

This Arboricultural Method Statement has been produced following a review of a fixed approved development layout for the site, based on data provided by the client. The methods of work described herein will be a requirement of all relevant contractors associated with the development proposals.

On Site Monitoring Regime & Contact Details

All operations detailed within this AMS will be monitored by the Principal Contractor. The Principal Contractor will ensure that specifications within this document are followed (this will be built into the contract specification) and that the Project Arboriculturist will be contacted for advice in relation to works near to retained trees. The Project Arboriculturist for the site is:

Name: Duncan Smith

Position: Arboricultural Manager

Mobile: 07827 850972

Email: duncan.smith@middlemarch.eco

Action	Project Arboriculturist Attendance Required
	✓ ✗
Pre-commencement site meeting / toolbox talk / induction	✓
Audit timetable	✓
RIBA Stage 5 - Enabling Works (Demolition)	
Tree Surgery	✓
Site set up and logistics	✓
Establishment of Demolition Exclusion Zone	✓
Topsoil Stripping / Subsoil Regrading	✗
Demolition of Structures and Removal of Hard Surfaces	✓
RIBA Stage 5 - Main Works (Construction)	
Establishment of Construction Exclusion Zone	✓
Permanent and Temporary Ground Protection Measures	✓
Construction of Structures within the RPA / Construction Exclusion Zone	✓
Working space to construct new buildings within RPAs	✓
Installation of utilities within RPAs	✓
RIBA Stage 6 – Handover and Close Out	
Removal of tree protection measures	✓
Tree Safety Assessment for handover	✓

Responsibilities

It is the responsibility of the Principal Contractor to ensure that the planning conditions attached to the planning consent are always adhered to and that a monitoring regime regarding tree protection is adopted on site.

The Principal Contractor will be responsible for contacting the Local Planning Authority should any issues are raised related to the trees on site.

If pruning works to trees beyond the agreed scope within this Method Statement are required at any time, then permission must be sought from the Local Planning Authority prior to commencement. All tree surgery works must be carried out in accordance with BS3998.

The Principal Contractor will ensure the build sequence is appropriate to ensure that no damage occurs to retained trees during the construction processes. Protective measures will remain in position until completion of the construction phase of development and will only be removed to allow the commencement of soft landscaping works.

The protection measures and signs will always be maintained in position and checked daily by a designated person on site under the responsibility of the Principal Contractor.

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1. Introduction

1.1 Project Background

This Arboricultural Method Statement was commissioned by Baker Mallet LLP to accompany a planning application for commercial development at Twycross Zoo near Atherstone. A survey of the trees on site and within influencing distance of the boundaries was undertaken on the 11th November 2022 as part of a Preliminary Arboricultural Assessment to aid design and avoid unnecessary tree removal.

An Arboricultural Impact Assessment (AIA) was subsequently undertaken to identify the potential impact of the development on the existing trees surveyed during the PAA in accordance with British Standard 5837:2012 '*Trees in Relation to Design, Demolition and Construction - Recommendations*' (hereafter referred to as BS5837).

This Arboricultural Method Statement has been compiled to provide the information necessary to satisfy RIBA Stage 5 including:

- Audit schedule
- Specific tree protection measures
- Specific tree-friendly construction operations
- Arboricultural Clerk of Works (ACoW) supervision

1.2 Site Description, Drawings and Appendices

Attribute	Description
National Grid Reference	SK 31935 06217
Topography	Generally flat.
Tree Cover	High, medium and low quality - Individual trees and groups of trees which have been planted to act as screening.
Drawings attached	Tree Survey Plan – C159277-01-01 Tree Retention Plan – C159277-02-01 Tree Protection Plan – C159277-03-01
Appendices	Appendix A: Tree Schedule Appendix B: Tree Protection Fencing Sign Appendix C Arboricultural Impact Assessment RT-MME-159277-02

Table 1.1: Summary of Site and Surroundings

1.3 Approved Development

The approved development of the site includes the demolition of the lemur house, removal of several animal enclosures and clearance of trees and vegetation to make way for the construction of a National Science Conservation Centre.

1.4 Documentation Provided

This statement is based upon the information provided by the client, in addition to information collected by Middlemarch during the Preliminary Arboricultural Assessment, as detailed below.

Author	Document	Drawing Number
Clancy Consulting	Drainage Strategy	21440-CCL-XX-XX-RP-C-001-REV P01
Clancy Consulting	Surface Water Drainage Strategy	21440-CCL-XX-XX-RP-C-001-REV P01
DEARADU ZU	Combined Landscape Masterplan	P22009-00-001-DZ-0110-02
HLM Architects	Proposed Site Plan	TWZ-HLM-00-00-DR-L-00001 REV P06
HLM Architects	Soft Landscape Strategy	TWZ-HLM-XX-ZZ-DR-L-4501 REV P01

Table 1.2: Documentation Provided

2. Statutory Designation

2.1 Tree Preservation Order and Conservation Area Protection

A desk-based study was undertaken to identify if any of the trees present within or near the site are affected by statutory constraints as detailed below.

Statutory Constraint	Present ✓ ✗	Source	Details
TPO	✗	Local Authority website – Hinckley and Bosworth Borough Council	N/A
Conservation Area	✗	Local Authority website – Hinckley and Bosworth Borough Council	N/A
Ancient Woodland	✗	Multi Agency Geographical Information for the Countryside (MAGIC)	N/A

Table 2.1: Summary of Statutory Constraints that Affect the Site

Where a tree preservation order, conservation area or ancient woodland applies to trees within the assessment area, statutory constraints will apply to the development in respect of trees.

No works must be undertaken on the protected trees without prior permission from the Local Authority unless authorised as part of an approved planning application. Works include pruning, topping, lopping, uprooting or wilful damage or wilful destruction of these trees. Any proposed pruning works not currently approved will need to be fully specified and agreed within a future planning application.

2.2 Protected Species

Bats

Mature trees often contain cavities, hollows, peeling bark or woodpecker holes which provide potential roosting locations for bats. Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations 2017)¹. They receive further legal protection under the

¹ HM Government – The National Archives (2017) [online] The Conservation of Habitats and Species Regulations 2017. Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>

Wildlife and Countryside Act (WCA) 1981², as amended. Consequently, causing damage to a bat roost constitutes an offence.

Generally, should the presence of a bat roost be suspected whilst completing works on any trees on site then an appropriately licensed bat worker should be consulted for advice.

Birds

Trees offer potential habitat for nesting birds which are protected under the Wildlife and Countryside Act (WCA) 1981, as amended. Some species (listed in Schedule 1 of the WCA) are protected by special penalties. This legislation makes it an offence to intentionally or recklessly damage or destroy an active bird nest or part thereof.

As the trees on, and adjacent, to the site provide potential habitat for nesting birds all tree work should ideally be completed outside the nesting bird season (Generally March to September).

If this is not possible then the vegetation should be subject to a nesting bird inspection by a suitably experienced ecologist prior to commencement of works. If any active nests are identified then the vegetation, and a defined buffer zone, will need to remain in place until the young have naturally fledged.

² HM Government – The National Archives 2017. *Wildlife and Countryside Act 1981*. [online] Available at: <http://www.legislation.gov.uk/ukpga/1981/69/contents>

3. Arboricultural Method Statement

3.1 Introduction

The following sections of this report detail the specific protection measures, working methodologies and pruning requirements to be adopted as part of the demolition and construction phases of the project.

The principal contractor must ensure that they read and understand all of the following sections prior to commencement of site occupation.

