University of Hull Photovoltaic Project, Hull Road – BS 5837:2012 Arboricultural Report, Impact Assessment and Method Statement

Gardiner and Theobald LLP

September 2022

Ecus Ltd

Report to: **2nd Floor**
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Report Title: **University of Hull Photovoltaic Project, Hull Road – BS5837:2012 Tree Survey, Arboricultural Impact Assessment and Arboricultural Method Statement**

Version: **V2.0**
Issue Date: **September 2022**
Report Ref: **18618C**

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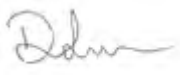

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Version	Author	Description	Date
V0.1	Dave Farmer	Draft	20.04.2022
V0.2	Drew Leeper	QA1	25.04.2022
V0.3	Karen O'Shea	QA2	28.04.2022
V1.0	Dave Farmer	Issue	29.04.2022
V2.0	Karen O'Shea	Update to reflect new layout	16.09.2022

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Executive Summary

On behalf of Gardiner and Theobald LLP (the Client), Ecus Limited (Ecus) has carried out a tree survey to BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations* in April 2022 at the University of Hull, Hull Road site. This survey has formed the basis of an assessment of the impacts that development proposals may have on existing trees and of any methodologies to be adopted to protect retained trees during development.

The survey recorded all significant trees within the site and those which may be affected by any development proposed within the site boundary, recording a number of parameters including species, crown spread and Root Protection Area (RPA).

The RPA of any given tree is calculated in accordance with BS 5837:2012 and is generally a circular plot centred on its stem. This area around each tree should not be disturbed by excavation, compaction, contamination or other related demolition and construction activities. Minor encroachment into the RPA may be possible if specific methodologies are put in place that reduce the likelihood of the tree being negatively impacted.

The survey recorded 12 individual trees, 14 tree groups and 1 hedgerow. The vast majority of the trees and groups were located close to the site boundaries, many of which had become overgrown.

No trees within the site boundary are protected by a Tree Preservation Order (TPO) and the site is not located within a Conservation Area.

An online search using the Multi Agency Geographical Information for the Countryside (MAGIC) website for statutory conservation sites was undertaken (where appropriate) to determine the presence of Ancient Woodland within 15.0 m of the site boundary.

The Client proposes the construction of a solar farm with associated access and facilities. This will require the removal of 1 tree group and a small section of 1 further group, and may have an impact on the roots, stems and canopies of retained trees unless suitable protection measures are put in place.

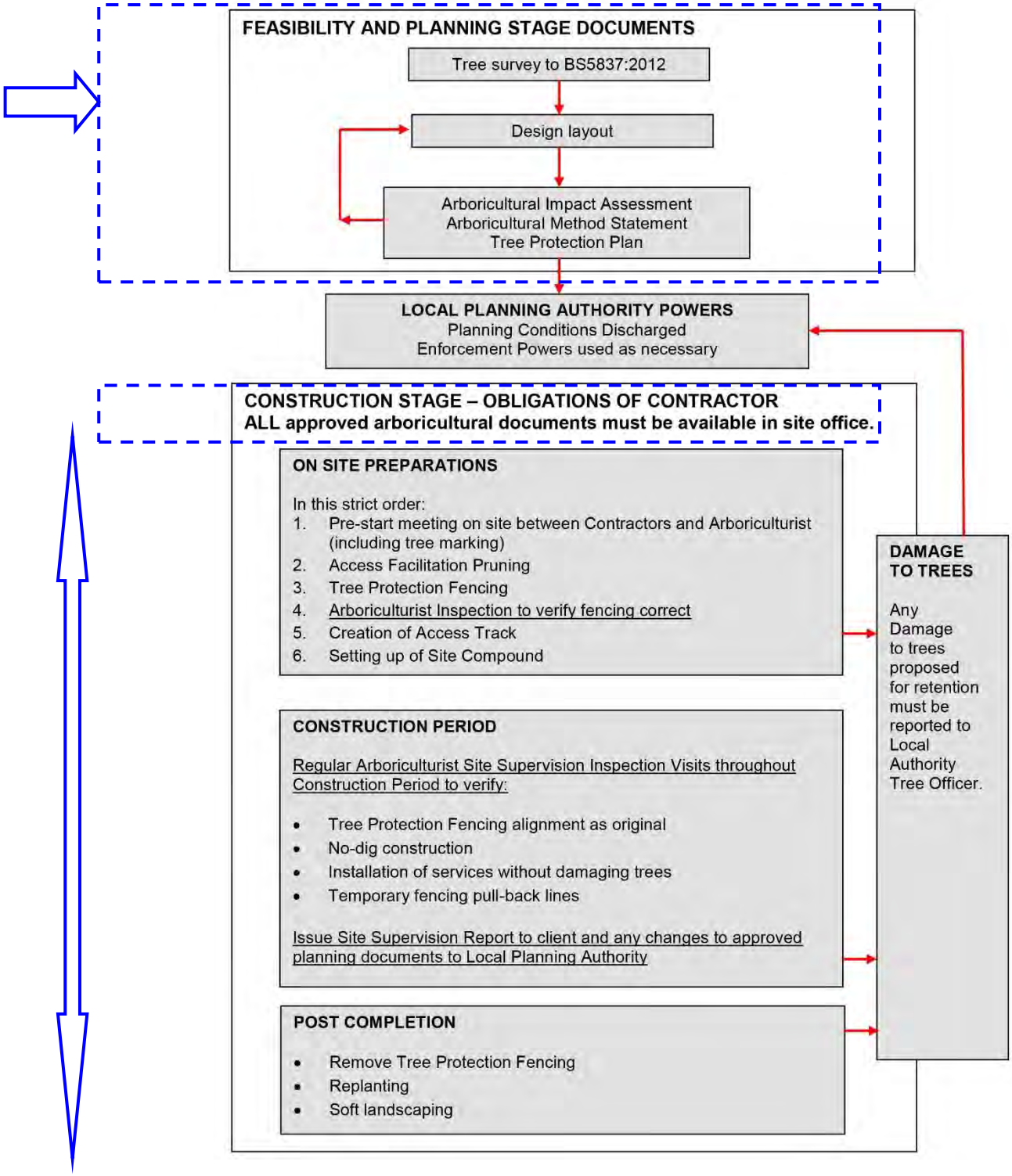
This report details the potential arboricultural impacts of development at the site and offers a range of protection measures and construction methodologies which should be adopted. These measures aim to prevent accidental damage and other adverse effects on the health of retained trees.

The report also makes recommendations for any measures to mitigate or compensate for the loss of trees within the site and the likely impact on the site and the wider local landscape.

