Gladman Developments Ltd

Bangor Road, Johnstown, Wrexham

Arboricultural Assessment

March 2020

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Rev	Issue Status	Prepared / Date	Approved/Date
-	Draft	TCB / 17.02.20	HR / 17.02.20
	Final	TCB / 28.02.20	HR / 28.02.20
A	Final	TCB / 11.03,20	HR / 11.03.20

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1.0 INTRODUCTION

1.1 This report has been prepared by FPCR Environment and Design Limited on behalf of Gladman Developments Ltd to present the findings of a survey of mature trees at the site of a former brickworks; Ruabon Brickworks, Hafod Road, Johnstown, Nr Wrexham (hereafter referred to as 'the site'). The site is centered on the Ordnance Survey Grid Reference GR SJ 310 460

1.2 The survey was carried out on 10th February 2020.

Scope of Assessment

1.3 The tree survey and assessment of existing trees has been carried out in accordance with guidance contained within British Standard 5837:2012 *'Trees in Relation to Design, Demolition and Construction - Recommendations'* (hereafter referred to as BS5837). The guidelines set out a structured assessment methodology to assist in determining which trees would be deemed either as being suitable or unsuitable for retention.

1.4 The guidance also provides recommendations for considering the relationship between existing trees and how those trees may integrate into designs for development; demolition operations and future construction processes so that a harmonious and sustainable relationship between any retained trees and built structures can be achieved.

1.5 The purpose of the report is therefore to firstly, present the results of an assessment of the existing trees' arboricultural value, based on their current condition and quality and to secondly, provide an assessment of impact arising from the proposed development of the site.

1.6 This report has been produced to accompany a S73 application to vary conditions on the extant outline planning permission and has included an assessment of any impact to the tree cover. The survey has therefore focused on any trees present within or bordering the site that may potentially be affected by the future proposals or will pose a constraint to any proposed development.

Site description

1.7 The site comprises the former Ruabon Brickworks occupying an area of approximately 17.34ha. The now mostly derelict main factory buildings and associated areas of hard standing exist in the northernmost part of the site. Areas of past workings, which have since cessation of works become colonised by pioneer species of tree and shrubs complete the majority of the remaining parts of the site, albeit an open grassland field compartment that extends along the length of the western part of the site contained by established hedgerows. Many other well-established hedgerows are present within the site both on the external boundaries and internally.

1.8 A number of public rights of way pass through the site area and western boundary. Bangor Road defines the southern boundary and with Hafod Road forming the eastern boundary. Surrounding the site, the land use includes Johnstown, which lies to the west; Hafod Quarry to the south; a nursing home part way along Hafod Road and beyond the site is open fields largely used for agricultural purposes.

1.9 For the most part species composition is restricted to pioneer species such as silver birch Betula pendula, goat willow Salix fragilis, hawthorn Crataegus monogyna and ash Fraxinus excelsior. Other species represented were English oak Quercus robur, sycamore Acer pseudoplatanus, hazel Corylus avellana and blackthorn Prunus spinosa.

Statutory Considerations

1.10 Local authorities have a Duty under the Town and Country Planning Act to create Tree Preservation Orders (TPO) in order to protect and preserve specific trees and woodlands that bring significant amenity benefit to a particular site or location. Under a TPO it is a criminal offence to cut down, top, lop, uproot or willfully destroy a tree protected by that Order, or to cause or permit such actions, if carried out without the prior written consent of the acting LPA. Anyone found guilty of such an offence is liable and in serious cases, may result in prosecution and incur an unlimited fine.

1.11 Following consultation with the relevant Local Planning Authority, Wrexham County Borough Council, it has been confirmed that there are no Tree Preservation Orders that would apply to any trees present within or in close proximity to the assessment site. The site is also not within a Conservation Area and therefore no statutory constraints would apply to the development in respect of trees.

1.12 Information provided on Tree Preservation Orders and Conservation Areas is accurate to the date of this assessment and cannot be assumed to remain unchanged. The last check was carried out on the July 2013.

Non-Statutory Considerations

1.13 In order to compile existing baseline information on relevant arboricultural considerations information was requested from both statutory and non-statutory nature conservation organisations. The Multi Agency Geographic Information for the Countryside (MAGIC)[1] website highlighted no tree cover within the site.

2.0 SURVEY METHODOLOGY

2.1 The survey of trees has been carried out in accordance with the criteria set out in Chapter 4 of BS5837. The survey has been undertaken by a suitably qualified and experienced arboriculturist and has recorded information relating to all those trees within the site and those adjacent to the site which may be of influence to any proposals. Trees were assessed for their arboricultural quality and benefits within the context of the proposed development in a transparent, understandable and systematic way.

2.2 Trees have been assessed as groups, where it has been determined appropriate.

- The term group has been applied where trees form cohesive arboricultural features either aerodynamically, visually or culturally including biodiversity or habitat potential for example parkland or wood pasture.

[1] http://magic.defra.gov.uk/

- For the purposes of this assessment, a hedgerow is described as any boundary line of trees or shrubs less than 5m wide at the base and are managed under a regular pruning regime.
- For the purposes of this assessment woodland is described as a habitat where 'trees are the dominant plant form. The individual tree canopies generally overlap and interlink, often forming a more or less continuous canopy'[2]. Woodlands, however, are not just formed of trees and generally include a great variety of other plants. These will include 'mosses, ferns and lichens, as well as small flowering herbs, grasses and shrubs'[3].

2.3 An assessment of individual trees within groups has been made where a clear need to differentiate between them, for example, in order to highlight significant variation between attributes including physiological or structural condition or where a potential conflict may arise.

BS5837 Categories

2.4 Trees have been divided into one of four categories based on Table 1 of BS5837, *'Cascade chart for tree quality assessment'*. For a tree to qualify under any given category it should fall within the scope of that category's definition (see below).

2.5 Category U trees are those which would be lost in the short term for reasons connected with their physiology or structural condition. They are, for this reason not considered in the planning process on arboricultural grounds. Categories A, B and C are applied to trees that should be of material considerations in the development process. Each category also having one of three further sub-categories (i, ii, iii) which are intended to reflect arboricultural, landscape and cultural or conservation values accordingly.

2.6 **Category (U) – (Red):** Trees which are unsuitable for retention and are in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years. Trees within this category are:

- Trees that have a serious irremediable structural defect such that their early loss is expected due to collapse and includes trees that will become unviable after removal of other category U trees.
- Trees that are dead or are showing signs of significant, immediate or irreversible overall decline.
- Trees that are infected with pathogens of significance to the health and/ or safety of other nearby trees or are very low-quality trees suppressing adjacent trees of better quality.
- Certain category U trees can have existing or potential conservation value which may make it desirable to preserve.

2.7 **Category (A) – (Green):** Trees that are considered for retention and are of high quality with an estimated remaining life expectancy of at least 40 years with potential to make a lasting contribution. Such trees may comprise:

- Sub category (i) trees that are particularly good examples of their species, especially if rare or unusual, or are essential components of groups such as formal or semi-formal arboricultural features for example the dominant and/or principal trees within an avenue.

[2] http://www.countrysideinfo.co.uk/woodland_manage/whatis.html
[3] http://www.countrysideinfo.co.uk/woodland_manage/whatis.html

- Sub category (ii) trees, groups or woodlands of particular visual importance as arboricultural and / or landscape features.
- Sub category (iii) trees, groups or woodlands of significant conservation, historical, commemorative or other value for example veteran or wood pasture.

2.8 **Category (B) – (Blue):** Trees that are considered for retention and are of moderate quality with an estimated remaining life expectancy of at least 20 years with potential to make a significant contribution. Such trees may comprise:

- Sub category (i) trees that might be included in category A but are downgraded because of impaired condition for example the presence of significant though remediable defects, including unsympathetic past management and storm damage.
- Sub category (ii) trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals or trees occurring as collectives but situated so as to make little visual contribution to the wider locality.
- Sub category (iii) trees with material conservation or other cultural value.

2.9 **Category (C) – (Grey):** Trees that are considered for retention and are of low quality with an estimated remaining life expectancy of at least 10 years or young trees with a stem diameter below 150mm. Such trees may comprise:

- Sub category (i) unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.
- Sub category (ii) trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value or trees offering low or only temporary / transient screening benefits.
- Sub category (iii) trees with no material conservation or other cultural value.

Site Plans

2.10 The individual positions of trees and groups have been shown on the Tree Survey Plan. The positions of trees are based on a topographical / land survey, as far as possible, supplied by the client. Where topographical information has not identified the position of trees these have been plotted using a global positioning system and aerial photography to provide approximate locations. The crown spread, root protection area and shade pattern (where appropriate) are also indicated on this plan.