Pre-commencement site meeting and site inductions

A pre-commencement site meeting involving the Project Arboriculturist and Principal Contractor will be undertaken at the beginning of the Enabling Works Phase, Main Construction Phase, Post Construction Phase.

Details of tree protection and methods of working around trees will be included within site inductions to new members of site staff. A copy of this document and the related Tree Protection Plan will be kept on site and referred to by operatives working near retained trees.

Monitoring/Audits

An inspection audit will be implemented by the Project Arboriculturist once the protective measures have been installed and prior to site occupation to ensure they provide the level of protection required for retained trees. Feedback will be provided to the Local Planning Authority Arboricultural Officer on completion of this visit and monthly audits of the tree protection measures will be undertaken by the Project Arboriculturist to ensure they remain in position and fit for purpose.

Use of Subcontractors

The Principal Contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any retained tree. If any issues arise in relation to the retained trees the Project Arboriculturist will be contacted for advice.

3.2 Enabling Works (Demolition)

Tree Work

All tree work should conform to BS3998:2010 and be completed prior to the installation of the tree protection measures and site occupation by demolition or construction contractors.

Tree/ Group/ Hedgerow Reference	Species	BS5837 Category	Retained		Comments
			✓	✗	
T1	Hornbeam	C		✗	Within footprint of proposed building
T2	White Poplar	B		✗	Within proposed access road and footpath / unsuitable species for retention in busy publicly accessible area

Tree/ Group/ Hedgerow Reference	Species	BS5837 Category	Retained		Comments
			✓	✗	
T16	Red Oak	B		✗	Within car park
T17	Red Oak	B		✗	To make way for drainage apparatus
T18	Red Oak	B		✗	To allow construction of a new wall
T19	Hawthorn	C		✗	To allow construction of new boardwalk
T21	Ash	U		✗	Unsuitable for retention due to its declining form and hazardous structure
T22	Hybrid Black Poplar	C		✗	To enable construction of building / unsuitable species for retention in busy publicly accessible area
T23	Field Maple	C		✗	Relandscaping to reflect site layout changes
T24	Field Maple	C		✗	Relandscaping to reflect site layout changes
T25	Hybrid Black Poplar	C		✗	Within proposed access footpath / unsuitable species for retention in busy publicly accessible area
G1	Hornbeam	B		✗	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes
G5*	Field Maple Hawthorn Goat Willow Hazel Holly	C		✗	Removal of the linear strip of G5 adjacent to the northern boundary and trees to provide sufficient space to accommodate two lodges including construction buffer.
G10*	Cherry	C		✗	Two trees removed; two trees retained
G11*	Blackthorn Hawthorn Hazel Holly Elder Sycamore Wild Service Tree	C		✗	Partial removal to make way for new buildings

Tree/ Group/ Hedgerow Reference	Species	BS5837 Category	Retained		Comments
			✓	✗	
G13	English Oak Sycamore	B		✗	Removal to make way for new buildings
G14	Cherry Scots Pine	B		✗	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes
G15	Hybrid Black Poplar	B		✗	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes Unsuitable species for retention in busy publicly accessible area
H2*	Beech Holly	C		✗	Central section to be removed to make way for relandscaping to reflect site layout changes

Table 3.1: Trees to be Removed or Pruned

Demolition Exclusion Zone

Protective barriers will define the Demolition Exclusion Zone (DEZ) and will be erected prior to site occupation. Signs will be installed on the barriers to inform site contractors of the importance of the tree protection measures and no works that cause physical damage to retained trees, compaction of the soil or severance of tree roots will occur within any exclusion zone. The extent of the DEZ encompasses the Root Protection Area (RPA) and / or tree canopy, whichever is the greatest.

No works, including storage of demolition materials shall take place within the Demolition Exclusion Zone as defined by the protective barriers.

The proposed location of the protective barriers surrounding the DEZ is identified on the Tree Protection Plan attached. The barriers will remain in place until completion of the demolition phase and will be adjusted as required to form the Construction Exclusion Zone (CEZ) prior to the next phase.

Site Setup, Compound, Materials Storage and Vehicle Parking

At the time of writing, the location of the site compound had not been formally identified, however, sufficient space is present within the site to accommodate the compound outside of Construction Exclusion Zones and its establishment is unlikely to result in harm to retained trees.

The site compound is to be located outside of the RPAs of retained trees and its establishment is unlikely to result in harm to retained trees.

Topsoil Stripping / Subsoil Regrading

Topsoil stripping and regrading of subsoils will not occur within the DEZ of any retained tree. Stored soil created from topsoil stripping will not be stored within any Demolition or Construction Exclusion Zone.

Where regrading works are to be carried out within the RPAs of retained trees, these must be supervised by the Project Arboriculturist. No machinery must be located or stored within the RPAs of retained trees and all work must be carried out from the perimeter of RPA, working towards the trees where necessary in a precautionary manner. The spoil created from these works will not be stored within the RPA. Uncovered roots need to be assessed by the Project Arboriculturist. If deemed necessary, minor roots (<25 mm in diameter) uncovered by the works shall be pruned using clean, sterilised pruning saw or secateurs, leaving as small a pruning wound as possible. If a major root (>25 mm in diameter) is found, then works will be redesigned to accommodate any large roots found.

Demolition of Structures and Removal of Hard Surfaces

There are no structures or hard surfaces that require demolition or removal within Demolition Exclusion Zones and no impact upon the existing trees is therefore anticipated.

3.3 Main Works (Construction)

Construction Exclusion Zone

Protective barriers will be positioned to define the Construction Exclusion Zone (CEZ). Signs will be installed on the barriers to inform site contractors of the importance of the tree protection measures and no works that cause physical damage to retained trees, compaction of the soil or severance of tree roots will occur within any exclusion zone. The extent of the CEZ encompasses the Root Protection Area (RPA) and / or tree canopy, whichever is the greatest.

No works, including storage of construction materials shall take place within the Construction Exclusion Zone as defined by the protective barriers.

The proposed location of the protective barriers surrounding the CEZ is identified on the Tree Protection Plan attached. The barriers will remain in place until completion of the demolition phase and will be adjusted as required to form the Construction Exclusion Zone (CEZ) prior to the next phase.

Permanent and Temporary Ground Protection Measures

Temporary ground protection will be utilised to construct the proposed lodges which passes through the Construction Exclusion Zones of retained trees forming T11, G2 and G5. All temporary ground protection shall support the expected loads in accordance with Structural Engineers recommendations to avoid permanent compaction and soil.

Foundations within RPAs

The construction of the two new lodges will require foundation construction within the RPA of tree T11 and tree group G5. When allowing for 2.50 metre working space clearance around the proposed building the RPA of these trees will be affected, albeit to a minor extent. Arboricultural supervision of these works will therefore be required to ensure these works result in minimal root impact. Temporary tree protection fencing, and ground protection measures will be required during the works to prevent soil compaction within the working zones.

Installation of utilities within RPAs

The installation of new subterranean utilities will require works at the periphery of the RPA for the westernmost tree of G6. The proposed excavation works near to this tree will be completed under supervision of the Project Arboriculturist.

Works near to roots will not occur where the ambient air temperature is less than +4 °C. Any exposed roots shall be temporarily recovered with soil where the ambient temperature exceeds 14 °C or completion of the works is not foreseen within 24 hours of the finished excavation.

3.4 Post Construction Works

Removal of Protective Barriers

Protective barriers will be removed once all external main construction works have been completed to allow the completion of hard and soft landscaping. Barriers shall be removed carefully to ensure no damage to retained trees occurs.