1. Introduction

1.1 Context of this Report in the Planning System

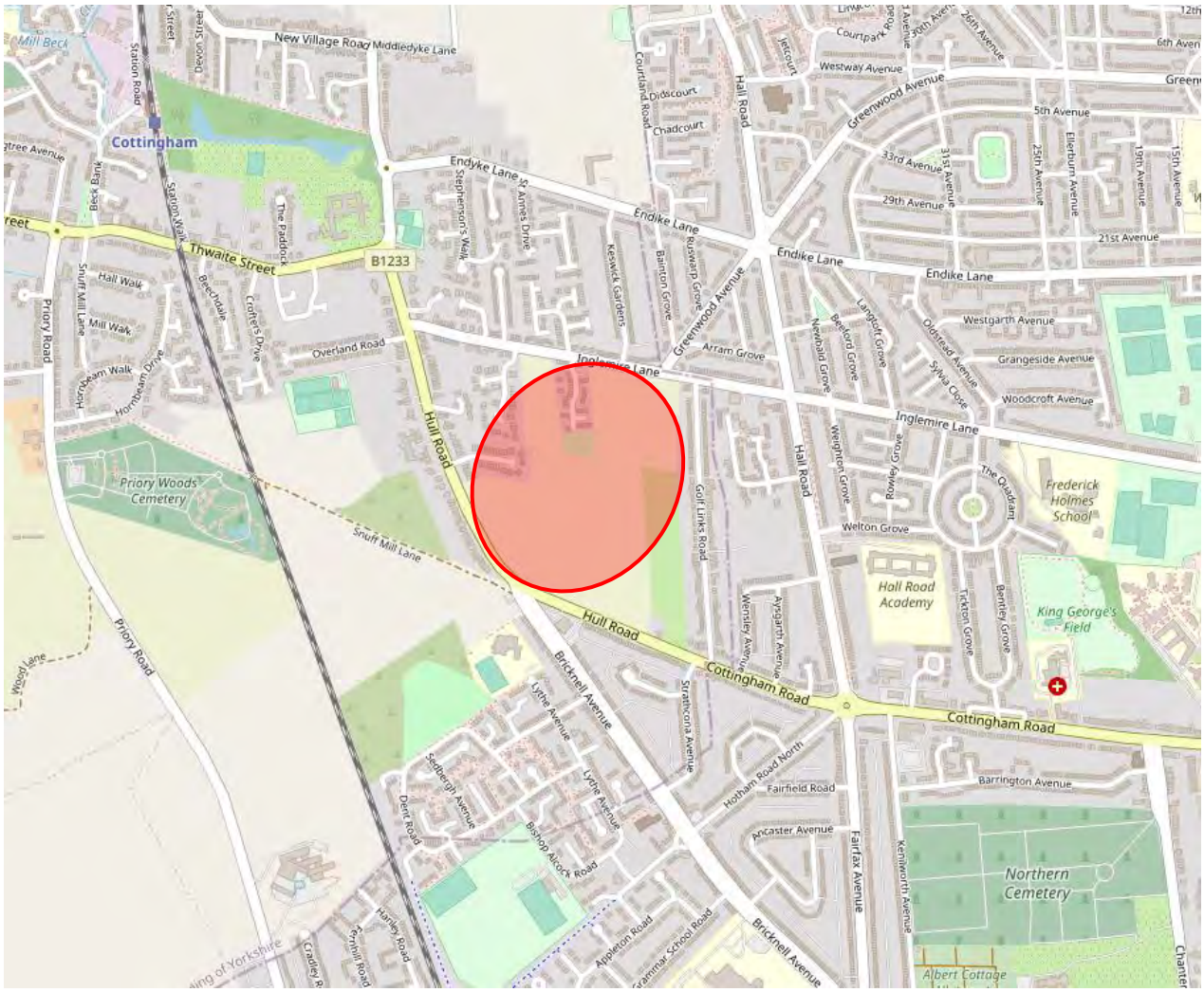
Figure 1: The Design and Construction Process and Tree Care



1.2 Location

1.2.1 Ecus Limited has been commissioned by the Client to undertake a tree survey of the site at Hull Road, Cottingham, HU16 4PU, Ordnance Survey UK Grid Reference TA060320, and prepare the findings in a report. The site location is shown in Figure 2.

Figure 2: Location Map



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1.3 Tree Designations

1.3.1 The information available on the Hull City Council website (https://www.hull.gov.uk/environment/environment/works-trees-and-tree-preservation-orders) has confirmed that the site is not located within a conservation area and no trees included in the survey are protected by a TPO.

1.3.2 The permission of the local planning authority must be sought before any works are carried out to protected trees. Potentially unlimited fines can be imposed for illegally carrying out any works to protected trees.

1.3.3 Reference to the Multi Agency Geographical Information for the Countryside (MAGIC) website indicates that no ancient woodland is present within a 15.0 m buffer of the site.

1.4 Protected Species

Bats

1.4.1 Mature trees can often contain cavities or hollows which provide potential roosting locations for bats. Bats and the places they use for shelter or protection (i.e. roosts) are protected under The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations 2017). They also receive legal protection under the Wildlife and Countryside Act (WCA) 1981. Consequently, causing damage to a bat roost constitutes an offence.

1.4.2 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

1.4.3 Trees and hedgerows can provide habitat for nesting birds which are protected under the Wildlife and Countryside Act (WCA) 1981. Some species are further protected by special penalties. This legislation makes it an offence to intentionally or recklessly damage or destroy an active bird nest or part thereof.

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

1.4.5 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 active nests are identified then the vegetation, and a defined buffer zone, will need to remain in place until the young have fully fledged.

2. Tree Survey Methodology

2.1 Site survey

2.1.1 Ecus have undertaken the tree survey in accordance with BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*, to provide detailed and independent arboricultural advice in the context of potential development. The survey was a ground based visual inspection carried out by a suitably qualified arboriculturist. No trees were tagged as part of the survey.

2.1.2 The tree inspection was carried out in March 2022 by Dave Farmer FdSc MArborA, Senior Arboricultural Consultant, when the deciduous trees were generally not in leaf.

2.1.3 The weather on the day of the survey was warm and dry. This allowed for a thorough inspection of all trees included in the survey.

2.1.4 The survey recorded all trees with a stem diameter of 75 mm or more at a height of 1.5 m above ground level within the site boundary. Any significant trees outside the boundary which could be significantly affected by the future development of the site were also recorded.

2.1.2 The following characteristics were recorded:

- Species
- Stem diameter at 1.5 m above ground level (mm)
- Estimated height (m)
- Approximate crown spread (m) in North, East, South and West directions
- Estimate of the number of years that the tree is likely to remain suitable for retention
- Age class
- Condition category in accordance with BS 5837:2012. The categories are defined as:
    - 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
    - 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
- Value subcategories where appropriate in accordance with BS 5837:2012. These are defined as:
    - 1 = Mainly arboricultural qualities
    - 2 = Mainly landscape qualities
    - 3 = Mainly cultural values, including conservation
- General notes about physiological and structural condition and any management recommendations

2.1.5 All survey data has been 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 locations through a topographical survey of the site is recommended to ensure future design accuracy.

2.1.6 Some measurements for trees with limited accessibility may have been estimated. This is highlighted with a hash (#) symbol in the Tree Survey Schedule at Appendix 1.

2.1.7 Where trees formed a contiguous canopy they may have been grouped, in line with the guidance of BS 5837:2012. If densely wooded areas are not expected to be directly affected by development proposals only the significant trees at the woodland perimeter will have been surveyed.

2.1.8 Trees are living organisms that change over time. A re-survey of all trees should be carried out if there have been any significant storm events or more than 12 months have passed since the survey was carried out.

2.2 Calculation of Root Protection Area (RPA)

2.2.1 The Root Protection Area (RPA) is calculated according to the formulae set out in BS 5837:2012. This is a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure should be treated as a priority.

2.2.2 Due to the specific topography of the site and the presence of surrounding structures the RPA is likely to be a simplified representation of the actual morphology and disposition of tree roots. Any deviation in the shape of the RPA from the calculated circular shape will largely be based on conjecture and so should generally be avoided. However, where significant site features are present that could clearly influence the disposition of tree root growth (e.g. water courses, building foundations and retaining walls), the RPA may be amended to take these features into account.

3. Tree Survey Results

3.1 General Site Description

3.1.1 The site was part of a wider area of agricultural fields that appears to have fallen out of use, located in the village of Cottingham, approximately 5.0 km to the northwest of Hull city centre.

3.1.2 The trees at the site were predominantly located close to the boundaries, both within the site and in neighbouring properties. The central areas were grassland or scrub.

3.2 Results of Tree Survey

3.2.1 The Tree Survey Schedule at Appendix 1 details the results of the tree survey and includes any management recommendations. The schedule should be read in conjunction with the tree plans at Appendix 3 which show the location of each tree and group surveyed and the extent of their canopies and RPA.

3.2.2 12 individual trees, 14 tree groups and 1 hedgerows have been recorded during the survey. A summary of the tree survey findings is shown in Table 1.

Table 1: Summary of Tree Survey Findings

Category A	Category B	Category C	Category U
0 Trees	7 Trees	5 Trees	0 Trees
0 Groups	1 Groups	13 Groups	0 Groups
0 Hedgerows	0 Hedgerows	1 Hedgerows	0 Hedgerows

3.2.3 The most significant trees were the individual Norway maples located along the roadside beyond the northern boundary, T021, T022, T023, T024, T026 and T027. These were all early mature, visually prominent trees, with good arboricultural value.