2.11 As part of this assessment, a Tree Retention Plan has been prepared to show the proposed layout in relation to the existing tree cover allowing an assessment of any potential conflicts. The plan also identifies which trees would be required to be removed or retained as part of the proposed development.

2.12 A Detailed Access Arrangement Plan has been provided to demonstrate the location of the primary access position in relation to the surrounding tree cover allowing the identification of any potential conflicts through implementation of the site access.

Tree Constraints and Root Protection Areas

2.13 Below ground constraints to future development are represented by tree roots and the soil environment in which they grow which needs to be protected if the tree is to be retained. Tree rooting systems are essential for the uptake of water and nutrients, serving the storage of carbohydrates for the future growth and function of the tree, and form structural anchorage and support for the stem and crown. The perceived rooting area of the tree; referred to as the root protection area (RPA) needs to be protected if the tree is to be retained.

2.14 The RPA is a notional area considered to be the minimum zone that must be protected to avoid any adverse impacts on retained trees. The RPA has been calculated in accordance with Annex C, D and Section 4.6 of BS5837:2012 and requires suitable protection in order for the tree to be successfully incorporated into any future scheme. As such, the RPA of existing trees is an important material consideration when considering site constraints and planning development activities.

2.15 Where applicable the shape of the Root Protection Area has been modified to consider the presence of any nearby obstacles (existing or past) which may have restricted root growth and the likely root distribution i.e. the presence of hard standing, structures and underground apparatus. Where groups of trees have been assessed, the Root Protection Area has been shown based on the maximum sized tree in any one 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 the group.

2.16 Whilst it is generally accepted that a trees roots may extend far greater distances than the notional RPA, with the distribution of the root system relating directly to the availability of suitable conditions for growth (namely oxygen, water and nutrients), with roots predominantly located in the upper 1,000 mm of the soil horizon; the RPA offers an accepted protective buffer from development.

2.17 Above ground constraints such as the current crown spread of the trees and an illustration of the shade pattern (where appropriate) have been considered and identified within the Tree Survey Plan and Tree Retention Plan indicates their potential area of shading influence.

Considerations and Limitations of the Tree Survey

2.18 The survey was completed from ground level only and from within the boundary of the site. Aerial tree inspections or an assessment of the internal condition of the stem/s or branches were not undertaken at this stage as this level of survey is beyond the scope of the initial assessment.

2.19 The statements made in this report regarding defects in assessed trees does not take into account the effects of extreme / adverse weather conditions, changes in land use prior to the site's development, unforeseen accidents or anti-social behaviors, such as vandalism, which occur since the date of the survey. As such, the assessment of tree condition given within applies to the date of survey and cannot be assumed to remain unchanged.

2.20 It will be necessary to review all comments and observations made within this report, in accordance with sound arboricultural practice, within two years of the date of survey (unless explicitly stated elsewhere within this report). Further review may also be necessary where site conditions change or works to trees are carried out which have not been specified in detail within this report.

2.21 Hedgerows are identified as a Habitat of Principal Importance (HPI) as listed within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The tree survey conducted, in accordance with BS5837, does not assess hedgerows against the Hedgerow Regulations 1997 or specifically from an ecological perspective, and is outside the scope of this assessment.

2.22 It may be necessary during detailed design to undertake further assessment and accurate positioning of woody species within tree groups and hedgerows to assist structural calculations for foundation design of structures in accordance with current building regulations. The exact position of individual trees or species included as part of a tree group 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 NHBC Chapter 4.2 Building near Trees.

3.0 RESULTS

3.1 A total of three individual trees and eighteen groups of trees were surveyed as part of the Arboricultural Assessment. Trees were surveyed as individual trees and groups of trees where examples are clearly present as per the description. Refer to the Tree Survey Plan and Appendix A – Tree Schedule for full details of the trees included in this assessment. The table below summarises the trees assessed.

Tree Schedule

3.2 Appendix A presents details of any individual trees, groups, hedgerows and woodlands found during the assessment including heights, diameters at breast height, crown spread (given as a radial measurement from the stem), age class, comments as to the overall condition at the time of inspection, BS5837 category of quality and suitability for retention and the root protection area.

3.3 General observations particularly of structural and physiological condition for example the presence of any decay and physical defect and preliminary management recommendations have also been recorded where appropriate.

Results Summary

Table 1: Summary of Trees by Retention Category

	Individual Trees	Total	Groups of Trees	Total
Category U - Unsuitable		0		0
Category A (High Quality / Value)		0		0
Category B (Moderate Quality / Value	T5	1	G8, G9, G9a, G10, G11, G12	6
Category C (Low Quality / Value)	T3, T4	2	G1, G2, G3, G5, G6, G7, G13, G14, G15, G16, G17, G18	12

3.4 Following cessation of works on the site, there are several extensive areas where development of natural colonization by pioneer tree species types such as goat willow Salix caprea and silver birch Betula pendula had occurred in the open areas and in places where there has not been any targeted control of vegetation. These areas would be described at this stage in their development as self-set immature broad-leaved woodland. Tree groups which reflect this type of tree cover are G1, G3, G6, a large part of G13, G14, G15, G16 and G17.

3.5 These particular groups all presented similar characteristics in terms of the nature of tree growth present. Individual specimens within the groups were of mostly of small dimensions up to 6-8m in height; self-set and largely of shrubby forms, often with multiple stemmed forms from ground level, and closely spaced. In many of the groups, Butterfly Bush Buddleia davidii, blackthorn Prunus spinosa and elder Sambucus nigra was also present.

3.6 Other species that also occurred throughout the above areas were hawthorn Crataegus monogyna and common ash Fraxinus excelsior, all of equally small overall dimensions.

3.7 G5 formed an old boundary hedgerow along another part of the sites northern edge features. The predominant species was hawthorn and examples exhibited characteristically dense crowns and multiple stemmed growth. Several examples displayed layered forms. Many of the individual stems had been subjected to damage, which over time had allowed ingress of rot and decay through the areas of wounding with cavities and dysfunctional wood developing.

3.8 G7 comprised hawthorn and hazel that formed part of a mostly defunct old field boundary hedgerow at the sites northern edge. There were several larger coppiced hazel specimens present.

3.9 G8 represented a mature hedgerow boundary of predominantly hawthorn within which was housed approximately four standard specimens of early maturing ash. The tree standards were mostly multiple stemmed forms with evidence of minor broken branches within their crowns. Apart from these minor defective parts, the trees were in good condition and typically characteristic for their species.

3.10 In addition to the younger colonising material described above there were several concentrations of well-established tree cover that formed boundaries to the field compartments within the southern and western parts of the site. G9 stretched the length of the boundary between an area of open grassland and the southernmost land parcel. Aberderfyn Brook follows this boundary and the tree cover was representative of a riparian habitat and included amongst others mature crack willow Salix fragilis and common alder Alnus glutinosa.

3.11 G9a and the south easternmost part of G13 comprised a more typical mature woodland composition with examples of ash, sycamore Acer pseudoplatanus, English oak Quercus robur and silver birch. Many of the larger trees within these groups housed dense ivy growth often high into the canopies.

3.12 G11 describes the tree cover along the western boundary associated with the public right of way and includes TG10. Mature trees lined either side of the footpath and comprised mostly ash, sycamore and oak along with several minor species forming an understory such as hawthorn, goat willow, hazel Corylus avellana and silver birch. Most species represented were well established thereby forming a tree dominated corridor. In parts there were sections of now defunct original field boundary hedgerows of hawthorn. Throughout there was the presence of ivy growth on stems of individual trees and many of the species represented exhibited multiple stemmed forms, indicative of past management through coppicing of the growth over the years, especially goat willow examples.

3.13 G13, including G12 formed a concentrated belt of trees extending along the entire length of the site's southern boundary. The eastern end of the group has already been described above. The group designation also included roadside tree cover which was generally well established and of mixed species. As already abovementioned, for the most part the area covered by TG13s description comprised material of pioneer species self-set in nature having naturally colonised the open ground. This material was largely shrubby in form and multiple stemmed from ground level of small dimensions between 1 - 4m in height.

3.14 Trees T3 and T4 were hawthorn of approximately 4 and 6m in height characteristic of the species and having self-set in opportunistic places.

3.15 T5 was a mature English oak and a prominent feature along the tree belt lining Aberderfyn Brook (G9). The specimen was approximately 12m in height. Being typically characteristic of an open grown specimen it displayed a domed, evenly balanced form.