Hard Landscaping

Hard landscaping works that have the potential to cause physical damage to retained trees, compaction of the soil or severance of tree roots shall not occur within the precautionary zones (RPA / canopy) unless under supervision of the Project Arboriculturist. Any hard landscaping works taking place within the precautionary zones surrounding retained trees should be completed in accordance with this AMS following advice from the Project Arboriculturist.

No unsupervised works or storage of hard landscaping construction materials shall occur within the Precautionary Zones (former CEZ).

Soft Landscaping

All soft landscaping within the exclusion zone will be undertaken by hand and in accordance with BS8545³.

A 500 mm radius from any tree stem will remain uncovered by turf or other planting to allow penetration of water and air into the soil. A propriety mulch will be applied to a depth of 100mm to inhibit weed and growth, reduce groundwater evaporation, resist and mitigate soil compaction, reduce maintenance requirements and act as a slow-release fertilizer.

3.5 Handover and Close Out

Tree Safety Assessment

A tree safety assessment will be required prior to handing over the site to the client for final site use to ensure all retained trees are in good condition and any potential hazards are mitigated sufficiently. All retained trees should positively contribute to the new development and should be included as part of a management plan to ensure the long-term safety of site users.

This BS5837:2012 survey is not a full or thorough assessment of the health and safety of the trees on or adjacent to the site; and therefore, it is recommended that detailed tree inspections are undertaken on a regular basis with the express purpose of complying with the landowner's duty of care to satisfy health and safety requirements.

³ British Standards Institution. (2014). *British Standard 8545:2014, Trees: from nursery to independence in the landscape – Recommendations*. British Standards Institution, London.



C159277-01-01-RevA

Legend

Tree location and stem diameter

Category A

Category B

Category C

Category U

Current canopy extent

Root Protection Area

Indicative tree shadow

Newly planted tree

Self-set tree

Area of newly planted trees

Site boundary

NOTES

All dimensions to be verified on site. Do not scale this drawing, use figured dimensions only. All discrepancies to be clarified with Project Arboriculturist. Drawing to be read in conjunction with Preliminary Arboricultural Assessment and Tree Schedule.

The positions of trees and their current crown spread, root protection area and shade pattern (where appropriate) have been shown on the Tree Survey Plan.

All survey data is based on a topographical survey where possible, supplied by the client.

Where topographical information has not identified tree positions or Ordnance Survey mapping has been utilised, trees have been positioned using GPS and aerial photography to provide approximate locations in relation to existing surrounding features. Further confirmation of tree and hedgerow locations through a topographical survey of the site is recommended to ensure future design accuracy.

The original of this drawing was produced in colour - a monochrome copy should not be relied upon.

The exact position of individual trees or species included as part of a tree group, woodland or hedgerow should be checked and verified on site prior to any decisions for foundation design, tree operations or construction activity being undertaken.

Further survey work would be required for calculating foundation depths in accordance with current Building Regulations requirements.

Trees are living organisms that change over time, the condition of all trees illustrated herein, are to be checked by the Project Arboriculturist should works commence 12 months after the date of this survey.

TREES INCLUDED DURING THE ASSESSMENT MAY BE SUBJECT TO STATUTORY CONSTRAINTS. IT IS THEREFORE ADVISED THAT NO WORKS SHOULD BE UNDERTAKEN TO ANY TREES ILLUSTRATED HEREIN WITHOUT FIRST OBTAINING THE RELEVANT AUTHORISATION TO DO SO UNLESS AGREED AS PER THE APPROVED PLANS THROUGH PLANNING CONSENT.

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Project

Twycross Zoo, Burton Rd, Atherstone

Drawing

Tree Survey Plan

Client

Twycross Zoo

Drawing Number

C159277-01-01-RevA

Revision

RevA

Scale @ A3

1:1,000

Date

October 2023

Approved By

DS

Drawn By

VO

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C159277-02-01

Legend

Tree location and stem diameter

Category A

Category B

Category B to be removed

Category C

Category C to be removed

Category U to be removed

Current canopy - tree to be retained

Current canopy - tree to be removed

Root Protection Area

Newly planted tree to be removed

Self-set tree to be removed

Area of newly planted trees

Indicative tree shadow

Site boundary

NOTES

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Project

Twycross Zoo, Burton Rd, Atherstone

Drawing

Tree Retention Plan

Client

Twycross Zoo

Drawing Number

C159277-02-01

Revision

00

Scale @ A3

1:1,000

Date

October 2023

Approved By

DS

Drawn By

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C159277-03-01

Legend

Tree location and stem diameter

Current canopy - tree to be retained

Root Protection Area

Tree protection barrier subject to BS5837

Category A

Category B

Category C

Area of newly planted trees

Indicative tree shadow

Site boundary

NOTES

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Project

Twycross Zoo, Burton Rd, Atherstone

Drawing

Tree Protection Plan

Client

Twycross Zoo

Drawing Number

C159277-03-01

Revision

00

Scale @ A3

1:1,000

Date

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DETAIL OF TREE PROTECTION BARRIER

Appendix A - Tree Schedule

Measurements	Age Class	Overall Condition	Root Protection Area (RPA)
Height - measured from ground level at base of stem/s (m).	YNG: Juvenile trees that have been recently planted.	G - Good: Trees with only a few minor defects and in good overall health needing little, if any attention.	- The RPA column gives the required area (m²). - The RPA Radius column gives the radius (m) of an equivalent circle. - The RPA is calculated using the formulae described in paragraph 4.6.1 of British Standard 5837: 2012 and is indicative of the required rooting area in order for a tree to be retained.
Stem Dia. - Diameter measured (mm) in accordance with Annex C of the BS5837.	SM: Semi-mature, trees upto 1/3 life expectancy.	F - Fair: Trees with minor, but rectifiable, defects or in the early stages of stress from which it may recover.	
Crown - crown spread estimated radially from the main stem (m).	EM: Early mature, trees 1/3 – 2/3 life expectancy.	P - Poor: Trees with major structural and/or physiological defects such that it is unlikely the tree will recover in the long term.	
Abbreviations Est - Estimated stem diameter Avg - Average stem diameter Max - Maximum stem diameter	M: Mature trees, upto 2/3 life expectancy.	D - Dead: Trees no longer alive. This could also apply to trees that are dying and unlikely to recover.	
	OM: Over mature, declining or moribund trees of low vigour.	In the assessment, of the BS category, particular consideration has been given to the following - The health, vigour and condition of each tree - The presence of any structural defects in each tree and its future life expectancy - The size and form of each tree and its suitability within the context of a proposed development - The location of each tree relative to existing site features e.g. its screening value or landscape features	
	V: Veteran, tree possessing certain attributes relating to veteran trees.	- Age class - Life expectancy	

Structural Condition

The following has been considered when inspecting structural condition:

- The presence of fungal fruiting bodies around the base of the tree or on the stem, as they could possibly indicate the presence of possible internal decay.
- Soil cracks and any heaving of the soil around the base.
- Any abrupt bends in branches and limbs resulting from past pruning.
- Tight or weak 'V' shaped forks and co-dominant stems.
- Hazard beam formations and other such biomechanical related defects (as described by Claus Mattheck, Body Language of Trees HMSO Research for Amenity Trees No. 4 1994).
- Cavities as a result of limb losses or past pruning.
- Broken branches or storm damage.
- Canker formations.
- Loose or flaking bark.
- Damage to roots.
- Basal, stem or branch / limb cavities.
- Crown die-back or abnormal foliage size and colour.
- Any changes to the timing of normal leaf flush and leaf fall patterns.