3.2.4 The majority of the trees and tree groups were of particularly low value, generally consisting of linear field boundary groups. Many of these were the result of a lack of recent management of hedgerows that have become overgrown. However these boundary trees provide some reasonable collective amenity value and comprehensively screen the site from the surrounding areas.

4. Arboricultural Impact Assessment (AIA)

4.1 Introduction

4.1.1 A BS 5837:2012 Arboricultural Impact Assessment (AIA) has been carried out for trees included in the survey. The AIA methodology evaluates the potential direct and indirect impacts the proposed development could have on the trees at the site. Where necessary mitigation measures are recommended.

4.1.2 BS 5837:2012 paragraph 5.4.2 states:

> *"The assessment should take account of the effects of any tree loss required to implement the design, and any potentially damaging activities proposed in the vicinity of retained trees. Such activities might include the removal of existing structures and hard surfacing, the installation of new hard surfacing, the installation of services, and the location and dimensions of all proposed excavations or changes in ground level, including any that might arise from the implementation of the recommended mitigation measures. In addition to the impact of the permanent works, account should be taken of the buildability of the scheme in terms of access, adequate working space and provision for the storage of materials, including topsoil."*

4.2 Development Proposals

4.2.1 The client proposes the construction of a solar farm with associated access and facilities.

4.2.2 This AIA is based on the development layout provided by the Client.

4.3 Tree Retention and Removal

4.3.1 The development proposals indicate that 1 tree group and a small western section of 1 further group within the site boundary will need to be removed to facilitate the new development, as they are situated in the footprint of new boundary fencing and site access.

4.3.2 The trees that need to be removed are detailed in the Tree Data Schedule at Appendix 1 and located on the Arboricultural Impact Assessment Plan at Appendix 3. A summary of the required tree removals is shown in Table 2.

Table 2: Summary of Required Tree Removals

Trees to be Removed			**Trees to be Retained**		
Category A	**Category B**	**Category C**	**Category A**	**Category B**	**Category C**
Trees: 0	Trees: 0	Trees: 0	Trees: 0	Trees: 7	Trees: 5
Groups: 0	Groups: 0	Groups:1 (+1 small section)	Groups: 0	Groups: 1	Groups: 12
Hedgerows: 0	Hedgerows: 0	Hedgerows: 0	Hedgerows: 0	Hedgerows: 0	Hedgerows: 1
Total: 0	**Total: 0**	**Total: 2**	**Total: 0**	**Total: 8**	**Total: 18**

4.3.3 Due to the low value of the trees to be removed the removals will have only a negligible negative arboricultural impact.

4.3.4 The development proposals have allowed space for the planting of replacement trees throughout the site once construction is complete. The planting of diverse tree species that are in keeping with the surrounding landscape character and tolerant of climate change can mitigate for the required removals and, in the longer term, increase the amenity value and ecosystem service benefits that the site's trees provide.

4.4 Tree Pruning

4.4.1 The pruning of trees should only be undertaken where essential, to prevent open wounds that can lead to bacterial or fungal infection. Pruning works should generally be undertaken during the winter months when the tree is dormant or during the summer months when the tree is fully active.

4.4.2 Any pruning works that are required to facilitate the development are detailed in the Tree Survey Schedule at Appendix 1.

4.4.3 Tree pruning should be carried out by a suitably qualified and insured arboricultural contractor and in accordance with the recommendations of BS 3998:2010 *Tree work – Recommendations.*

4.5 Impacts from Demolition/Construction Operations

4.5.1 Where proposed operations encroach beneath the canopy or into the RPA of retained trees there is the potential for damage to occur.

4.5.2 Installation of boundary fencing is proposed within the RPA of the retained trees T007, T009 and T010.

4.5.3 Potential impacts to tree roots can often be overcome through the use of fencing that requires minimal excavations.

4.5.4 All works within the RPA or beneath the canopy of retained trees should be detailed as part of an Arboricultural Method Statement to ensure that these works are carried out in a manner that eliminates the likelihood of any damage occurring.

4.6 Ash Die Back (*Hymenoscyphus fraxineus*)

4.6.1 Ash Die Back (ADB) also known as Chalara or Chalara Dieback of Ash, is a disease of ash trees caused by a fungus called Hymenoscyphus fraxineus. ADB causes leaf loss, crown dieback and bark lesions in affected trees. Once a tree is infected the disease is usually fatal, either directly or indirectly by weakening the tree to the point where it succumbs more readily to attacks by other pests or pathogens.

4.6.2 It is difficult to assign ash trees a retention category using the BS5837:2012 standards because of ADB. The general advice from public bodies is to retain ash trees and see how the disease develops within the local population. However, if clear signs of ADB are found on sites, it is highly likely that all the ash trees on that site will succumb in time. It could therefore be unreasonable to consider an ash tree a significant constraint to development.

4.6.3 The Tree Council has produced a document giving guidance to tree owners and managers on how to deal with ADB. *Ash dieback: an Action Plan Toolkit* (Summer 2019)[1]. This gives guidance on assessing the danger posed by trees infected with ADB. Ecus have adopted the Suffolk County Council Ash Health Assessment System (Appendix 4). The system categorises ash trees with ADB symptoms into 4 classes:

[1] https://treecouncil.org.uk/wp-content/uploads/2019/11/Tree-Council-Ash-Dieback-Toolkit-2.0.pdf

- Ash Health Class (AHC) 1 – 100 – 75% Live Canopy (Vitality Class 0)
- Ash Health Class (AHC) 2 – 75% -50% Live Canopy (Vitality Class 1)
- Ash Health Class (AHC) 3 – 50% - 25% Live Canopy (Vitality Class 2)
- Ash Health Class (AHC) 4 – 25% - 0% Live Canopy (Vitality Class 3)

4.6.4 Many local authorities have concluded that any trees which fall within AHC 3 and 4 require management and it seems reasonable to follow a similar system. The priority of that management depends on the severity of the tree's condition, with trees declining from AHC 2 into AHC 3 requiring work as part of a program of regular works. As the trees decline towards class 4, action becomes more urgent to abate any hazard, assuming the tree is in a high risk area.

4.7 Mitigation and Protection

4.7.1 The retained trees will need protecting from development operations to ensure that they are not negatively impacted by development operations. This should be detailed as part of an Arboricultural Method Statement. The primary method to achieve this is through the use of temporary protective fencing which encloses the RPA of retained trees, creating a sacrosanct Construction Exclusion Zone (CEZ) where no works can take place.

4.7.2 In areas where protective fencing is not practicable or would cause an excessive constraint to development operations, further protective methods can be employed such as ground protection measures to avoid soil compaction or stem boxes to protect tree stems from physical damage.

4.7.3 Where existing hard surfaces are present within the RPA of retained trees they should be kept in place where possible, even if they are not part of the design proposals. These hard surfaces will provide ground protection for any roots present beneath the hard surface during development works.

4.7.4 To compensate for potential root damage and stress caused by construction activities, retained trees onsite should be mulched. The materials that may be used include wood chip, pulverized bark, or leaf mould. The mulched area should extend throughout the open ground within the RPA. The depth of an organic mulch should not be so much as to inhibit aeration of the root system or to cause overheating (Approximately 50 mm to 100 mm).

4.7.5 Where the removal of trees is required to facilitate the development, the planting of suitable replacement trees will be required as part of a wider landscaping scheme. It is recommended that tree planting follows a 5 – 10 – 20 - 30 formula (i.e. No more than 5% of any one cultivar, no more than 10% of any one species, no more than 20% of any one genus, and no more than 30% of any one family.) This gives any new tree population maximum resilience against pests and diseases.

4.7.6 Tree planting and establishment should be carried out in accordance with BS 8545:2014 *Trees: from nursery to independence in the landscape – Recommendations*.

5. Arboricultural Method Statement (AMS)

5.1 General

5.1.1 This Arboricultural Method Statement (AMS) details the specific measures to be adopted to ensure that the retained trees are suitably protected for the duration of the proposed development and should be read in conjunction with the tree plans at Appendix 3.

