



Gladman Developments Ltd

Bangor Road, Johnstown, Wrexham

Arboricultural Assessment

July 2013

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Rev	Issue Status	Prepared / Date	Approved/Date
-	Draft	HCK / 08.05.2012	HCK / 13.02.2013
-	Final	NJG / 18.02.2013	HCK / 17.07.13

CONTENTS

1.0	INTRODUCTION.....	2
2.0	METHODOLOGY.....	3
3.0	RESULTS.....	7
4.0	ARBORICULTURAL IMPACT ASSESSMENT.....	10
5.0	TREE PROTECTION MEASURES.....	15
6.0	CONCLUSION.....	17

TABLES

Table 1: Summary of Trees by Retention Category

FIGURES

Figure 1: Location Plan (4355-A-01)

Figure 2: Tree Location Quality and Constraints Plan (4355-A-02)

Figure 3: Tree Retention Plan (4355-A-03)

APPENDICES

Appendix A: Tree Schedule

Appendix B: Protective Fencing Specifications

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 and is shown as Figure 1. The survey was carried out on the 2nd May 2012.
- 1.2 The purpose of the report is to provide an assessment of the arboricultural value of the trees present based on their current condition and quality in accordance with British Standard 5837:2012 'Trees in Relation to Design, Demolition and Construction – Recommendations', to accompany a planning application for the creation of a mixed use development. The tree survey has therefore focused on any trees present within the site that may potentially be affected by the future proposals and includes those on or close to the boundaries that may be indirectly affected by the proposals through their influence of the site.
- 1.3 Trees, tree groups and woodlands have been considered following evaluation into one of four categories (U, A, B & C) based on tree quality as outlined in British Standard 5837 (2012). The categorisation of trees gives an indication of the trees importance in relation to the site and the local landscape and their current arboricultural quality. This allows for informed decisions to be made concerning which trees could be removed or retained in the context of any development proposals.

Site Description

- 1.4 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 post 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.
- 1.5 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.
- 1.6 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*.
- 1.7 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.

- 1.8 The report comprises of the following:
- Chapter 1 provides an introduction to the assessment work, its purpose and background details.
 - Chapter 2 describes the methodology to which the tree assessment has been undertaken.
 - Chapter 3 presents the results of the assessment.
 - Chapter 4 evaluates the findings in respect of the development proposals in the form of an **Arboricultural Impact Assessment (AIA)** and also provides the principal recommendations for tree protection measures to be considered.
 - Chapter 5 presents an indication of the tree protection measures to be required from a general viewpoint such as typical fencing requirements.
 - Chapter 6 provides a conclusion to the findings.
- 1.9 However it must be understood that should any specific tree protection be required, this would need to be separately considered where needs arise at the appropriate stage following approval of any development on the site and prior to the commencement of construction activity. This would be in the form of an Arboricultural Method Statement (AMS), produced in conjunction with a specific Tree Constraints Plan (TCP) and Tree Protection Plan (TPP), produced in accordance with guidance in British Standard 5837:2012, and is beyond the scope of this arboricultural assessment. Appendix A presents a summary table of the tree survey data as collected whilst on site.

2.0 METHODOLOGY

- 2.1 Trees have been broadly assessed based on guidance set out within British Standard 5837:2012 5837. This standard provides recommendations and guidance on the principles to be applied to achieve successful integration of development with trees, shrubs and hedgerows. Where development (including demolition) is proposed, the standard provides guidance on the approach needed to decide which trees are appropriate for retention, on the means for protecting these trees during the development and on the means of incorporating trees into the developed landscape.
- 2.2 Trees have been divided into one of four categories (based on Table 1 Cascade chart for tree quality assessment within the British Standard). These are classed as U, A, B & C and are included in section 4.5 of British Standard 5837:2012. The categorisation of each tree or group gives an indication as to the tree's overall condition, value, quality and importance in relation to the site and wider local landscape in the current context. This assists informal decisions concerning which trees should be removed or retained should development occur.
- 2.3 For a tree to qualify under any given category it should fall within the scope of that category's definition (see below). Categories A, B & C cover trees that should be a material consideration in the development process, each with three further sub-categories (i, ii, iii) which are intended to reflect arboricultural, landscape and cultural (nature conservation) values. 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. In assigning trees to the A, B or C categories the presence of any serious disease or tree – related hazards are taken into account.