Quality Assessment of Retention Category

Category U - Trees 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.

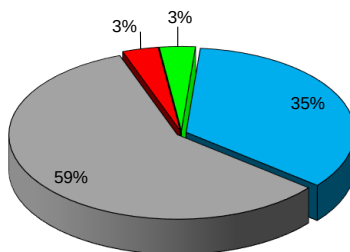
Category A - Trees of high quality with an estimated remaining life expectancy of at least 40 years.

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

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

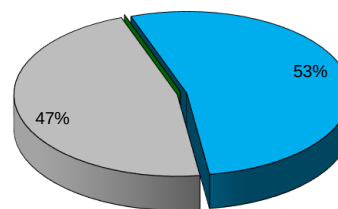
Sub-categories: (i) - Mainly arboricultural value
(ii) - Mainly landscape value
(iii) - Mainly cultural or conservation value

BS5837 category: Individuals



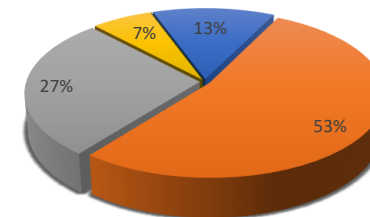
■ Category U
 ■ Category A
■ Category B
 ■ Category C

BS5837 category: Groups of trees



■ Category B
 ■ Category C

Age distribution of tree stock



■ Young
 ■ Semi Mature
 ■ Early Mature
 ■ Mature

Appendix A - Summary

	Individual Trees	Totals	Tree Groups	Totals
Category U	T21	1		0
Category A	T13	1		0
Category B	T2, T3, T11, T16, T17, T18, T26, T27, T28, T29	10	G1, G2, G4, G6, G9, G13, G14, G15	8
Category C	T1, T4, T5, T6, T7, T8, T9, T10, T12, T14, T15, T19, T20, T22, T23, T24, T25	17	G3, G5, G7, G8, G10, G11, G12	7
	Total	29	Total	15

	Hedgerows	Totals	Woodlands	Totals
Category U		0		0
Category A		0		0
Category B		0		0
Category C	H1, H2	2		0
	Total	2	Total	0

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
T1	Hornbeam	5.5	2.0	3	60 50 100	1.0	1.0	1.0	1.0	SM	F	F	10	1.8	C 1	Branch stubs observed Exposed heartwood Included unions observed Minor deadwood in the crown Pruning wounds observed
T2	White poplar	13.0	3.0	1	400	5.0	5.0	5.0	5.0	EM	F	G	72	4.8	B 1	Dense ivy on the stem Light ivy in the crown Limited inspection due to ivy Limited inspection due to dense vegetation Minor deadwood in the crown No obvious defects observed
T3	White poplar	14.0	3.0	1	380	5.0	5.0	5.0	5.0	SM	F	G	72	4.8	B 1	Branch stubs observed Light ivy on stem Limited inspection due to dense vegetation Minor deadwood in the crown No obvious defects observed
T4	Field maple	7.5	2.0	1	200	2.0	2.5	2.0	1.0	SM	F	F	18	2.4	C 1	Dense ivy on the stem Branch stubs observed Limited inspection due to ivy Minor deadwood in the crown Pruning wounds observed Generally poor specimen
T5	Field maple	6.0	2.0	1	160	1.0	2.0	0.5	0.5	SM	F	F	14	2.1	C 1	Branch stubs observed Epicormic growth on the main stem Limited inspection due to dense vegetation Pruning wounds observed Generally a poor specimen
T6	Field maple	7.5	2.0	1	150	1.5	3.0	1.5	0.5	SM	F	F	10	1.8	C 1	Branch stubs observed Limited inspection due to dense vegetation Pruning wounds observed
T7	Field maple	6.0	2.0	1	110	1.0	1.0	1.0	0.5	SM	F	F	7	1.5	C 1	Dense ivy on the stem

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
T8	Field maple	8.0	3.0	2	120 160	1.5	2.0	1.5	1.0	SM	F	F	18	2.4	C 1	Dense ivy on the stem Pruning wounds observed Limited inspection due to dense vegetation Limited inspection due to ivy
T9	Field maple	7.5	3.0	1	140	1.5	1.5	1.5	1.5	SM	F	F	10	1.8	C 1	Branch stubs observed Minor deadwood in the crown Pruning wounds observed
T10	Field maple	6.0	3.0	1	100	1.0	1.0	1.0	1.0	SM	F	F	5	1.2	C 1	Dense ivy in the crown Dense ivy on the stem Limited inspection due to ivy
T11	White poplar	12.0	3.0	1	380	5.0	5.0	5.0	5.0	EM	F	G	72	4.8	B 1	Branch stubs observed Limited inspection due to dense vegetation No obvious defects observed
T12	Field maple	7.0	2.0	2	180 200	2.5	3.0	3.0	1.0	SM	F	F	34	3.3	C 1	Dense ivy in the crown Dense ivy on the stem Lateral dieback observed Limited inspection due to dense vegetation Limited inspection due to ivy Minor deadwood in the crown Generally a poor specimen
T13	English oak	15.0	2.0	1	610	8.5	8.5	8.5	8.5	EM	G	G	177	7.5	A 1	Branch stubs observed Dense ivy in the crown Dense ivy on the stem Epicormic growth observed in the crown Hard surfaces within the rooting area Limited inspection due to dense vegetation Limited inspection due to ivy Minor deadwood in the crown No obvious defects observed Pruning wounds observed

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
T14	Cherry	9.0	2.0	1	260	4.0	3.0	2.0	3.0	SM	F	F	34	3.3	C 1	Branch stubs observed Dense ivy on the stem Estimated dimensions Limited inspection due to dense vegetation Limited inspection due to ivy
T15	Ash	14.0	3.0	1	700	8.0	8.0	8.0	8.0	M	P	P	222	8.4	C 3	Branch stubs observed Conservation value Dense ivy in the crown Dense ivy on the stem Estimated dimensions Large hanging branches in the crown Lateral dieback observed Apical dieback Limited inspection due to dense vegetation Major deadwood in the crown Minor deadwood in the crown Tree is showing signs of decline Innotus present Tree requires tree safety assessment to determine future viability
T16	Red oak	10.0	3.0	1	200	3.5	3.5	3.5	3.5	SM	G	G	18	2.4	B 1	Branch stubs observed No obvious defects observed Pruning wounds observed
T17	Red oak	8.0	2.2	1	190	2.0	2.0	2.0	2.0	SM	F	G	18	2.4	B 1	Branch stubs observed No obvious defects observed Pruning wounds observed
T18	Red oak	6.5	2.0	1	210	2.5	2.5	2.5	2.5	SM	F	G	23	2.7	B 1	Branch stubs observed No obvious defects observed Pruning wounds observed
T19	Hawthorn	6.0	8.0	4	80 100 90 40	3.5	3.5	3.5	3.5	EM	F	F	14	2.1	C 1,3	Branch stubs observed Estimated dimensions Limited inspection due to dense vegetation Minor deadwood in the crown