5.1.2 No equipment, machinery or materials shall be brought onto the site in connection with the development until this AMS has been submitted to and approved by the Local Planning Authority.

5.2 Sequence of Events

- For the purpose of protecting the retained trees, the development works on site should be completed in line with the following sequence of events:
- Pre-commencement site meeting
- Tree works
- Installation of tree protection measures
- Construction operations
- Temporary access into the CEZ for installation of boundary fencing
- Removal of tree protection measures

5.3 Pre-Commencement Site Meeting

5.3.1 A pre-commencement site meeting should take place prior to any works being started to finalise plans for the layout of the tree protection measures and to ensure that all potential issues are adequately considered.

5.3.2 The site developer and the project arboriculturist should be in attendance for the meeting. It may also be a requirement for the LPA tree officer to attend and so prior notification of the meeting should be provided to the LPA.

5.4 Tree Works

5.4.1 Prior to the commencement of any development operations and the storage of plant, machinery and materials on site, any required tree works should be carried out. The trees to be removed and any pruning works that are required to facilitate the development are detailed in the Tree Survey Schedule at Appendix 1.

5.4.2 All tree works should be carried out by a suitably qualified and insured arboricultural contractor and in accordance with the recommendations of BS 3998:2010 *Tree work – Recommendations*.

5.4.3 It is recommended that trees should be checked in advance of any works by a suitably qualified ecologist to ensure there is no disturbance to nesting birds or roosting bats.

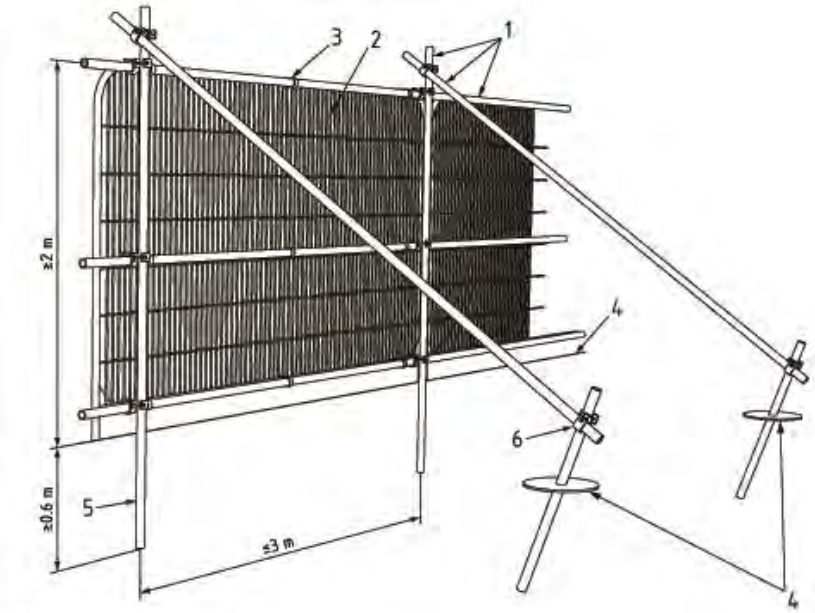
5.5 Tree Protection Fencing

5.5.1 Prior to the commencement of any development operations and the storage of plant, machinery and materials on site the tree protective fencing should be located as shown on the Tree Protection Plan at Appendix 3. Where possible this fencing should exclude all site activities from the RPA of retained trees, creating a sacrosanct Construction Exclusion Zone (CEZ).

5.5.2 It should be confirmed by the project arboriculturist that the fencing has been correctly set out on site, prior to the commencement of any other operations.

5.5.3 The default specification for tree protection fencing is shown in Figure 3. However, where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboriculturist and, where relevant, agreed with the local planning authority.

Figure 3: BS 5837:2012 Default Protection Fencing Specification



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

5.5.4 An example of an alternative specification is 2 m tall welded mesh panels on rubber or concrete feet. In such cases, the fence panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The distance between the fence couplers should be at least 1 m and should be uniform throughout the fence. The panels should be supported on the inner side by stabilizer struts, which should be attached to a base plate secured with ground pins or mounted on a block tray.

5.5.5 All-weather notices should be attached to the fencing to indicate that operations are not permitted within the CEZ, with words such as “CONSTRUCTION EXCLUSION ZONE – NO ACCESS”.

5.5.6 Once the tree protection fencing has been installed it should not be altered or removed without prior consultation with the project arboriculturist. If the tree protection fencing needs to be re-positioned to allow for development operations to continue, this must be carried out under the supervision of the project arboriculturist and with prior consent from the LPA.

5.5.7 The tree protective fencing must remain in place until the all construction operations on site have been completed and all plant and machinery has been removed.

5.6 Temporary Access into the CEZ for Installation of Boundary Fencing

5.6.1 Where fencing is to be installed within the RPA of retained trees this must consist of posts and panels or rails only, trenched footings are not acceptable within the RPA. The holes for posts should be kept to the minimum depth required and excavated using hand tools only.

5.6.2 Fence posts should be erected a minimum of 1.0 m from tree stems. The post locations may need adjusting if significant roots are uncovered, so that the roots remain intact. If wet concrete is to be used, post holes should be lined with an impermeable membrane to prevent soil contamination close to tree roots.

5.6.3 The fencing alignment should allow for a minimum distance of 0.5 m between any tree stem and the fence, providing sufficient room for future growth and minimising the risk of potential conflicts between the fence structure and tree stems.

5.6.4 This will require the tree protection fencing to be temporarily breached and should therefore be carried out in consultation with the project arboriculturist.

5.7 Installation of Utilities and Services

5.7.1 Where possible all above and below ground utilities and services are to be directed away from the retained trees. Above ground services should be routed away from tree canopies, allowing sufficient space to allow for likely future crown growth. Below ground services should be grouped together and routed away from the RPA of retained trees.

5.7.2 Any below ground utilities or services that must be routed through the RPA should be installed in accordance with BS 5837:2012 clause 7.7.2 and NJUG 10: *Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*.

5.8 Management of Exposed / Damaged Roots

5.8.1 Provided that works in close proximity to retained trees are carried out in line with the specifications detailed within this report the potential for damage to significant roots is low. However, on occasion approved works that are close to or within the RPA of retained trees can result in accidental root damage or roots becoming exposed.

5.8.2 If any exposed roots are smaller than 25 mm diameter they can be pruned back if required, however roots occurring in clumps or of 25 mm diameter and over should be retained where possible and worked around.

5.8.3 Where the severance of larger roots is unavoidable, the advice of the project arboriculturist must be sought, as such roots might be essential to the tree's health and stability. It may be determined that the design layout must be slightly altered to allow for the retention and adequate protection of significant roots.

5.8.4 Roots that are heavily damaged or severed during approved works may need to be pruned back using a suitable sharp tool, such as secateurs or a handsaw. The cut must be made cleanly, leaving the smallest surface area possible, and beyond any obvious damage, towards the tree that the root is likely to have come from. If it is not clear which direction the root has grown from, the root should be pruned back to both sides of the damage/severance.

5.8.5 A health and safety assessment should be carried out or a regular monitoring regime put in place for trees that have incurred damage to roots in close proximity to their stems or where the damaged roots are 100 mm in diameter or larger. Such damage could lead to instability or a decline in health and condition.

5.8.6 Exposed roots or roots that have been pruned should be immediately recovered with earth to prevent desiccation. If this is not possible they should be wrapped in hessian sheets which are dry in winter, wet in summer. These should be removed prior to backfilling.

5.9 Landscaping Works

5.9.1 Where soft landscaping is proposed within the RPA of retained trees, excavations should be kept to the minimum required to provide adequate conditions for the establishment of new shrubs and trees. Excavations should be carried out carefully and by hand, avoiding the severance of any roots larger than 25mm diameter.