3.16 There was an area of missing bark on the east facing side of the stem approximately 1.5m in length extending vertically from ground level which had resulted in exposure of the heartwood. There did not appear to be any significant deterioration of the surface of the wounded area at the time of inspection. The stem housed a moderate burden of ivy growth to approximately 9m. A main central stem section within the crown was dead, although the cause was not established and throughout the crown there was a high amount of major dead wood, often as whole branches, amongst other storm damaged branch material and occasional branch / limb breakages. For its good quality and considerable future life expectancy, T5 would be regarded as retention category B.

4.0 ARBORICULTURAL IMPACT ASSESSMENT

4.1 The following paragraphs present a summary of the tree survey and discussion of particular trees and groups recorded in the context of any proposed development in the form of an Arboricultural Impact Assessment in accordance with section 5.4 of BS5837. Any final tree retentions will need to be reconciled with the advice contained within this report.

4.2 The AIA has been based upon the Illustrative Masterplan and seeks to outline the relationship between the proposals and the existing trees and hedgerows. The drawing shows the proposals for residential development of up to 300 dwelling, employment, local store, main access road, road infrastructure, drainage infrastructure and landscaping. An overlay of the layout has been incorporated in the Tree Retention Plan to assist in identifying the relationship and any potential conflicts between the proposals and the existing trees and hedgerows.

4.3 To facilitate the above plan there would be the need to remove all or part of the following trees and tree groups.

4.4 G1, G3, G5, G6 & G16 would be removed to accommodate the residential provision. These groups were assessed as retention category C, as the material was entirely self-seeded, thereby its removal should not raise any objection from an arboricultural perspective due to its very limited value.

4.5 The main access to the site is to be forged off the B5426 Bangor Road to the south and will comprise of a right-hand turn junction rather than a roundabout as previously approved. To facilitate the proposed access and association alterations such as footpath provision and visibility splays, tree cover from G13 will need to be removed. For the most part, tree cover described as G13 along the southern boundary comprised material of pioneer species self-set in nature colonising the open within the site and therefore should not raise any objection from an arboricultural perspective. Mature trees are positioned along the roadside however these are of poor and unmanaged condition and their loss should not raise objections. The removal of these trees will allow the future establishment of trees set further into the site.

4.6 Tree losses required for the proposed junction are considered to be similar to those previously shown for the roundabout. Whilst trees will need to be removed along the entire length of Bangor Road from within G13 to facilitate the road alignment and footpath requirement, the amended junction will allow the retention of trees around the point of access. Tree losses required to facilitate the amended junction are not considered to be any greater than those accepted to facilitate the approved roundabout.

4.7 Small sections of G9 and G15 will need to be removed to allow for the main access road as it moved north through the site. Once again, this loss is not considered to be detrimental to the overall tree stock on site.

4.8 A small portion of the southerly extent of G9 would need to be removed along with G9a to accommodate the employment provision although the vast majority of the principal tree cover forming the group along the brook course west of the section to be removed would be retained. The material to be removed would largely be restricted to the self-seeded growth that has colonised the open area on the south side.

4.9 The loss of the material to accommodate the residential and employment provision in this part of the site would be replaced by extensive areas of new structural landscaping along the southern boundary and around the roundabout to support the schemes delivery where the development fronts Bangor Road thereby offering a high quality new landscaped entrance suited to the site and the local landscape alike.

4.10 Tree groupings G14 and G15 will be incorporated into the green infrastructure proposals. The nature of the tree cover of these particular groups of trees at present is overgrown and relatively dense in places as the various species have steadily over time colonised the open ground. Therefore the groups would require management intervention in the future such as reduction in numbers / thinning of density of the younger self seeded material and improvements to overall the visual amenity through tree surgery to those more mature trees where necessary and appropriate, in order to make the area more useable as open space. Any future work would need to be mindful of the nature conservation value that the material holds and should work be proposed, it would need to be with the advice of an ecologist.

4.11 The only individual tree to be removed would be T4, a 6m high hawthorn regarded as retention category C. Its loss should not raise any significant objection on arboricultural grounds considering the overall amount of tree planting being proposed to support the development.

4.12 Where drainage infrastructure is required, tree cover will need to be removed. The full extent of any losses will need to be considered within the detailed design of the drainage infrastructure however the loss of tree cover to facilitate this is not considered to be detrimental and due to the species present, trees will soon re-colonise areas that have been cleared.

4.13 Currently the majority of the site is brownfield land and in a derelict state. The proposed development would improve the use of this land, changing it from empty space to a residential area of a higher value. |New tree planting is shown across the entire development which will vastly improve what is currently present.

4.14 Overall these proposals should be viewed as a way to greatly improve an area of land that is currently not in use. Despite internal tree losses, the retention of all boundary tree cover will restrict views inwards and outwards of the development, preserving the existing visual landscape.

Tree Management

4.15 The layout of the development is currently reserved for subsequent approval. In the course of a reserved matters application pursuant to layout, a review of the relationship between the layout and the retained trees should be undertaken by a qualified arboriculturist to assess the existing tree cover and prepare a schedule of tree works.

4.16 All retained trees should be subjected to sound arboricultural management as recommended within section 8.8.3 of BS5837 *Post Development Management of Existing Trees,* where there is a potential for public access in order to satisfy the landowner's duty of care. Additionally, inspections annually and following major storms should be carried out by an experienced arboriculturist or arborist to identify any potential public safety risks and to agree remedial works as required.

4.17 All tree works undertaken should comply with British Standard 3998:2010 and should therefore be carried out by skilled tree surgeons. It would be recommended that quotations for such work be obtained from Arboricultural Association Approved Contractors as this is the recognised authority for certification of tree work contractors.

4.18 All vegetation and, particularly, woody vegetation proposed for clearance should be removed outside of the bird-breeding season (March - September inclusive) as all birds are protected under the Wildlife and Countryside Act, 1981 (as amended) whilst on the nest. Where this is not possible, vegetation should be checked for the presence of nesting birds prior to removal by an experienced ecologist.

5.0 NEW TREE AND HEDGEROW PLANTING

5.1 As part of the development proposals an adequate quantity of structured tree planting has been demonstrated predominantly within or close to hard landscaped areas of car parking or alongside the primary access roads within the roadside verges. The purpose and function of this new tree planting should be understood from the start of any design stages so that key objectives from a landscape perspective can also be achieved.

Trees

5.2 The landscaping scheme should consider the use of both native tree species (for their low maintenance requirements and nature conservation value) and ornamental species (for their contribution to urban design and amenity value). Species choices should be selected on the basis of their suitability for the final site use. Furthermore, during the design process consultation should be made with the Local Planning Authority to obtain information on their tree strategy and incorporate the planting proposals with any local policies and initiatives and/or Biodiversity Action Plans (BAP).

5.3 All schemes should aim achieve a net gain in biodiversity value. Nationally recognised biodiversity metrics allow for the inclusion of, not limited to, newly planted scattered trees, woodlands and hedgerows as a means of compensating for loss of habitat as part of the development. Tree and shrub planting can therefore be used to contribute to this biodiversity gain.

5.4 To maximise biodiversity value (and contribution to net gain) native species or varieties should be specified. Such provisions can be incorporated into both the hard and soft landscaping of the scheme. It is recommended that tree and hedgerow specifications are made following consultation with guidance published by the Local Planning Authority.

5.5 When deciding upon suitable tree species, careful consideration would need to be given to the following: ultimate height and canopy spread, form, habit, density of crown, potential shading effect, colour, water demand, soil type and maintenance requirements in relation to both the built form of the new development and existing properties.

5.6 Through careful species selection, the landscape scheme shall reduce the risk of trees being removed in the future on the grounds of nuisance. Nuisance can be perceived in a number of ways and vary from person to person however most commonly, within the context of trees, low overhanging branches, excessive shading, seasonal leaf fall and the misinformed perception that trees close to buildings cause damage.

Hedgerows

5.7 Hedgerows are identified as a Habitat of Principle Importance (HPI) as listed within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Consequently, it is important that the proposed scheme delivers a net gain in terms of linear hedgerows through new planting to compensate for any losses. Species should be native, and characteristic of the locality.

5.8 Recommended species for native hedgerow planting are as follows:

- *Crataegus monogyna*
- *Prunus spinosa*
- *Cornus sanguinea*
- *Corylus avellana*
- *Acer campestre*
- *Euonymus europaeus*

Rooting Environment and Soil Volumes

5.9 The success of any landscaping scheme relies on an adequate provision of a high-quality rooting environment within which trees can thrive and reach their full potential. Planting trees with due care and consideration can, in the long term, provide a greater return on a schemes green investment and ensure trees remain healthy and grow to mature proportions. Healthy mature trees integrate well into the built environment; increase the maturity of the landscape; help provide a natural green and leafy urban environment in which people would want to reside whilst also benefiting local wildlife.