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
T20	Ash	13.0	3.0	5	210 180 100 220 100	6.5	6.5	6.5	3.0	EM	F,P	F,P	72	4.8	C 1	Apical dieback Branch stubs observed Estimated dimensions Limited inspection due to dense vegetation Minor deadwood in the crown
T21	Ash	14.0	3.0	1	840	7.0	5.0	7.0	7.0	M	P	F	327	10.2	U	Apical dieback Branch stubs observed Conservation value Estimated dimensions Exposed heartwood Lateral dieback observed Tree is in decline Innotus hispidus everywhere, this tree offers a limited contribution
T22	Hybrid black poplar	25.0	3.0	1	960	11.0	11.0	9.0	5.0	M	F	F	430	11.7	C 1	Apical dieback Branch stubs observed Hard surfaces within the rooting area Minor deadwood in the crown Storm damage observed Tree is showing signs of decline
T23	Field maple	6.5	1.5	1	190	2.0	2.0	2.0	2.0	SM	F	F	18	2.4	C 1	Basal epicormic growth observed Branch stubs observed Minor deadwood in the crown
T24	Field maple	6.0	2.0	1	190	1.5	1.5	1.5	1.5	SM	F	F	18	2.4	C 1	Branch stubs observed Epicormic growth on the main stem

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
T25	Hybrid black poplar	23.0	3.0	1	900	6.0	9.5	3.0	9.5	M	F	F	366	10.8	C 1	Apical dieback Branch stubs observed Epicormic growth observed in the crown Epicormic growth on the main stem Estimated dimensions Light ivy on stem Limited inspection due to access Limited inspection due to dense vegetation Minor deadwood in the crown Storm damage observed
T26	Beech	11.0	2.5	1	390	5.5	5.5	5.5	5.5	EM	F	G	72	4.8	B 1	Branch stubs observed Hard surfaces within the rooting area Pruning wounds observed
T27	Walnut	11.0	2.5	1	420	5.5	5.5	5.5	5.5	EM	G	G	81	5.1	B 1	Branch stubs observed Building within the rooting area Pruning wounds observed Tear wounds present
T28	Copper beech	7.5	2.5	1	330	5.5	5.5	5.5	5.5	SM	G	G	55	4.2	B 1	No obvious defects observed
T29	Sycamore	16.0	2.5	1	510	5.5	5.5	5.5	5.5	EM	G	G	124	6.3	B 1	No obvious defects observed

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
G1	Hornbeam	8.0	2.0	-	180	1.5	1.5	1.5	1.5	SM	G,F	G,F	18	2.4	B 2,3	Group is sparse in areas Hard surfaces within the rooting area Included unions observed Pruning wounds observed Building within the rooting area
G2	Leyland cypress	13.0	0.0	-	340	2.5	2.5	2.5	2.5	SM EM	G,F	G,F	55	4.2	B 2,3	Conjoined canopy No obvious defects observed Provides screening
G3	Hawthorn Sycamore Holly Ash	5.0	0.0	-	80	1.5	1.5	1.5	1.5	Y SM	F	F	5	1.2	C 2,3	Hard surfaces within the rooting area Included unions observed Outgrown hedge
G4	Sycamore	13.0	3.0	-	320	3.5	3.5	3.5	3.5	SM EM	G,F	F,G	48	3.9	B 2,3	Branch stubs observed Group is located off site but overhangs the study area Hard surfaces within the rooting area Limited inspection due to access Limited inspection due to dense vegetation Minor deadwood in the crowns No obvious defects observed Provides screening
G5	Field maple Goat willow Hawthorn Hazel Holly	6.0	0.0	-	140	1.5	1.5	1.5	1.5	Y SM	G,F	G,F	10	1.8	C 2,3	Branch stubs observed Group is sparse in areas Included unions observed Limited inspection due to dense vegetation Minor deadwood in the crowns Pruning wounds observed

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
G6	Field maple	11.0	2.0	-	250	3.0	1.0	3.0	3.0	SM EM	G,F	G,F	28	3.0	B 2,3	Branch stubs observed Dense ivy in the crowns Dense ivy on the stems Ivy restricts inspection Limited inspection due to dense vegetation Limited inspection due to ivy No obvious defects observed Provides screening
G7	Hawthorn Hazel Field maple	6.0	8.0	-	120	1.5	1.5	1.5	1.5	Y SM	F	F	7	1.5	C 3	Branch stubs observed Group is sparse in areas Ivy suppressing a number of trees Limited inspection due to dense vegetation Provides screening
G8	Blackthorn Cherry Hawthorn	5.0	0.0	-	80	1.5	1.5	1.5	1.5	Y SM	F	G	5	1.2	C 2,3	Branch stubs observed Conjoined canopy Ivy suppressing a number of trees Limited inspection due to dense vegetation Provides screening
G9	English oak	11.0	2.0	-	450	5.0	5.0	5.0	5.0	SM EM	G	G	92	5.4	B 1,2,3	Conjoined canopy Hard surfaces within the rooting area Ivy restricts inspection Ivy suppressing a number of trees Limited inspection due to dense vegetation Limited inspection due to ivy No obvious defects observed Provides screening
G10	Cherry	6.0	2.0	-	280	3.0	3.0	3.0	3.0	SM EM	F,P	F,P	41	3.6	C 2,3	Group is sparse in areas Limited inspection due to dense vegetation Cherry by sub box requires further investigation and so do the others

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
G11	Blackthorn Elder Hawthorn Hazel Holly Sycamore Wild service tree	7.0	0.0	-	150	2.0	2.0	2.0	2.0	Y SM EM	G,F	G,F	10	1.8	C 2,3	Dead and dying trees present Group is sparse in areas Hard surfaces within the rooting area Limited inspection due to dense vegetation Provides screening
G12	Ash	11.0	2.0	-	380	4.5	4.5	4.5	4.5	SM EM	F	F,P	72	4.8	C 2,3	Branch stubs observed Conjoined canopy Included unions observed Light ivy in the crowns Light ivy on stems Limited inspection due to dense vegetation Minor deadwood in the crowns Provides screening
G13	English oak Sycamore	11.0	1.0	-	370	2.0	3.5	4.5	4.5	SM EM	G,F	G,F	64	4.5	B 2,3	Branch stubs observed Minor deadwood in the crowns Provides screening
G14	Cherry Scots pine	8.0	0.0	-	240	2.0	2.0	2.0	2.0	Y SM	G	G	28	3.0	B 2,3	Conjoined canopy Limited inspection due to access Estimated dimensions
G15	Hybrid black poplar	24.0	2.0	-	840	10.0	10.0	10.0	10.0	EM M	F	G	327	10.2	B 2,3	Conjoined canopy Limited inspection due to access No obvious defects observed Provides screening

Tree No	Species	Height (m)	Crown Clearance (m)	No. of Stems	Stem Dia. (mm)	Crown Radius				Age Class	Structure	Vigour	RPA (m)	RPA Radius (m)	Cat	Comments
						N	E	S	W							
H1	Blackthorn Hawthorn Holly	4.5	0.0	-	30	1.5	1.5	1.5	1.5	Y SM	G	G	3	0.9	C 2,3	Managed Provides screening
H2	Beech Holly	1.0	0.0	-	10	0.5	0.5	0.5	0.5	Y SM	G	G	3	0.9	C 3	Managed



**PROTECTIVE FENCING. THIS
FENCING MUST BE
MAINTAINED IN ACCORDANCE
WITH THE APPROVED PLANS
AND DRAWINGS FOR THIS
DEVELOPMENT.**



**TREE PROTECTION AREA
KEEP OUT !**

**(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY
PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A
TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY
LEAD TO CRIMINAL PROSECUTION**

**ANY INCURSION INTO THE PROTECTED AREA MUST BE
WITH THE WRITTEN PERMISSION OF THE LOCAL
PLANNING AUTHORITY**



Report Verification

Report Version	Date	Completed by:	Checked & Approved by:
Final	12/10/2023	Duncan Smith BSc (Hons) MArborA Arboricultural Manager	Luke Webb BSc (Hons) MArborA Senior Arboricultural Consultant

Declaration of Compliance

This study has been undertaken in accordance with British Standard 5837:2012 '*Trees in Relation to Design, Demolition and Construction – Recommendations*'.