5.9.2 Ground levels within the RPA should generally not be altered to avoid the potential for damage to tree roots. Roots are considered to be primarily within the top 0.6 m of the soil. Any excavations have the potential to damage or remove part of the root system and could affect the vigour or stability of the tree. Conversely, increasing the ground level can compact the soil, potentially suffocating the roots and causing them to die off. If minor level changes are unavoidable as part of an approved landscaping scheme, the advice of the project arboriculturist should be sought.

5.9.3 Any landscaping works that are within the RPA of retained trees or will require the tree protection fencing to be temporarily breached should be carried out in consultation with the project arboriculturist.

5.10 Additional Precautions

5.10.1 Consideration should be given to site operations outside of the CEZ that could indirectly impact the retained trees, including the provision of adequate space for site cabins, welfare facilities and other temporary structures.

5.10.2 Site operations should take sufficient account of wide or tall loads in order that they can operate without coming into contact with retained trees. The movement of plant in proximity to trees should be supervised by a banksman, to ensure adequate clearance from trees is maintained at all times.

5.10.3 Fires on sites should generally be avoided. Where fires are unavoidable, they should not be lit in a position where heat could affect the foliage or branches of retained trees. The potential size of a fire and the wind direction should be taken into account when determining its location, and it should be attended at all times.

5.10.4 Any materials that could contaminate the ground around tree roots, such as fuels, oils or cement, should be stored and handled well away from the outer edge of the RPA.

6. Arboricultural Site Supervision

6.1.1 Site monitoring and supervision by the project arboriculturist is likely to be required on a regular basis throughout the development. The specific site operations in close proximity of retained trees that will require supervision include:

- Tree removal and tree pruning works
- Installation of tree protection measures
- Installation of any service runs in proximity to retained trees

6.1.2 A minimum of one week's notice should be given to the supervising arboriculturist where possible before the start of any works within the RPA of retained trees, to allow the site visit to be scheduled.

6.1.3 All site visits will be recorded with the date and time along with any findings or comments relating to the tree protection measures and the specific operations supervised. These can be made available to the LPA tree officer on request.

7. References

BS 3998:2010 *Tree work – Recommendations*. ISBN 978 0 580 53777 6

BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*. ISBN 978 0 580 69917 7

BS 8545:2014 *Trees: from nursery to independence in the landscape – Recommendations.* ISBN 978 0 580 713170

Littlefair P. (2011). *Site layout planning for daylight and sunlight: a guide to good practice (BR 209).* ISBN 978 1 84806 178 1.

Volume 4 National Joint Utilities Group (NJUG) *Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*, Volume 4: Issue 2: 16/11/2007, www.njug.org.uk

Appendix 1: Tree Survey Schedule

Table 3: Tree Survey Schedule

Key:	Symbols used	Age Class	Est Yrs	Comments	Tree Management	BS 5837:2012 Retention Categories
	< = less than ~ = approximately > = greater than # = estimated	Young, Semi mature, Early mature, Mature or Over mature	Estimate of safe life expectancy (<10, 10+, 20+ or 40+ years)	MS – Multi-stemmed TD - Trunk division (height in metres) DED – Dutch Elm Disease ADB – Ash Die Back AHC (1, 2, 3 or 4) – Ash Health Class	*Tree works that are recommended regardless of future development are in italics* **Tree works that are required to facilitate the proposed development are in bold**	U – Unsuitable for retention A – High B – Moderate C – Low **Sub-categories:** 1 = mainly arboricultural qualities 2 = mainly landscape qualities 3 = mainly cultural values

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G001	Goat Willow 10+ *(Salix caprea)* Hawthorn 10+ *(Crataegus monogyna)*	5	80 avg	See Plan				0.5	Semi Mature	10+ Years	Fair	Relatively sparse group growing either side of a drainage channel, dense ivy & brambles in some areas, predominately hawthorn with several willow & the occasional other species, several dead stems & failed branches	**Pruning of northern canopy required to facilitate new boundary fencing**	C2	-	-

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
T002	Oak *(Quercus robur)*	11	520	5	5	5	5	2	Early Mature	20+ Years	Poor	Growing at edge of drainage channel, small goat willow beneath crown, large area of historical bark damage to eastern 3rd of stem from ground level up to 1m, related branch stub approx 30cm diameter at 2.5m, occasional pruning wound & epicormic growth in crown, moderate deadwood	-	C1	6.24	122
T003	Goat Willow *(Salix caprea)*	6	80 avg	2.5	2.5	2.5	2.5	0.5	Semi Mature	10+ Years	Fair	Growing within drainage channel, potential waterlogging, multi-stemmed at base with several included bark unions	-	C2	2.88	26
G004	Hawthorn 10+ *(Crataegus monogyna)*	6	90 avg	See Plan				0.5	Semi Mature	20+ Years	Fair	Linear group likely to have been planted as a hedgerow, sparse in sections, multi-stemmed with several included bark unions, minor deadwood throughout	-	C2	-	-

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G005	Goat Willow 10+ *(Salix caprea)* Hawthorn 10+ *(Crataegus monogyna)*	5	100 avg	See Plan				0	Semi Mature	40+ Years	Fair	Relatively dense group growing either side of a drainage channel, occasional larger stem, dense ivy & brambles in some areas, predominately hawthorn with several willow & the occasional other species, several dead stems & failed branches	-	C2	-	-
G006	Goat Willow 10+ *(Salix caprea)* Hawthorn 10+ *(Crataegus monogyna)*	5	100 avg	See Plan				0	Semi Mature	40+ Years	Fair	Relatively dense group with the occasional gap growing either side of a drainage channel, occasional larger ash, dense ivy & brambles in some areas, predominately hawthorn with several willow & the occasional other species, several dead stems & failed branches	**Removal of small western section required to facilitate new boundary fencing**	C2	-	-
T007	Ash *(Fraxinus excelsior)*	11	430	5	5	5	5	2	Early Mature	10+ Years	Fair	Growing at edge of drainage channel, soul erosion & exposed roots at base, minor deadwood in crown	-	C1	5.16	85

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G008	Goat Willow 10+ *(Salix caprea)* Hawthorn 10+ *(Crataegus monogyna)*	6.5	100 avg	See Plan				0	Semi Mature	40+ Years	Fair	Relatively dense group with the occasional gap growing either side of a drainage channel, occasional larger ash, dense ivy & brambles in some areas, predominately hawthorn with several willow & the occasional other species, several dead stems & failed branches	-	C2	-	-
T009	Ash *(Fraxinus excelsior)*	12	290, 330	4.5	4.5	4.5	4.5	2.5	Early Mature	10+ Years	Fair	Growing at edge of drainage channel, soil erosion & exposed roots at base, 1m tall bark wound with signs of decay at base, several branch stubs & minor deadwood in crown	-	C1	5.268	88
T010	Ash *(Fraxinus excelsior)*	14	530, 640	4	7.5	6.5	7	1.5	Mature	10+ Years	Fair	Twin stemmed at base, included bark unions near base, branch stubs & minor deadwood in crown, prominent & good value tree but may be limited in long term by ADB	-	C1	9.972	314
G011	Hawthorn 10+ *(Crataegus monogyna)*	7.5	100 avg	See Plan				0.5	Semi Mature	20+ Years	Fair	Linear group, potentially planted as a hedgerow, dense ivy & brambles limited the visibility of all trees	-	C2	-	-

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G012	Norway Maple x3 *(Acer platanoides)*	10	250 avg #	See Plan				3	Semi Mature	40+ Years	Good	3 trees forming a single canopy, growing in neighbouring garden, limited visibility due to dense undergrowth	-	B1	-	-
G013	Ash (Fraxinus excelsior) Hawthorn 10+ *(Crataegus monogyna)*	6	100 avg	See Plan				0.5	Semi Mature	20+ Years	Fair	Linear group, potentially planted as a hedgerow, dense ivy & brambles limited the visibility of all trees	-	C2	-	-
G014	Hawthorn 10+ *(Crataegus monogyna)* Goat Willow x5 *(Salix caprea)*	6	80 avg	See Plan				0.5	Semi Mature	<10 years	Poor	Sparse group of generally poor trees surrounded by dense ivy & brambles, very limited long term prospects and some trees may need to be removed if close to future development	-	C2	-	-
G015	Ash 10+ *(Fraxinus excelsior)* Hawthorn 10+ *(Crataegus monogyna)*	6.5	100 avg	See Plan				1	Semi Mature	20+ Years	Fair	Linear group, largely inaccessible due to dense surrounding brambles & undergrowth, occasional larger tree in northern half of group, various dead stems & failed branches	-	C2	-	-