5.10 The planting of trees within confined urban environments should consider the use of appropriately designed planting pits specifically engineered to promote tree health and longevity. Crucially the aim will be to provide an adequate volume of quality soil for roots to suitably develop by calculating the amount of available soil volumes needed and selecting species whose mature size is compatible with the site. This is an integral component of the planning stage (Lindsey & Bassuk, 1991).

5.11 In a natural environment free from constraints to growth, it has been proven through research that root systems can extend up to three times the radius of the tree crown and although in an urban environment there is often insufficient space to accommodate the extent of the full potential for root growth, all efforts should be made to at least provide as much soil volume as possible. One researched method of calculating the minimum required soil volume is as follows:

Table 2: Example of calculating Soil Volume for New Tree Planting (Source: CIRIA C712 and Calculating Target Soil Volumes – Green Blue Urban)

Projected canopy area of mature tree (m) x depth 0.6m		
Calculation 1	Projected mature canopy diameter (metres)	= 3 (Diameter)
Calculation 2	Projected mature canopy area (square metres), (n x Radius^2)	= 7.1 (Area)
Calculation 3	Target soil volume (cubic metres), (Area x 0.6m)	= 4.24 (Volume)
	Target soil volume	= 4.24m^3

General Planting Recommendations

5.12 Wherever possible, following discussions with the developer and utility companies, common service trenches should be specified to minimise land take associated with underground service provision and facilitation access for future maintenance.

5.13 Tree planting should be avoided where they may obstruct overhead power lines or cables. Any underground apparatus should be ducted or otherwise protected at the time of construction to enable trees to be planted without resulting in future conflicts.

General Design Principles in Relation to Retained Trees

5.14 In a subsequent Reserved Matters application following the final layout of the scheme, assessment of the distance of proposed development in relation to the calculated root protection area of retained trees should be made which will inform the final layout.

5.15 Ground investigation through the use of pneumatic excavation, such as an Air Spade and digging of trial pits, may be required should there be areas where it is not possible to modify the layout to avoid conflict with retained trees. Ground investigations would aim to determine the actual location of the physical roots without causing them damage in the process. Such an assessment would enable consideration of the practicality and suitability of certain 'tree friendly' construction methods and would better inform decision making for a design.

5.16 Further assessment of the impact to actual roots found during the ground investigations can then be made and solutions reached thus, greatly reducing any potential future impacts on retained trees whilst allowing the development to proceed and minimising risks to future tree health. Ultimately the aim would be to reduce conflicts between trees and buildings and achieve successful tree retention.

5.17 The use of "no-dig" construction methods should be considered prior to decisions being made as to the removal of each tree concerned, where conflicts between trees identified for retention and the layout arise. Such methods of construction and the use of industry led specialist engineering solutions i.e. three dimensional "load bearing" cellular confinement systems can be used particularly in the case of carriageways, footways and driveways in order to avoid unnecessary losses of trees.

5.18 The routing of below ground services should also be considered with regard to the retained trees as part of a subsequent reserved matters application pursuant to layout. As recommended by the guidance given in section 7.7 of BS5837 services, where possible, should not encroach within the Root Protection Areas of retained trees. If below-ground services are proposed within a Root Protection Area, modifications to the alignment of the service route may need to be made in order to minimise adverse effects on root stability and overall tree health.

5.19 Consideration may also need to be given to the potential for tree roots of newly planted trees and hedgerows to affect or compromise the future services. As far as feasible, it would be preferable that proposed services near both the existing and any new planting should be ducted for ease of access and maintenance and grouped together to minimise any future disturbance.

6.0 TREE PROTECTION MEASURES

6.1 Retained trees will be adequately protected during works ensuring that the calculated root protection area for all retained trees can be appropriately protected through the erection of the requisite tree protection barriers. Measures to protect trees should follow the guidance in BS5837 and will be applied where necessary for the purpose of protecting trees within the site whilst allowing sufficient access for the implementation of the proposed layout. These have been broadly summarised below.

General Information and Recommendations

6.2 All trees retained on site will be protected by suitable barriers or ground protection measures around the calculated RPA, crown spread of the tree or other defined constraints of this assessment as detailed by section 6 and 7 of BS5837.

6.3 Barriers will be erected prior to commencement of any construction work and before demolition including erection of any temporary structures. Once installed, the area protected by fencing or other barriers will be regarded as a construction exclusion zone. Fencing and barriers will not be removed or altered without prior consultation with the Project Arboriculturist.

6.4 Any trees that are not to be retained as part of the proposals should be felled prior to the erection of protective barriers. Particular attention needs to be given by site contractors to minimise damage or disturbance to retained specimens.

6.5 Where it has been agreed, construction access may take place within the root protection area if suitable ground protection measures are in place. This may comprise single scaffold boards over a compressible layer laid onto a geo-textile membrane for pedestrian movements. Vehicular movements over the root protection area will require the calculation of expected loading and the use of proprietary protection systems.

6.6 Confirmation that tree protective fencing or other barriers have been set out correctly should be gained prior to the commencement of site activity.

Tree Protection Barriers

6.7 Tree protection fencing should be fit for the purpose of excluding any type of construction activity and suitable for the degree and proximity of works to retained trees. Barriers must be maintained to ensure that they remain rigid and complete for the duration of construction activities on site.

6.8 In most situations, fencing should comprise typical construction fencing panels attached to scaffold poles driven vertically into the ground. For particular areas where construction activity is anticipated to be of a more intense nature, supporting struts, acting as a brace should be added and fixed into position through the application of metal pins driven into the ground to offer additional resistance against impacts.

6.9 Where site circumstances and the risk to retained trees do not necessitate the default level of protection an alternative will be specified appropriate to the level / nature of anticipated construction activity. The recommended methods of fencing specifications for this site have been illustrated in Appendix B.

6.10 It may be appropriate on some sites to use temporary site offices, hoardings and lower level barrier protection as components of the tree protection barriers. Details of the specific protection barriers for the site can be provided should the application be approved, as part of a site specific Arboricultural Method Statement for a Reserved Matters application and in accordance with the guidance contained within BS5837.

Protection outside the exclusion zone

6.11 Once the areas around trees have been protected by the barriers, any works on the remaining site area may be commenced providing activities do not impinge on protected areas.

6.12 All weather notices should be attached to the protective fencing to indicate that construction activities are not permitted within the fenced area. The area within the protective barriers will then remain a construction exclusion zone throughout the duration of the construction phase of the proposed development. Protection fencing signs can be provided upon request.

6.13 Wide or tall loads etc should not come into contact with retained trees. Banksman should supervise transit of vehicles where they are in close proximity to retained trees.

6.14 Oil, bitumen, cement or other material that is potentially injurious to trees should not be stacked or discharged within 10m of a tree stem. No concrete should be mixed within 10m of a tree. Allowance should be made for the slope of ground to prevent materials running towards the tree.

6.15 No fires will be lit where flames are anticipated to extend to within 5m of tree foliage, branches or trunk, taking into consideration wind direction and size of fire.

6.16 Notice boards, telephone cables or other services should not be attached to any part of a retained tree.

6.17 Any trees which need to be felled adjacent to or are present within a continuous canopy of retained trees, must be removed with due care (it may be necessary to remove such trees in sections).

Protection of Trees Close to the Site

6.18 A number of trees were located on the boundaries of the site and therefore the root protection area and crown spread of these trees will need to be protected in the same way as all the retained trees within the site. All trees located outside the boundaries of the assessment site yet within close proximity to works should be adequately protected during the course of the development by barriers or ground protection around the calculated root protection area.