Disclaimer

The contents of this report are the responsibility of Middlemarch. It should be noted that, whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Middlemarch accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

Validity of Data

The findings of this study are valid for a period of 12 months from the date of survey. If works have not commenced by this date, an updated site visit should be carried out by a suitably qualified and experienced arboriculturist to assess any changes to the trees, groups, and hedgerows on site and to inform a review of the conclusions and recommendations made.

It should be noted that trees are dynamic living organisms that are subject to natural changes as they age or are influenced by changes in their environment. As such, following any significant meteorological event or changes in the growing environment of the trees they should be re-assessed by a suitably qualified and experienced arboriculturist.

This Arboricultural Impact Assessment has been produced following a review of a proposed development layout for the site based on data provided by the client. Should the development proposals change, this report will need to be updated to assess the impact of the amended development.

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1. Introduction

1.1 Project Background

This Arboricultural Impact Assessment was commissioned by Baker Mallet LLP to accompany a planning application for commercial development at Twycross Zoo near Atherstone. A survey of the trees on site and within influencing distance of the boundaries was undertaken on the 11th November 2022 as part of a Preliminary Arboricultural Assessment to aid design and avoid unnecessary tree removal.

This Arboricultural Impact Assessment has been carried out in accordance with British Standard 5837:2012 '*Trees in Relation to Design, Demolition and Construction - Recommendations*¹ (hereafter referred to as BS5837).

The purpose of this report is to:

- Review the relationship between the proposed development and the existing trees and hedgerows identified during the Preliminary Arboricultural Assessment.
- Provide a Tree Retention Plan to determine trees and hedgerows to be retained and removed in the context of the proposed development.
- Identify mitigation to offset any tree or hedgerow loss as part of the development proposals.
- Identify all areas where specific working methods are required to ensure protection of retained trees and hedgerows as part of an Arboricultural Method Statement.

1.2 Site Description, Drawings and Appendices

Attribute	Description
National Grid Reference	SK 31935 06217
Topography	Generally flat.
Tree Cover	High, medium and low quality - Individual trees and groups of trees which have been planted to act as screening.
Drawings attached	Tree Survey Plan – C159277-01-01 Tree Retention Plan – C159277-02-01
Appendices	Appendix A – Tree Schedule

Table 1.1: Summary of Site and Surroundings

¹ British Standards Institution. (2012). *British Standard 5837:2012, Trees in relation to design, demolition, and construction – Recommendations*. British Standards Institution, London.

1.3 Development Proposals

The proposed development will comprise demolition works and removal of trees and vegetation to make way for a new, National Conservation Science Centre with associated landscaping and tree planting.

1.4 Documentation Provided

This assessment is based upon the information provided by the client in addition to information collected by Middlemarch during the Preliminary Arboricultural Assessment, as detailed below.

Author	Document	Drawing Number
Clancy Consulting	Drainage Strategy	21440-CCL-XX-XX-RP-C-001-REV P01
Clancy Consulting	Surface Water Drainage Strategy	21440-CCL-XX-XX-RP-C-001-REV P01
DEARADU ZU	Combined Landscape Masterplan	P22009-00-001-DZ-0110-02
HLM Architects	Proposed Site Plan	TWZ-HLM-00-00-DR-L-00001 REV P06
HLM Architects	Soft Landscape Strategy	TWZ-HLM-XX-ZZ-DR-L-4501 REV P01

Table 1.2: Documentation Provided

2. Survey Methodology

2.1 Survey Scope

To determine the status of the trees within the site, a full arboricultural survey has been undertaken, assessing the species and status of all trees present. This survey has been carried out in accordance with BS5837.

All individual trees with a stem diameter greater than 75 mm are shown on the Tree Survey Plan and have been assigned a unique reference number. Trees were visually assessed and a schedule prepared listing:

- Tree number
- Species
- Tree height
- Minimum crown clearance
- Stem diameter
- Crown spread
- Age class
- Vigour
- Structural condition

Measurements for tree height, minimum crown clearance and crown spread were taken to an accuracy of 0.5 m. Stem diameter measurements were recorded to the nearest 10 mm. Any specific observations were also noted. All observations and measurements are included in Appendix A Tree Schedule.

Trees were assessed and assigned one of the following categories:

Category U:

Trees 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.

Category A:

Trees of high quality with an estimated remaining life expectancy of at least 40 years.

Category B:

Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.

Category C:

Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm.

Categories A, B and C have further sub-categories with regards to the reasons for tree retention:

- Mainly arboricultural qualities.
- Mainly landscape qualities.
- Mainly cultural values, including conservation.

N.B. Certain trees considered unsuitable to retain in their current context (Retention Category U) may possess existing or potential conservation value which make them desirable to preserve in the context of wildlife habitat (e.g. areas with limited public access).

2.2 Root Protection Area (RPA)

To avoid damage to the roots or rooting environment of retained trees, the RPA has been calculated for each of the Category A, B and C trees in accordance with section 4.6 of BS5837. BS5837 recommends this as the minimum area around a tree that contains sufficient roots and rooting volume to maintain viable tree vigour and structure. Where groups of trees have been assessed, the Root Protection Area has been shown based on the maximum sized tree stem in each group and so may exceed the Root Protection Area required for some of the individual specimens within the group. Further detailed inspection of the individual trees forming a group may be required where development impacts upon individual trees forming the combined group.

Protection of the roots and soil structure within the RPA should be treated as a priority. These figures have been calculated utilising the formulas within Section 4.6 and Annex D of BS5837.

2.3 Tree Schedule

Appendix A details the individual trees, groups, hedgerows, and woodlands (where present) and includes the relevant information for each at the time of inspection. General observations of any structural and physiological condition and the presence of any decay or physical defects have also been included.

2.4 Assessment Limitations

This survey has been undertaken in accordance with BS5837 and trees with a stem diameter of less than 75mm and the specific location of species within a hedgerow have not been identified in accordance with the guidance. It may therefore be necessary during detailed design to undertake further assessment and accurate positioning of juvenile trees or woody species within hedgerows and tree groups to assist structural calculations for foundation design of structures in accordance with current building regulations and NHBC Chapter 4.2 *Building near Trees*².

This survey is not a full or thorough assessment of the health and safety of the trees on or adjacent to the site; and therefore, it is recommended that detailed tree inspections are undertaken on a regular basis with the express purpose of complying with the landowner's duty of care to satisfy health and safety requirements.

For the purposes of this assessment, a hedgerow is described as a line of trees or shrubs with canopies less than 5m wide which is regularly managed through pruning. Where trees are present within a hedgerow that are significantly different in character from the remainder, these have been identified and recorded separately. A tree survey in accordance with BS5837 does

² National House Building Council. (2022). *NHBC Standards 2022: Chapter 4.2 - Building Near Trees*. NHBC, Milton Keynes.

not assess hedgerows against the Hedgerow Regulations 1997³ or from an ecological perspective.

The exact position of individual trees or species included as part of a tree group, hedgerow or woodland should be checked and verified on site prior to any decisions for foundation design, tree operations or construction activity being undertaken.