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G016	Horse Chestnut x5 *(Aesculus hippocastanum)*	7	150 avg	See Plan				1	Semi Mature	10+ Years	Poor	Dense group of stems forming a single canopy, growing at edge of drainage channel, various signs of damage & decay at base, limited prospects	-	C2	-	-
G017	Hawthorn 10+ *(Crataegus monogyna)*	5	80 avg	See Plan				0.5	Semi Mature	10+ Years	Fair	Relatively sparse group growing either side of a drainage channel, occasional elder, ash, horse chestnut, dense ivy & brambles in some areas, predominately hawthorn with several willow & the occasional other species, several dead stems & failed branches	-	C2	-	-
T018	Horse Chestnut *(Aesculus hippocastanum)*	10	320	4	5	4.5	4	1	Semi Mature	40+ Years	Good	Situated in neighbouring property, no obvious defects	-	B1	3.84	45

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
H019	Hawthorn 10+ *(Crataegus monogyna)* Blackthorn 10+ *(Prunus spinosa)* Elder 10+ *(Sambucus nigra)* Privet 10+ *(Ligustrum vulgare)*	2	80 avg	See Plan				0	Semi Mature	40+ Years	Fair	Managed boundary hedgerow, predominantly hawthorn with several sections of elder, blackthorn & privet, some sections full of dense ivy, some small gaps	-	C2	-	-
G020	Goat Willow 10+ *(Salix caprea)* Hawthorn 10+ *(Crataegus monogyna)*	6.5	80 avg	See Plan				0.5	Young	40+ Years	Fair	Dense group surrounded by dense brambles & ivy, no obvious defects	-	C2	-	-
T021	Norway Maple *(Acer platanoides)*	13	450	5	3.5	2	4.5	3	Early Mature	40+ Years	Good	Exposed roots at base, old pruning wounds, minor deadwood	-	B1	5.4	92
T022	Norway Maple *(Acer platanoides)*	13	440	4	3	1.5	3	4	Early Mature	40+ Years	Fair	Exposed roots at base, old pruning wounds, minor deadwood	-	B1	5.28	88
T023	Norway Maple *(Acer platanoides)*	13	410	5	3.5	2	1.5	4	Early Mature	40+ Years	Fair	Exposed roots at base, sparse crown, old pruning wounds, minor deadwood	-	B1	4.92	75
T024	Norway Maple *(Acer platanoides)*	10	410	5	3.5	3	3.5	3	Early Mature	40+ Years	Fair	Old pruning wounds, epicormic growth, minor deadwood	-	B1	4.92	75

Tree No.	Species	Height (m)	Stem Diam. @ 1.5 m (mm)	Canopy Spreads (m)				Height of Crown Clearance (m)	Age Class	Est Yrs	Overall Condition	Comments	Tree Management	BS 5837:2012 Retention Category	RPA Radius (m)	RPA (m^2)
				N	E	S	W									
G025	Norway Maple x5 *(Acer platanoides)* Hawthorn *(Crataegus monogyna)*	6	80 avg	See Plan				1.5	Semi Mature	20+ Years	Good	Young to semi mature sparse group, surrounded by dense brambles, shrubs & undergrowth	**Removal required to facilitate new boundary fencing & site access**	C2	-	-
T026	Norway Maple *(Acer platanoides)*	13	470	4.5	3.5	2.5	3	2	Early Mature	40+ Years	Fair	Old pruning wounds, epicormic growth, minor deadwood	-	B1	5.64	99
T027	Norway Maple *(Acer platanoides)*	13	530	4	3	4.5	5	3	Early Mature	40+ Years	Fair	Exposed roots at base, old pruning wounds, sparse crown, minor deadwood	-	B1	6.36	129

Appendix 2: Site Photographs

Plate 1: G001 from the north west

Plate 2: T002 from the west

Plate 3: Section of G006 that will need to be removed, from the north

Plate 4: T010, T021 to T024 and G025 from the south

Plate 5: G016 and G017 from the south west

Plate 6: H019 from the north

Appendix 3: Figures

G015
G017
G017
G016
T003
T002
G005
G004
G001
G001
G020
H019
2.5m
B11
130
The West Bulls (PH)
N

The original version of the drawing was produced in colour. Monochrome copies should not be relied upon.

0m 10m 20m 50m

SCALE BAR 1:500

GENERAL NOTES

- Drawing for Planning purposes only
- Refer to arboricultural report produced by Ecus Ltd titled 'University of Hull Photovoltaic Project, Hull Road – BS 5837:2012 Arboricultural Report, Impact Assessment and Method Statement'.
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3RD-PARTY INFORMATION

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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Category U Trees

Root Protection Area (RPA)

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT

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Title

Figure 4 - Tree Constraints Plan (Sheet 1 of 3)

By	Date	Scale @ A1	Drg. no.
DF	**Apr 2022**	**1:500**	**18618C-ARB-01**

T027
T026
T024
T023
T022
T021
T010
G025
G011
T009
G012
G008
G013
G006
G014
T007
G006
G015
G017
G016

Drain

2.0m

N

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0m 10m 20m 50m

SCALE BAR 1:500

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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Category U Trees

Root Protection Area (RPA)

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT

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Title

Figure 5 - Tree Constraints Plan (Sheet 2 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-02

T018
G017
H019
H019
H019
H019
H019
G020
H019
Shelter
Drain
2.4m
55
1
15
57
2
14
63
62
62a
74
78
98
46

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0m 10m 20m 50m

SCALE BAR 1:500

N

GENERAL NOTES

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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Category U Trees

Root Protection Area (RPA)

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT

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Title

Figure 6 - Tree Constraints Plan (Sheet 3 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-03

G015
G017
G017
G016
Drain
T003
T002
Drain
Existing saplings
to be removed
G005
G004
Pruning of northern canopy required
to facilitate new boundary fencing
G001
G001
SUB
G020
H019
COMPOUND AREA
+ 3.1m
Proposed site access
2.5m
+ 3.0m
118
130
The West Bulls
(PH)
HULL ROAD
99
+ 3.0m

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N

0m 10m 20m 50m

SCALE BAR 1:500

GENERAL NOTES

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- Based on topographic survey provided by the client.
- Building layout and masterplan provided by the client.
- Refer to Engineer's details for level and drainage information.
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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Existing Tree to be Removed

Root Protection Area (RPA)

RPA of Tree to be Removed

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
A	16.09.22	KO	DF	UPDATED LAYOUT

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Title

Figure 7 - Tree Impacts Plan (Sheet 1 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-04

New boundary fencing within the RPA and beneath the crown of retained trees in these areas

GENERAL NOTES

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- Building layout and masterplan provided by the client.
- Refer to Engineer's details for level and drainage information.
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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Existing Tree to be Removed

Root Protection Area (RPA)

RPA of Tree to be Removed

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0m 10m 20m 50m

SCALE BAR 1:500

N

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
A	16.09.22	KO	DF	UPDATED LAYOUT

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Title

Figure 8 - Tree Impacts Plan (Sheet 2 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-05

OUTLANDS ROAD

HULL ROAD

T018

G017

H019

H019

H019

H019

H019

G020

Drain

Shelter

SUB

SUB

N

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0m 10m 20m 50m

SCALE BAR 1:500

GENERAL NOTES

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- Based on topographic survey provided by the client.
- Building layout and masterplan provided by the client.
- Refer to Engineer's details for level and drainage information.
- Check all dimensions on site.
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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Existing Tree to be Removed

Root Protection Area (RPA)

RPA of Tree to be Removed

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
A	16.09.22	KO	DF	UPDATED LAYOUT

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Title

Figure 9 - Tree Impacts Plan (Sheet 3 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-06

Tree Protection Fencing

Prior to the commencement of any development operations and the storage of plant, machinery and materials on site the tree protective fencing should be located as shown. Where possible this fencing should exclude all site activities from the RPA of retained trees, creating a sacrosanct Construction Exclusion Zone (CEZ).