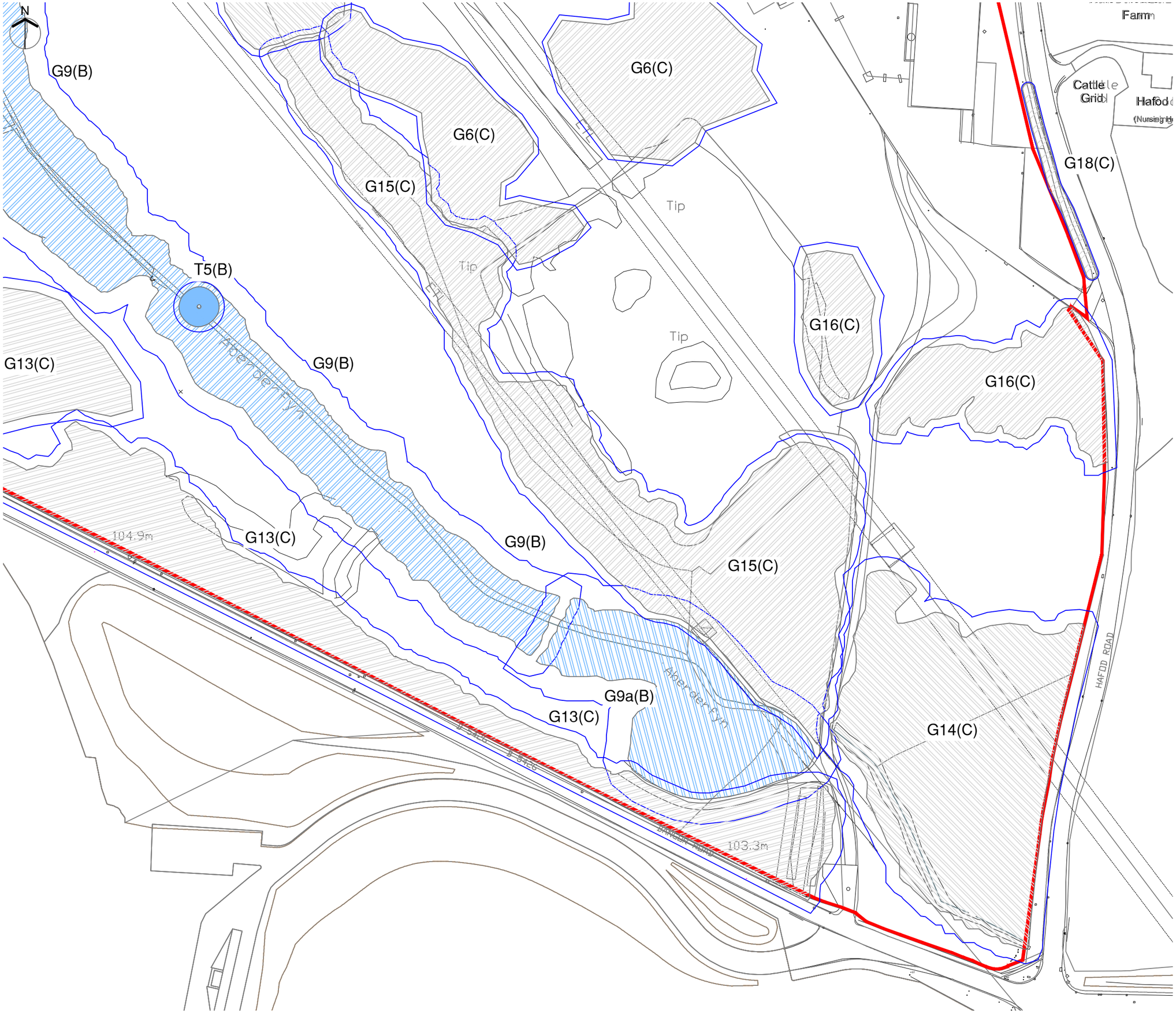
6.19 Any trees which are to be retained and whose Root Protection Areas may be affected by the development should be monitored, during and after construction, to identify any alterations in quality with time and to assess and undertake any remedial works required as a result.

Protection for Aerial Parts of Retained Trees

6.20 Where it is deemed necessary to operate wide or tall plant within close proximity to trees it is best advised that appropriate, but limited tree surgery, be carried out beforehand to remove any obstructive branches as any such equipment would have potential to cause damage to parts of the crown material, i.e. low branches and limbs, of retained trees within the protective barriers. This is termed as 'access facilitation pruning' within BS5837. Any such pruning should be undertaken in accordance with a specification prepared by an arboriculturist.

6.21 A pre-commencement site meeting with contractors who are responsible for operating machinery is advised to firstly highlight the potential for damage occurring to tree crowns and to ensure that extra care is applied when manoeuvring machinery during such operations within close proximity to retained trees to avoid any contact.

6.22 In the event of having caused any branch or limb damage to retained trees it is strongly recommended that suitable tree surgery be carried out, in accordance with British Standard 3998:2010 and in agreement with the Local Planning Authority prior to correcting the damage, upon completion of development.



KEY

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TREE SURVEY PLAN

scale	drawn/checked	date
1:1250 @ A3	TCB/HR	Feb 2020

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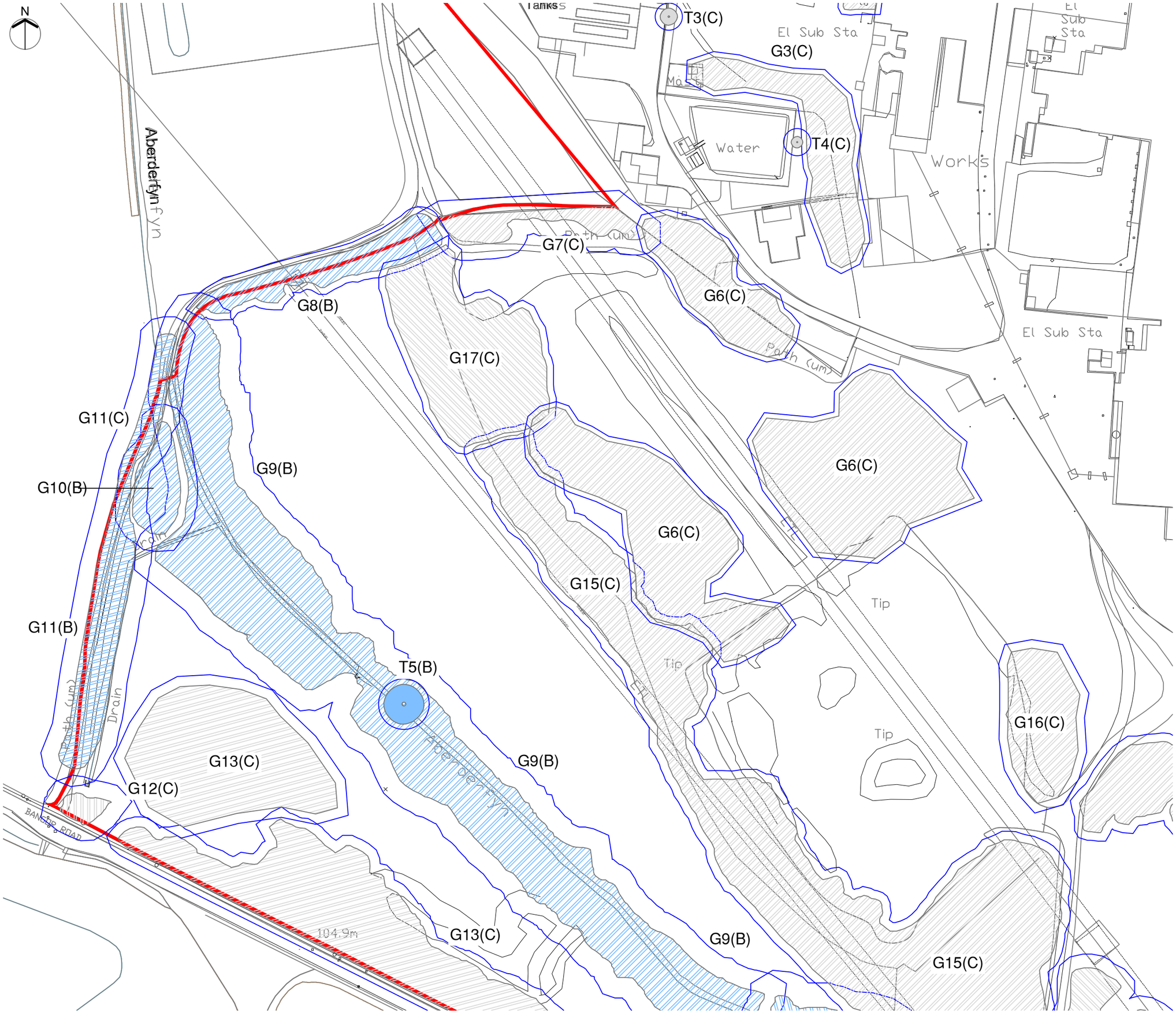