2.5 Conditions of Tree Survey

The survey was completed by a suitably qualified and experienced Arboriculturist from ground level and from within the boundary of the site. Aerial tree inspections or the internal condition of the stem/s or branches was not undertaken at this stage. Evaluation of tree condition given within this assessment applies to the date of survey and cannot be assumed to remain unchanged. It may be necessary to review these within 12 months, in accordance with sound arboricultural practice.

All survey data is based on a topographical survey where possible, supplied by the client. Where topographical information has not identified tree positions or Ordnance Survey mapping has been utilised, trees and hedgerows have been positioned using GPS and aerial photography to provide approximate locations in relation to existing surrounding features. Further confirmation of tree and hedgerow locations through a topographical survey of the site is recommended to ensure future design accuracy.

2.6 Tree Survey Plan

The Tree Survey Plan identifies the existing trees including above and below ground constraints which should be considered during the design process.

2.7 Tree Retention Plan

The Tree Retention Plan identifies which trees and hedgerows are to be retained and incorporated as part of the site development and which are to be removed.

³ Department of the Environment, Transport, and the Regions: London. (1997). *The Hedgerows Regulations 1997: A Guide to the Law and Good Practice*.

3. Statutory Protection

3.1 Tree Preservation Order and Conservation Area Protection

A desk-based study was undertaken to identify if any of the trees present within or near the site are affected by statutory constraints as detailed below.

Statutory Constraint	Present ✓ ✗	Source	Details
TPO	✗	Local Authority website – Hinckley and Bosworth Borough Council	N/A
Conservation Area	✗	Local Authority website – Hinckley and Bosworth Borough Council	N/A
Ancient Woodland	✗	Multi Agency Geographical Information for the Countryside (MAGIC)	N/A

Table 3.1: Summary of Statutory Constraints that Affect the Site

Where a tree preservation order, conservation area or ancient woodland applies to trees within the assessment area, statutory constraints will apply to the development in respect of trees.

No works must be undertaken on the protected trees without prior permission from the Local Authority unless authorised as part of an approved planning application. Works include pruning, topping, lopping, uprooting or wilful damage or wilful destruction of these trees. Any proposed pruning works not currently approved will need to be fully specified and agreed within a future planning application.

3.2 Protected Species

Bats

Mature trees often contain cavities, hollows, peeling bark or woodpecker holes which provide potential roosting locations for bats. Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations 2017)⁴. They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981⁵, as amended. Consequently, causing damage to a bat roost constitutes an offence.

⁴ HM Government – The National Archives (2017) [online] *The Conservation of Habitats and Species Regulations 2017*. Available at: <https://www.legislation.gov.uk/uksl/2017/1012/contents/made>

⁵ HM Government – The National Archives 2017. *Wildlife and Countryside Act 1981*. [online] Available at: <http://www.legislation.gov.uk/ukpga/1981/69/contents>

Generally, should the presence of a bat roost be suspected whilst completing works on any trees on site then an appropriately licensed bat worker should be consulted for advice.

Birds

Trees offer potential habitat for nesting birds which are protected under the Wildlife and Countryside Act WCA 1981 (as amended). Some species (listed in Schedule 1 of the WCA) are protected by special penalties. This legislation makes it an offence to intentionally or recklessly damage or destroy an active bird nest or part thereof.

As the trees on, and adjacent, to the site provide potential habitat for nesting birds all tree work should ideally be completed outside the nesting bird season (Generally March to September).

If this is not possible then the vegetation should be subject to a nesting bird inspection by a suitably experienced ecologist prior to commencement of works. If any active nests are identified then the vegetation, and a defined buffer zone, will need to remain in place until the young have naturally fledged.

4. Results Summary

4.1 Preliminary Arboricultural Assessment

The assessment twenty-nine individual trees, fifteen groups of trees and two hedgerows as detailed below and in Appendix A Tree Schedule.

BS5837:2012 Category	Tree/ Group/ Hedgerow Reference
U	T21.
A	T13.
B	T2, T3, T11, T16, T17, T18, T26, T27, T28, T29, G1, G2, G4, G6, G9, G13, G14, G15.
C	T1, T4, T5, T6, T7, T8, T9, T10, T12, T14, T15, T19, T20, T22, T23, T24, T25, G3, G5, G7, G8, G10, G11, G12, H1, H2.

Table 4.1: Summary of Trees, Groups and Hedgerows in BS5837:2012 Categories

Twycross Zoo is located within Leicestershire near Norton Juxta, Twycross. The survey area included the following enclosures: Lemur, Tufted Deer and Top Chimps and the Tiger and Gorilla enclosures were located close to the survey area. In addition to the animal enclosures, an access track and field were also located within the survey area to the south.

The survey area included various tree species, of varying ages and structural conditions. The boundary trees had initially been planted to provide screening of the zoo and these had been supplemented by recent tree planting.

Category U

Only one tree was considered unsuitable to retain and assessed as Retention Category U. T21 was a mature Ash tree which was in poor structural condition through terminal decline, offering limited arboricultural contribution to the site and wider landscape. However, due to the wildlife habitat features observed during the assessment T21 currently provides conservation value and should be retained if safe to do so. During the survey *Inonotus hispidus* was present in the canopy, on major limbs, main stem (at various heights) and old fruiting brackets where present on the ground. The presence of *Inonotus hispidus* throughout the scaffold limbs of the canopy will require the extensive loss of the crown to prevent failure, resulting in a distorted form of limited future value.

Category A

T13 was an early mature English oak located along the southern boundary. This tree was considered to be of high quality, offering an estimated life expectancy of at least 40 years. Due to the dense ivy and vegetation, it was not possible to undertake a detailed inspection of T13, however, no obvious defects were observed, and the overall vigour observed confirmed T13 was in good health.

Category B

Ten individual trees and eight groups of trees were assessed as moderate quality, offering a minimum contribution of 20 years to the site. Due to impaired conditions, unsympathetic management, and storm damage these specimens lacked the qualities necessary to merit Retention Category A designation. These moderate value arboricultural features offer a collective

visual contribution to the visitors of the zoo and the essential screening considered highly desirable not only to obscure the enclosures from road users, but also for the welfare of the zoo animals.

Category C

The remaining seventeen individual trees, seven groups of trees and two hedgerows were considered to be of low quality. Additionally, many of trees assessed as low quality were of young age with stems under 150 mm in diameter. The species present and the current management regime had made many of lower quality groups transient in nature, limiting their contribution in terms of landscape and conservation benefits.

5. Arboricultural Impact Assessment

5.1 Introduction

This section of the report details the potential impacts that the proposed development may have upon the site's tree stock. The assessment has been based upon the documents detailed in Table 1.1 with reference to the results of the Preliminary Arboricultural Assessment.

5.2 Tree Retention and Removal

The trees to be removed are detailed below and are identified on the Tree Retention Plan. All trees, groups and hedgerows not featured within the table below, are to be retained within the proposed development.

Tree/Group/ Hedgerow Reference	Species	Retention Category	Reason for Removal
T1	Hornbeam	C	Within footprint of proposed building
T2	White Poplar	B	Within proposed access road and footpath / unsuitable species for retention in busy publicly accessible area
T16	Red Oak	B	Within car park
T17	Red Oak	B	To make way for drainage apparatus
T18	Red Oak	B	To allow construction of a new wall
T19	Hawthorn	C	To allow construction of new boardwalk
T21	Ash	U	Unsuitable for retention due to its declining form and hazardous structure
T22	Hybrid Black Poplar	C	To enable construction of building / unsuitable species for retention in busy publicly accessible area
T23	Field Maple	C	Relandscaping to reflect site layout changes
T24	Field Maple	C	Relandscaping to reflect site layout changes
T25	Hybrid Black Poplar	C	Within proposed access footpath / unsuitable species for retention in busy publicly accessible area
G1	Hornbeam	B	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes
G5*	Field Maple Hawthorn Goat Willow Hazel	C	Removal of the linear strip of G5 adjacent to the northern boundary and trees to provide sufficient space to accommodate two lodges including construction buffer.