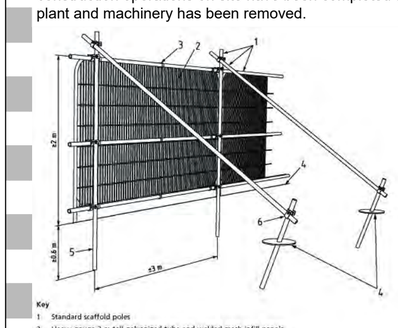
It should be confirmed by the project arboriculturist that the fencing has been correctly set out on site, prior to the commencement of any other operations.

The default specification for tree protection fencing is shown below. However, where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboriculturist and, where relevant, agreed with the local planning authority.

All-weather notices should be attached to the fencing to indicate that operations are not permitted within the CEZ, with words such as “CONSTRUCTION EXCLUSION ZONE – NO ACCESS”.

Once the tree protection fencing has been installed it should not be altered or removed without prior consultation with the project arboriculturist. If the tree protection fencing needs to be re-positioned to allow for development operations to continue, this must be carried out under the supervision of the project arboriculturist and with prior consent from the LPA.

The tree protective fencing must remain in place until the all construction operations on site have been completed and all plant and machinery has been removed.



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

Installation of Utilities & Services

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Any below ground utilities or services that must be routed through the RPA should be installed in accordance with BS 5837:2012 clause 7.7.2 and NJUG 10: *Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*.

G017
G017
Drain
G016
T003
T002
6.5m
Drain
Existing saplings to be removed
G005
G004
G001
Drain
G001
SUB
COMPOUND AREA
H019
+ 3.1m
Proposed site access
+ 3.0m
2.5m
VENUE
178
130
The West Bulls (PH)
HULL ROAD
+ 3.0m

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N

0m 10m 20m 50m

SCALE BAR 1:500

GENERAL NOTES

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KEY

Stem Location from Topographic Survey

Stem Location Estimated

Tree Categories (BS 5837:2012)

Category A Trees

Category B Trees

Category C Trees

Root Protection Area (RPA)

Tree Protection Fencing*

***See note on drawing**

KEY PLAN (not to scale)

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
A	16.09.22	KO	DF	UPDATED LAYOUT

ecus part of CuraTerrae
Brook Holt
Blackburn Road
Sheffield S61 2DW
Tel. (0114) 2669292
www.ecusltd.co.uk

Job
18618C - University of Hull Photovoltaic Project, Hull Road

Title
Figure 10 - Tree Protection Plan (Sheet 1 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-07

Tree Protection Fencing

Prior to the commencement of any development operations and the storage of plant, machinery and materials on site the tree protective fencing should be located as shown. Where possible this fencing should exclude all site activities from the RPA of retained trees, creating a sacrosanct Construction Exclusion Zone (CEZ).

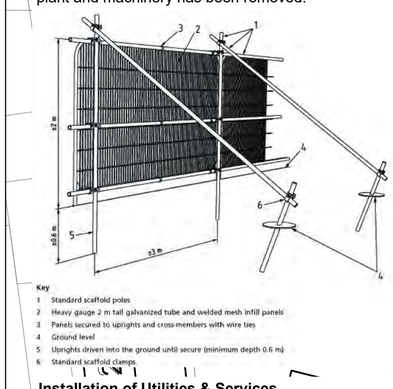
It should be confirmed by the project arboriculturist that the fencing has been correctly set out on site, prior to the commencement of any other operations.

The default specification for tree protection fencing is shown below. However, where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboriculturist and, where relevant, agreed with the local planning authority.

All-weather notices should be attached to the fencing to indicate that operations are not permitted within the CEZ, with words such as “CONSTRUCTION EXCLUSION ZONE – NO ACCESS”.

Once the tree protection fencing has been installed it should not be altered or removed without prior consultation with the project arboriculturist. If the tree protection fencing needs to be re-positioned to allow for development operations to continue, this must be carried out under the supervision of the project arboriculturist and with prior consent from the LPA.

The tree protective fencing must remain in place until the all construction operations on site have been completed and all plant and machinery has been removed.



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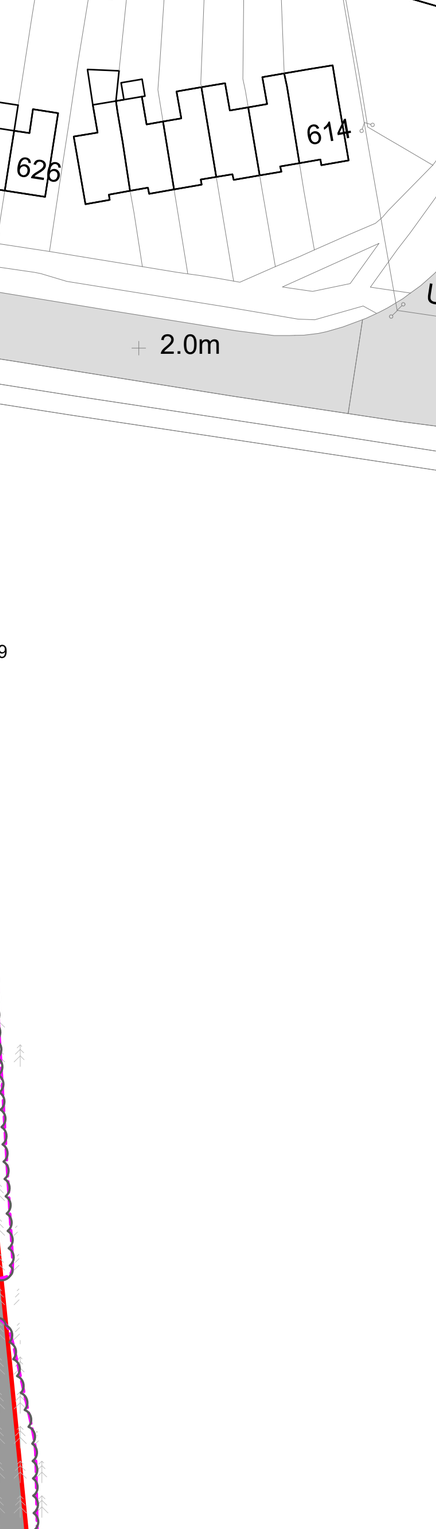

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0m 10m 20m 50m

SCALE BAR 1:500

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Title
Figure 11 - Tree Protection Plan (Sheet 2 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-08

OUTLANDS ROAD

HULL ROAD

T018

H019

Drain

SUB

SUB

Shelter

Proposed site access

Tree Protection Fencing

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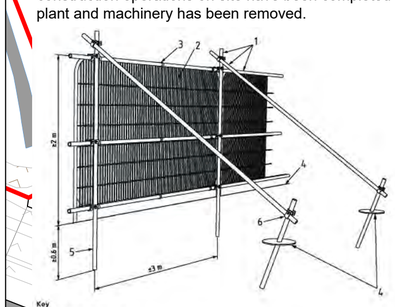

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0m 10m 20m 50m

SCALE BAR 1:500

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Figure 12 - Tree Protection Plan (Sheet 3 of 3)

By	Date	Scale @ A1	Drg. no.
DF	Apr 2022	1:500	18618C-ARB-09

Appendix 4: Suffolk County Council Ash Die Back Canopy Description

Ash Tree Assessment

The Issue

Identifying the symptoms of Ash Dieback in large trees can be difficult, so a sysyem was needed to enable easy description of the current state of as Ash Tree. Tree Canopy assessment has been widely used since the late 1980's across Europe based on work produced in Switzerland in 1986. In 1990 the Forestry Commission produced a book – 'Assessment of Tree Condition' to enable a standard system for describing the condition of a tree based on the percentage of existing canopy remaining.