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drawing number
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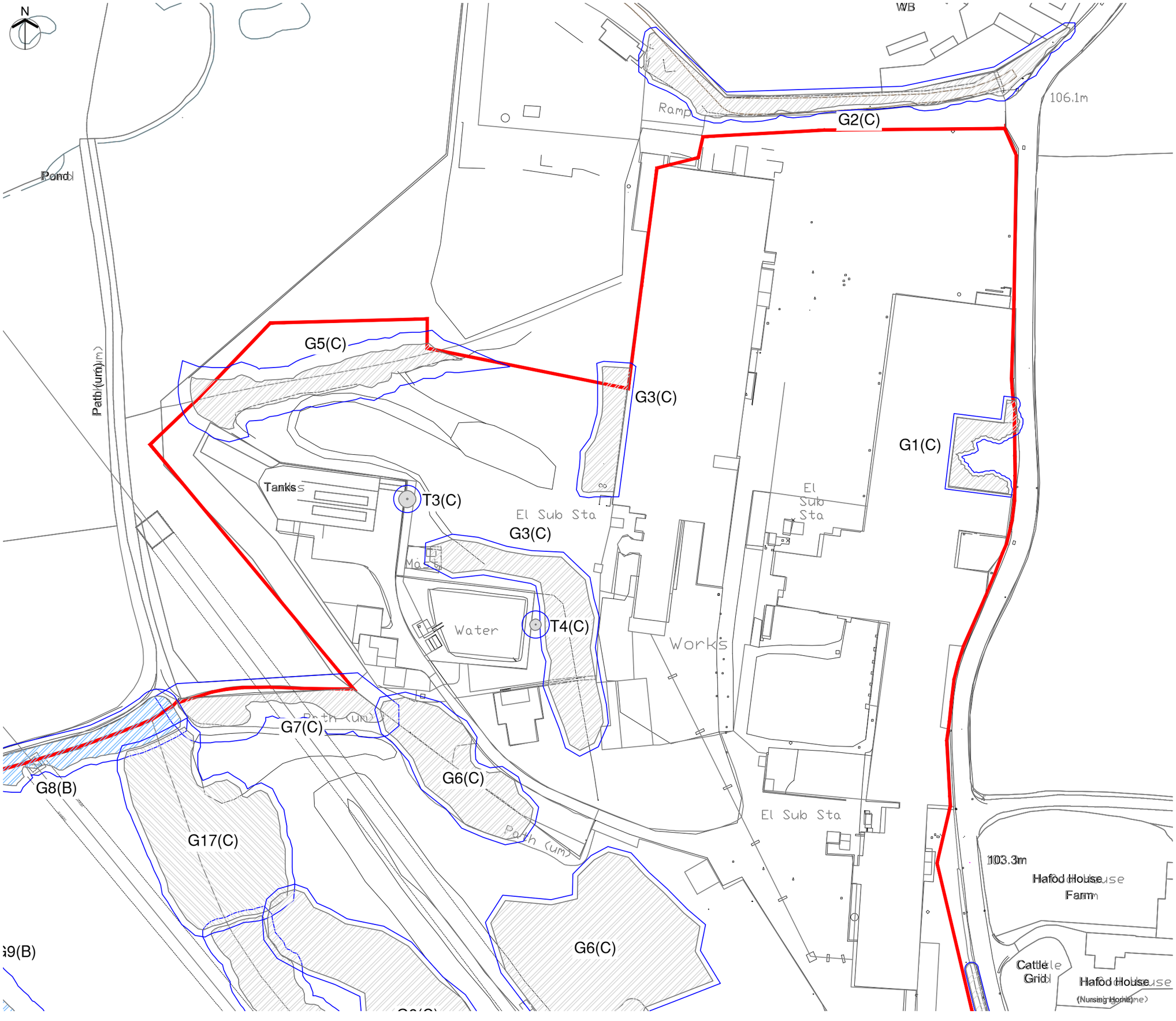

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4355-T-04

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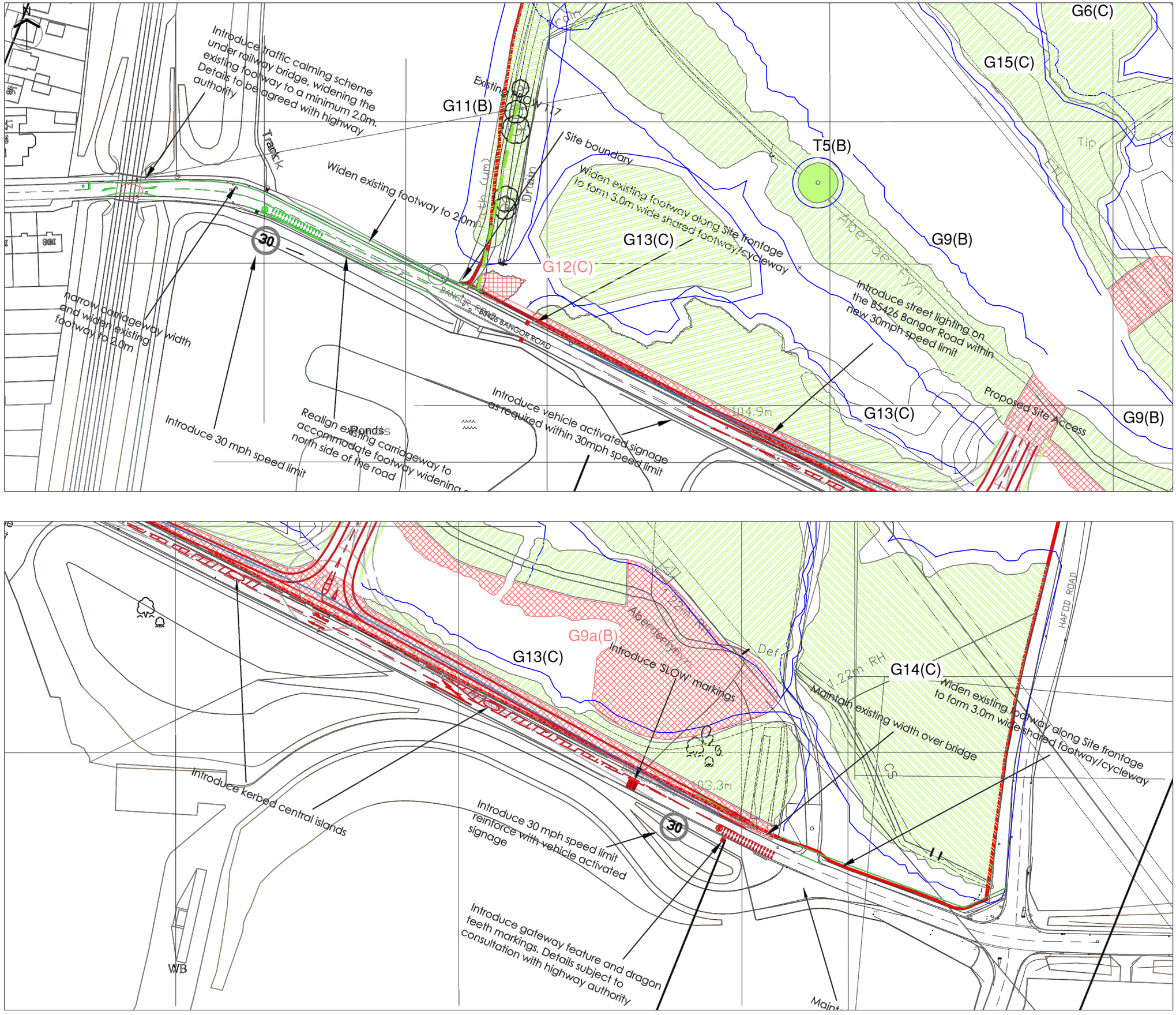

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Appendix A - Tree Schedule

Measurements	Age Classes	Quality Assessment of BS Category	ULE (relates to BS Category)
Height - Measured using a digital laser clinometer (m)	**YNG**: Establishing, typically with good vigour and fast growth rates and strong apical dominance; c. less than 1/3 life expectancy	**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.	<10 years
Stem Dia. - Diameter measured (mm) in accordance with Annex C of the BS5837	**SM:** Semi-mature trees less than 1/3 life expectancy	**Category A -** Trees of high quality with an estimated remaining life expectancy of at least 40 years.	40+ years
Crown Radius - Measured using a digital laser clinometer radially from the main stem (m)	**EM:** Established, typically vigorous and increasing in apical height and lateral spread; 1/3 - 2/3 life expectancy. Offers landscape significance	**Category B -** Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.	20-40 years
Abbreviations est - Estimated stem diameter avg - Average stem diameter for multiple stems upto - Maximum stem diameter of a group	**M:** Fully established over 2/3 life expectancy, generally good vigour and achieving full height potential with crown still spreading	**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.	10-20 years
	OM: Fully mature, at the extremes of expected life expectancy, vigour decreasing, declining or moribund	Sub-categories: (i) - Mainly arboricultural value (ii) - Mainly landscape value (iii) - Mainly cultural or conservation value	
	V: biological, cultural or aesthetic value comprising niche saproxylic habitat. Individuals of large proportions (stem girth) in comparison to trees of the same species/surviving beyond the typical age range for their species.	**The BS category particular consideration has been given to the following:** • The presence of any structural defects in each tree/group and its future life expectancy • The size and form of each tree/group 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 • Age class and life expectancy	