Tree/Group/ Hedgerow Reference	Species	Retention Category	Reason for Removal
	Holly		
G10*	Cherry	C	Two trees removed; two trees retained
G11*	Blackthorn Hawthorn Hazel Holly Elder Sycamore Wild Service Tree	C	Partial removal to make way for new buildings
G13	English Oak Sycamore	B	Removal to make way for new buildings
G14	Cherry Scots Pine	B	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes
G15	Hybrid Black Poplar	B	Within footprint of proposed buildings and hardstanding Relandscaping to reflect site layout changes Unsuitable species for retention in busy publicly accessible area
H2*	Beech Holly	C	Central section to be removed to make way for relandscaping to reflect site layout changes
Key *: Partial removal of trees within group or hedgerow			

Table 5.1: Tree Removal

The proposed development will ensure the retention and incorporation of the vast majority of trees surveyed and new tree planting as part of the wider landscape strategy will sufficiently mitigate the losses identified. The proposed development will require the removal of eleven individual trees and four groups of trees as well as the partial removal of three groups of trees and a hedgerow.

A mature ash tree, T21, identified for removal was considered to be unsuitable for retention (Retention Category U) during the Preliminary Arboricultural Assessment and therefore the removal of this tree would be required, irrespective of the proposed development, due to its poor condition and location, immediately adjacent to a busy publicly accessible area. T21 did, however, contain several features considered to be of high conservation value which could potentially make it desirable to preserve in the context of wildlife habitat (e.g. areas with limited public access). However, the potential risk of injury to people or damage to property is, on balance, considered too high and T21 should, therefore, be removed.

None of the individual trees or tree groups identified for removal were considered to be of high value (Retention Category A).

Four individual trees and four tree groups identified for removal were of moderate quality (Retention Category B) and suitable new tree planting will therefore be provided to offer an adequate level of mitigation for this loss. T2, White Poplar and tree group G15 were considered to be of moderate quality during the survey but were considered unsuitable species for retention in busy publicly accessible area. (See below note).

The remaining six trees for removal and three tree groups and hedgerow identified for partial removal were considered to be of a low quality (Retention Category C) during the Preliminary Arboricultural Assessment.

NB: It should be noted that T2, identified as White Poplar and T22, T25 and G15 identified as Hybrid Black Poplar are not species considered suitable within busy public areas, and would be recommended for removal and replacement through ongoing management of the site's safety review over the short to medium term, irrespective of any future development. Populus species such as these grow rapidly at the cost of strength and all three trees and group of trees have a propensity to lose large sections of stem or branch material without warning, resulting in an unacceptable level of risk to users of the site.

The proposed removal of these trees and hedgerow should be considered acceptable as they largely stand centrally within the site and offer limited visual amenity to the wider area. New tree and hedgerow planting of higher quality trees more suited to the redevelopment will make a lasting contribution to the visual amenity value and canopy coverage of the site.

5.3 Works within Root Protection Areas (RPA)

Some aspects of the proposed development will require works within the RPAs of retained trees, however, none of the proposed works within RPAs are considered detrimental to tree health or stability and tree protection measures including regular audits implemented as part of an approved Arboricultural Method Statement will be undertaken to ensure any potential impact to tree canopies and rooting volume is minimised.

The proposed attenuation tank extends into the RPA of T13, an early mature Retention Category A oak tree. The attenuation facility is to be located within an existing area of hardstanding and will enter a small portion of the RPA of T13 and any potential negative impact upon the trees health or stability is therefore unlikely. All excavation works to facilitate the attenuation tank should be supervised by the Project Arboriculturist as part of an approved Arboricultural Method Statement.

The proposed lodges and access footpath / track adjacent to the western boundary will be located at the periphery of the RPAs of retained trees and tree groups and the proposed works are, therefore, unlikely to cause significant harm. The installation of the lodges may require works at the periphery of the canopy of T11 and tree group G2 and all works within or near to the RPAs or beneath the canopies of these retained trees should be detailed as part of an Arboricultural Method Statement to ensure the method of construction is suitably considered.

5.4 Trees and Foundations

Any structures built on the site should comply with current building regulations and NHBC Chapter 4.2 - *Building near Trees* (2022)⁶. Foundation depths for buildings near or adjacent to trees should consider the potential size of the trees at maturity and their subsequent water demand. The soil types throughout the site should be fully investigated and appropriate measures taken. If trees are removed across the site, the potential for soil heave should be assessed and foundations designed accordingly.

This survey has been undertaken in accordance with BS5837 and further assessment in accordance with current building regulations will be required to inform foundation design.

5.5 Tree Pruning

Pruning of mature trees should only be undertaken where essential, to prevent open wounds that allow the ingress of decay and provide opportunity for fungal spores to infect the tree. Pruning works should ideally be undertaken during the winter months when the tree is dormant or during the summer months when the tree is fully active. Autumn pruning (when fungal spores are abundant in the surrounding atmosphere) should be avoided if possible. Juvenile trees should be formatively pruned in their early years to reduce the presence of potential defects into maturity that would reduce their lifespan.

All tree pruning works should be detailed as part of an Arboricultural Method Statement and completed in accordance with the current best practice guidance set out within BS3998:2010 *“Tree Work – Recommendations”*⁷ by suitably competent, qualified, and insured arboricultural contractors. The extent of pruning should be identified to contractors in a pre-commencement site meeting as part of enabling works.

5.6 New Tree Planting

As part of the development proposals, an adequate quantity of mitigation tree planting to compensate for the tree loss identified has been demonstrated within the Combined Landscape Masterplan (P22009-00-001-DZ-0110-02). The purpose and function of the new tree planting should be carefully considered so that key objectives from a visual amenity, wildlife habitat and landscape perspective can also be achieved.

⁶ National House Building Council. (2022). *NHBC Standards 2022: Chapter 4.2 - Building Near Trees*. NHBC, Milton Keynes.

⁷ British Standards Institution. (2010). *British Standard 3998:2010, Tree Work – Recommendations*. British Standards Institution, London.

6. Conclusion

6.1 Summary of Impacts

The proposed development of the site is unlikely to significantly impact the visual amenity of the local area as a result of the proposed tree removal. Whilst some works are to be undertaken within the RPAs of retained trees, the nature of those works are such that they can be completed without causing significant impact, subject to the adoption of appropriate working practices as detailed in a future Arboricultural Method Statement following approval of the current planning application.

7. Arboricultural Method Statement

7.1 Introduction

An Arboricultural Method Statement will be required for the site as various aspects of the proposed development affect retained trees. The purpose of an Arboricultural Method Statement is to ensure that all site operations occur with minimal risk of adverse impact upon trees that are to be retained.

In relation to this development the Arboricultural Method Statement should address the following:

Action	Required
Tree Surgery	✓
Site set up and logistics	✓
Building demolition and removal of hard surfaces within RPAs	✓
Working space to construct new buildings within RPAs	✓
Installation of utilities within RPAs	✓
Site access, material storage contractor's parking and site compound location	✓
Protective barrier and ground protection location and specification	✓
Pre-commencement site meeting per phase	✓
Arboricultural Clerk of Works supervision	✓
Audit timetable	✓