Using this methodology Suffolk County Council undertook to describe the health of an Ash in Suffolk.

The steps undertaken

During the summer of 2013/14 Suffolk County Council assessed and photographed Ash accross the county. They determined that there were 4 useful categories to describe Ash canopies. The categories chosen were

- 100% full canopy,
- 75% canopy,
- 50% canopy
- and 25% canopy.

These are represented photographically in the pictures at the end of this Case Study.

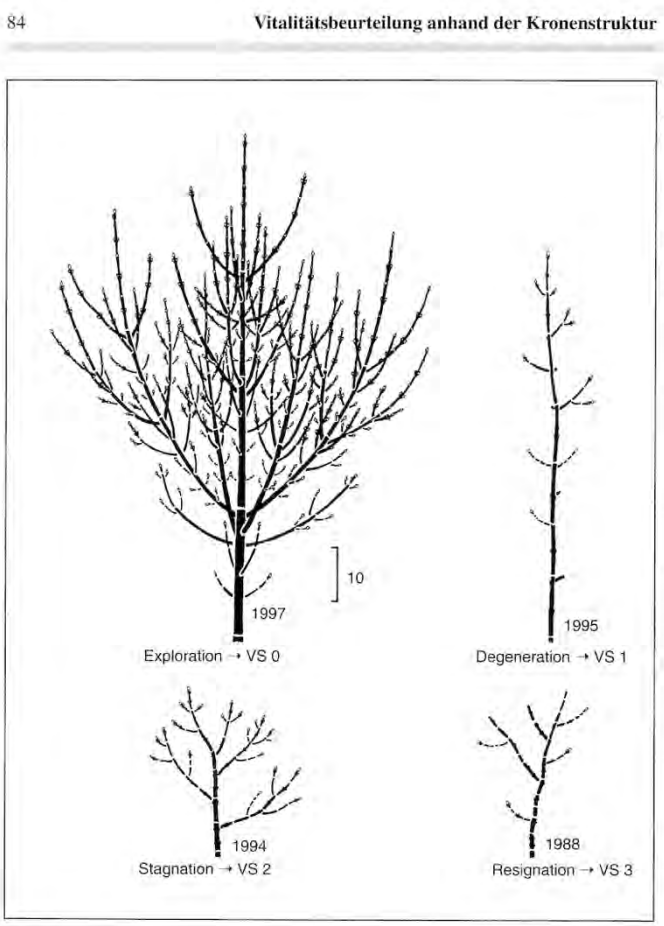
These 4 classes fit with work undertaken in Germany by Professor Andreas Roloff who has been describing the state of vitality of European Trees. He also uses 4 categories – described as

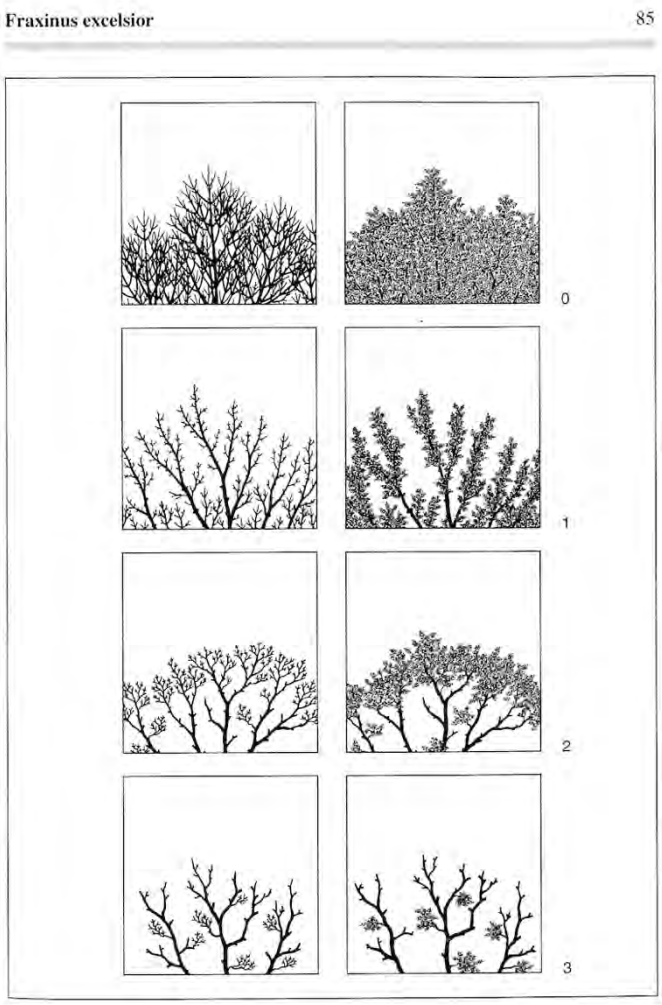
- Vitality Class 0: Healthy vigorous trees showing treetop shoots in the exploration phase: both the main axes and part of the lateral twigs consist of long-shoots. For this reason, a regular net-like branching pattern is developed, which reaches deep into the interior of the crown. The crowns are equally closed and domed, and do not show any greater gap unless a stronger intervention has occurred, such as pruning measures, because such a gap is closed quickly by the intensive ramification. In summer, a dense foliage arises without any greater gap.
- Vitality Class 1: Weakened trees show treetop shoots in the degeneration phase. Thus, spears/"fox tails" are formed, rising above the canopy. The leaves on these spears are dense and grow all around them (at the top of the lateral short-shoots or shortshoot chains). The crowns make a frazzled impression on the outside, and have a fastigiated appearance, because the airspace between the spears is not completely filled by leaves and twigs, and the crown has a spiky outline. Inside the crown, the branching pattern, and hence the foliage, is quite dense. In this vitality class, straight percurrent main axes of the treetop branches are still dominant, but the crowns no longer look as intact as in class 0 because of the spears shooting out of the canopy.
- Vitality Class 2: In obviously less vigorous trees, the treetop shoots begin to build short-shoots in the stagnation phase. The leafless state could be designated as the claw stage, because the short-shoot chains in the outside of the crowns grow longer, are predominant, and stretch claw-like to the light. These short-shoot chains, growing too long, break off in summer in thunderstorms and heavy rains, and strew the forest floor in

declining stands. Under normal circumstances, trees get rid of parts of their unimportant twigs in the inner and lower crown parts in this way. However, if the treetop shoots themselves are declining, the self-pruning of twigs progresses into the outskirts of the crown, and the crowns become thin from the inside outwards. The cause for this occurrence is not premature leaf fall, but broken short-shoot chains, a lack of shoots, and dead buds and twigs. The branching pattern shows a bushy and lumpy accumulation in the periphery of the crown. This accumulation causes summer and winter bushy crown structures and greater gaps. The crown periphery still has hardly any straight percurrent branches.

- Vitality class 3:, In considerably damaged or declining trees of the crowns finally fall apart by the breaking off of larger branches and the dieback of whole crown parts. The tree seems to consist only of more or less surplus sub-crowns, dispersed randomly in the airspace and forming whip-like structures. The treetop is often dying back or is already dead, because the treetop shoots grew in the retraction phase.

These 4 vitality classes are shown below for Ash.





The work in Germany and Suffolk complements each other and establishes the ability to be able to assisgn an ash tree to 1 of 4 categories, which describe the trees current health or vitality. This is a simple and useful method for describing the current state of an Ash's heatlh.

The Outcome

Using this 4 category framework, allows a tree to be assigned to a category, showing its current state of health, enabling data on the tree to be collected. The suggestion going forward is that these 4 classes are used as described as:

Ash Health Class 1 – 100 – 75% Canopy (Vitality Class 0)

Ash Health Class 2 – 75% -50% Canopy (Vitality Class 1)

Ash Health Class 3 – 50% - 25% Canopy (Vitality Class 2)

Ash Health Class 4 – 25% - 0% Canopy (Vitality Class 3)

Figure 1: Photos of Dieback of ash trees

0% Dieback - Healthy Crown

25% Dieback

50% Dieback

75% Dieback

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