Structural Condition	Physiological Condition
Good - No significant structural defects	**Good -** No significant health problems
Fair - Structural defects that can be remediated	**Fair -** Symptoms of ill-health that can be remediated
Poor - Significant defects beyond remediation, present a risk of failure in the foreseeable future	**Poor -** Significant ill-health. Unlikely the tree will recover in the long term
Dead - Dead tree with structural integrity of tree severely compromised	**Advanced Decline** / **Dead -** Advanced state of decline and unlikely to recover or Dead

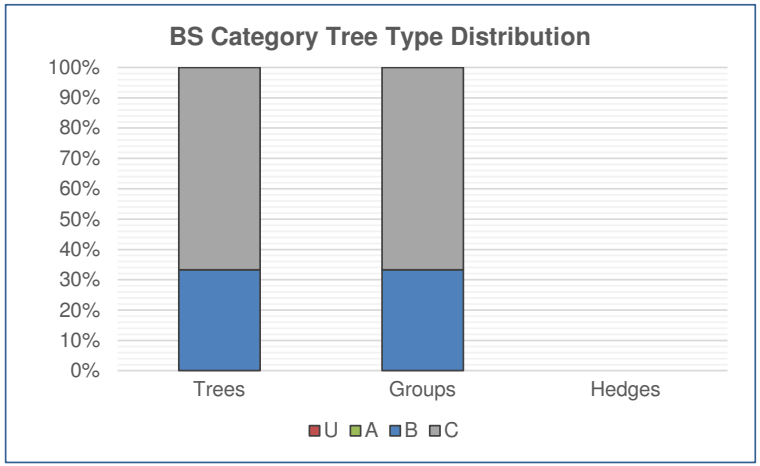
Root Protection Area (RPA)
• The RPA Radius column provides the extent of an equivalent circle from the centre of the stem (m). • The RPA is calculated using the formulae described in paragraph 4.6.1 of British Standard 5837: 2012 and is indicative of the rooting area required for a tree to be successfully retained. Tree roots extend beyond the calculated RPA in many cases and where possible a greater distance should be protected. • Where veteran trees have been identified the RPA has been calculated in accordance with Natural England guidance i.e. 15x the stem diameter, uncapped.

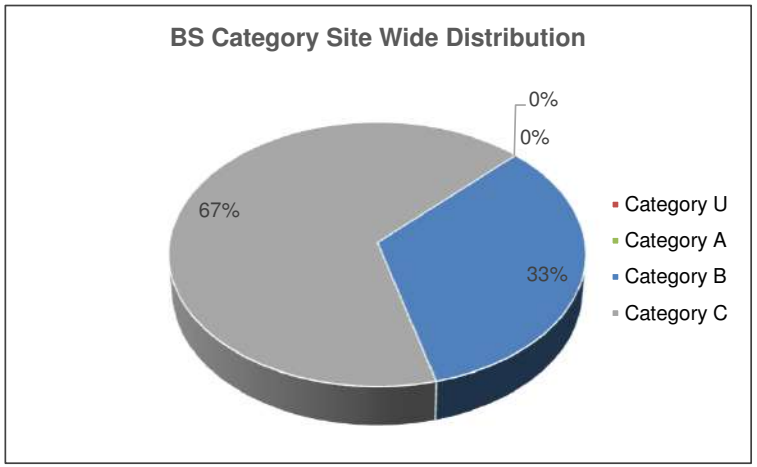
Appendix Summary

	Individual Trees	Totals	Tree Groups and Hedgerows	Totals
Category U		0		0
Category A		0		0
Category B	T5	1	G8, G9, G9a, G10, G11, G12	6
Category C	T3, T4	2	G1, G2, G3, G5, G6, G7, G13, G14, G15, G16, G17, G18	12
	Total	3	Total	18

BS Category Tree Type Distribution displays the proportion of trees assessed in each type to enable a better understanding of the category distribution.

BS Category Site Wide Distribution shows the proportion of trees assessed in each category across the whole site which allows an interpretation of the site's overall quality.





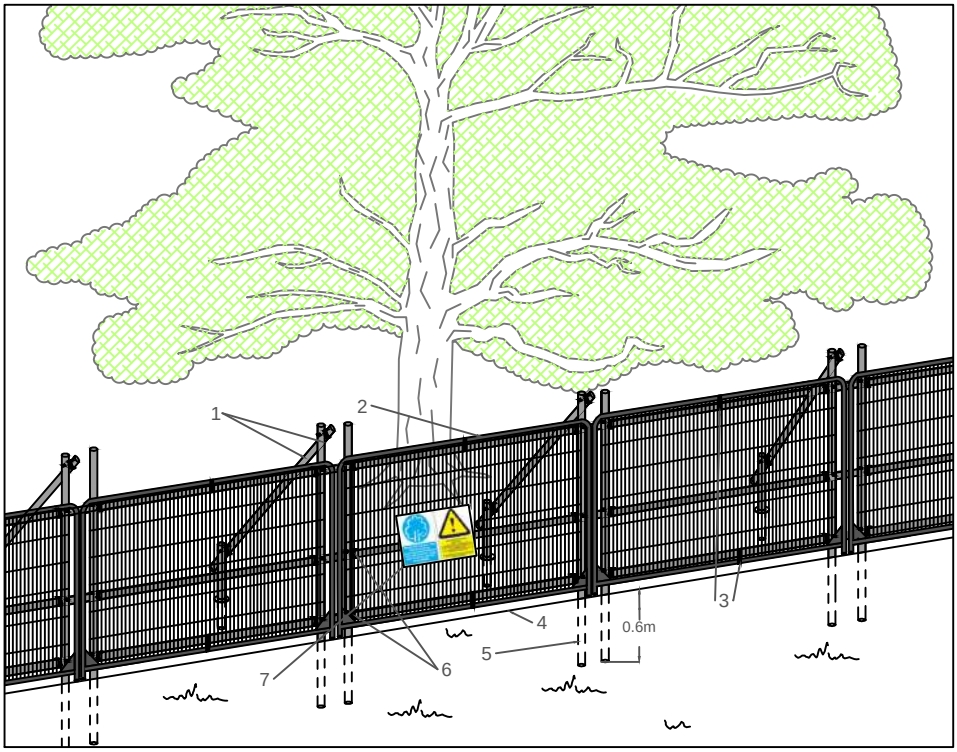
Tree No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
INDIVIDUAL TREES										
T1	Tree no longer present									
T2	Tree no longer present									
T3	Hawthorn Crataegus monogyna	6	est 400	3	M	F	Typically characteristic for the species and of evenly balanced form Multiple stemmed form No obvious defects	72	4.8	C (i)
T4	Hawthorn Crataegus monogyna	4	est 400	2	EM	F	Typically characteristic for the species and of evenly balanced form Multiple stemmed form No obvious defects	72	4.8	C (i)
T5	English Oak Quercus robur	12	740	7	M	F	Domed form Missing bark in a vertical strip for approximately 1.5m from ground level which has exposed the heartwood - east facing side of the lower stem Ivy growth to approximately 9m in height Central lead stem is dead Crown contains a high burden of major dead wood Visible evidence of storm damaged branch material and occasional branch / limb breakages	248	8.9	B (i)

Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
GROUPS OF TREES										
G1	Goat Willow Salix caprea Sycamore Acer pseudoplatanus Scots Pine Pinus sylvestris	6	less than 100	3	EM	F	All the material is pioneer species of self-set nature colonising open ground Shrubby forms Multiple stemmed from ground level in most cases Buddleia and elder also present	5	1.2	C (ii)
G2	Lawson Cypress Chamaecyparis lawsoniana Hawthorn Crataegus monogyna English Oak Quercus robur Goat Willow Salix caprea	8	150	3	EM	F	Group comprises material growing along the northern boundary of the assessment area Embankment for the most part Present amongst much self-set material is an occasional planted oak circa 150mm DBH Area generally unmanaged	10	1.8	C (ii)
G3	Goat Willow Salix caprea Hawthorn Crataegus monogyna	5	150	2	EM	F	Area comprises material of pioneer species of self-set nature colonising open ground Shrubby forms Multiple stemmed from ground level in most cases Buddleia and elder also present Also present occasional oak and ash sapling less than 50mm DBH	10	1.8	C (ii)
G4	No longer present									
G5	Goat Willow Salix caprea Hawthorn Crataegus monogyna	5	est 350	3	M	F	Continuation of the original field boundary hedgerow For the most part the hedge is defunct Occasional individual larger hawthorn examples similar to those in TG4, of multiple stemmed forms Evidence of "laying" in hawthorn examples	55	4.2	C (ii)
G6	Goat Willow Salix caprea Silver Birch Betula pendula	5	less than 150	2	EM	F	All the material is pioneer species of self-set nature colonising open ground Shrubby forms Multiple stemmed from ground level in most cases	10	1.8	C (ii)

Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
G7	Hawthorn Crataegus monogyna Hazel Corylus avellana	6	est 450	4	M	F	Group comprises several individual specimens forming part of a largely defunct old field boundary hedgerow Contains several larger coppiced hazel specimens	92	5.4	C (ii)
G8	Common Ash Fraxinus excelsior	8	est 200	4	M	F	Group includes approximately 3 - 4 standard specimens along the line of the field boundary hedgerow of hawthorn Hawthorn are well established circa 250mm DBH Ash are mostly multiple stemmed with evidence of minor broken branches, although otherwise no obvious defects Ash were considered typically characteristic for the species	18	2.4	B (ii)
G9	Hawthorn Crataegus monogyna Ash Fraxinus excelsior Blackthorn Prunus spinosa Wild Cherry Prunus avium Crack Willow Salix fragilis	6 to 10	upto 600	4	M	F	Group comprises trees present within a well established internal hedgerow Continuous length of hedgerow Various species present	163	7.2	B (ii)
G9a	Common Ash Fraxinus excelsior Silver Birch Betula pendula Common Alder Alnus glutinosa	14	upto 720	7	M	G	Sub group designated as the southern end of TG9 Material present comprises larger and maturer specimens than the majority of TG9 above Generally comprises single specimens amongst self-set material Ivy growth present in most trees	235	8.6	B (ii)
G10	1 Ash Fraxinus excelsior 2 Goat Willow Salix caprea 1 Hazel Corylus avellana 3 Silver Birch Betula pendula 3 English Oak Quercus robur	14	upto 720	7	M	G	Group comprises a small cluster of trees to the side of the public right of way along the western boundary of the site One oak example is well established with a low and spreading crown The hazel is coppiced Goat willow examples are multiple stemmed forms from ground level with est DBH circa 300mm	235	8.6	B (ii)

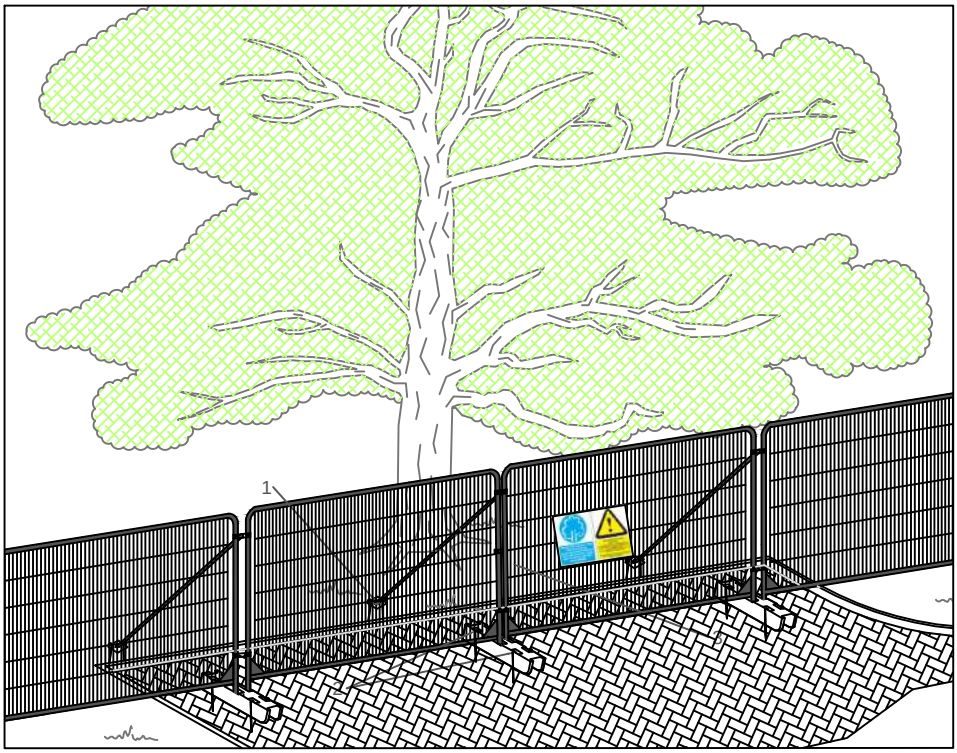
Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
G11	Silver Birch Betula pendula Goat Willow Salix caprea Hawthorn Crataegus monogyna English Oak Quercus robur Sycamore Acer pseudoplatanus Common Ash Fraxinus excelsior	10	upto 500	4	M	G	Group is described as the tree cover along both sides of the public right of way running along the western boundary of the site Numerous trees present aligning the path sides Most species represented are well established thereby forming a tree dominated corridor In parts there was sections of now defunct original field boundary hedgerows Much growth of ivy extending up stems of individual trees Many species represented exhibited multiple stemmed forms, indicative of past management by coppicing of the growth over the years, especially goat willow examples	113	6.0	B (ii)
G12	1 Field Maple Acer campestre 2 Goat Willow Salix caprea	8	est 500	5	M	F	Three specimens located close to the roadside in the south western corner of the site Multiple stemmed forms Evidence of past pruning work involving clearance of branch growth over the access point and road	113	6.0	B (ii)
G13	English Oak Quercus robur Goat Willow Salix caprea Silver Birch Betula pendula Common Ash Fraxinus excelsior Sycamore Acer pseudoplatanus Hawthorn Crataegus monogyna	6 to 12	300	2 to 6	EM	F	Extensive area of general tree cover along the southern boundary Group includes description for road side tree cover which is well established and of mixed species For the most part the area comprises material of pioneer species self-set in nature colonising open ground Shrubby forms Multiple stemmed from ground level in most cases and of small dimensions 1 - 4m in height Towards the eastern end of the group designation the material becomes more established, up to 12m in height and in some cases beyond Specimens represented are typical of their respective species and house varying amounts of ivy growth	41	3.6	C (ii)
G14	Ash Fraxinus excelsior Goat Willow Salix caprea	10	est 400	4	M	F	Area of mostly more advanced growth of self-set tree cover amongst younger regeneration of pioneer species Occasional larger specimens of willow and ash noted randomly scattered throughout the area High quantity of hawthorn, blackthorn and sycamore thicket type growth	72	4.8	C (ii)

Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
G15	Hawthorn Crataegus monogyna Blackthorn Prunus spinosa Goat Willow Salix caprea Wild Cherry Prunus avium English Oak Quercus robur	5	est 250	2	EM	F	Similar to TG14 above	28	3.0	C (ii)
G16	Goat Willow Salix caprea Hawthorn Crataegus monogyna	6	est 250	3	EM	F	Similar to TG14 and TG15 above	28	3.0	C (ii)
G17	Silver Birch Betula pendula	6	upto 200	2	EM	F	Area separated for grouping due to similar species composition Mostly regeneration of silver birch Dense spacing All self-set material	18	2.4	C (ii)
G18	Ash Fraxinus excelsior	6	upto 200	2	EM	F	Road side group Poor quality	18	2.4	C (ii)



Standard specification for protective barrier

1. Standard scaffold poles
2. Heavy gauge 2m tall galvanized tube and welded mesh infill panels
3. Panels secured to scaffold frame with wire ties
4. Ground level
5. Uprights driven into the ground until secure (min depth of 0.6m)
6. Standard scaffold clamps
7. Construction Exclusion Zone signs



Above ground stabilising systems

1. Stabiliser strut with base plate secured with ground pins
2. Feet blocks secured with ground pins
3. Construction Exclusion Zone signs

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APPENDIX B
PROTECTIVE FENCING SPECIFICATIONS

CAD file: S:\Arb resources\Basic Templates\Tree Protection\Appendix B - Protective Fencing A4.dwg