- 2.4 If the disease is considered fatal and / or irremediable, or likely to require sanitation for the protection of other trees it may be categorised as U, even if they are otherwise of considerable value.
- **Category (U) – (Dark Red):** Trees for removal are those trees in such a condition that any existing value would be lost within 10 years and which should in the current context be removed for reasons of sound arboricultural management. Trees within this category are:
 - Trees that have a serious irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees.
 - Trees that are dead or are showing signs of significant, immediate or irreversible overall decline.
 - Trees infected with pathogens of significance to the health and or/safety of other trees nearby trees or very low quality trees suppressing adjacent trees of better quality.
- 2.5 Category (A) – (Light Green): are trees whose retention is most desirable and are of high quality and value. These trees are considered to be in such a condition as to be able to make a lasting contribution (a minimum of 40 years) and may comprise:
- (i) Trees which are particularly good examples of their species, especially if rare or unusual, or essential components of groups or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue).
 - (ii) Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. avenues or other arboricultural features assessed as groups).
 - (iii) Trees or groups or woodlands of significant conservation, historical, commemorative or other value (e.g. Veteran or wood-pasture trees).
- 2.6 Category (B) – (Blue): are trees whose retention is considered desirable and are of moderate quality and value. These trees are considered to be in such a condition as to make a significant contribution (a minimum of 20 years) and may comprise:
- (i) Trees that might be included in the high category but because of their numbers or slightly impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage), are downgraded in favour of the best individuals.
 - (ii) Trees present in numbers such that they form distinct landscape features and attract a higher collective rating than they would as individuals. Individually these trees are not essential components of formal or semi-formal arboricultural features, or trees situated mainly internally to the site and have little visual impact beyond the site.
 - (iii) Trees with clearly identifiable conservation or other cultural benefits.
- 2.7 Category (C) – (Grey): are trees that could be retained and are considered to be of low quality and value. These trees are in an adequate condition to remain until new planting could be established (a minimum of ten years) or are young trees with a stem diameter below 150mm and may comprise:

- (i) Trees not qualifying in higher categories.
- (ii) Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value and or trees offering low or only temporary screening benefit.
- (iii) Trees with very limited conservation or other cultural benefits.

Tree Schedule

- 2.8 In the tree schedule (Appendix A) species have been recorded in both common and botanical names. Tree height has been estimated in metres and stem diameter measured at 1.5 metres above ground level (recorded in millimetres). Crown spread has been measured in metres and given as a radial spread from the stem. Crown spreads have been measured to the point of greatest spread in most cases unless a crown is clearly asymmetric, in which case measurements have been recorded as radial distance from the stem in one or more of the corresponding compass points, N, S, E or W.
- 2.9 In the assessment particular consideration has been given to the following when considering the appropriate British Standard Category and Sub-Category allocation:
- The health, vigour and condition of each tree;
 - The presence of any structural defects in each tree and its remaining contribution in years (i.e. future life expectancy);
 - The size and form of each tree and its suitability within the context of a proposed development;
 - The location of each tree relative to existing site features, e.g. its value as a screen or as a skyline feature.
- 2.10 Age class is assessed according to the age class categories referred to in the British Standard.
- YNG: Young trees up to five years of age.
 - SM: Semi-mature, trees less than 1/3 life expectancy.
 - EM: Early mature, trees 1/3 – 2/3 life expectancy.
 - M: Mature trees over 2/3 life expectancy.
 - OM: Over mature – declining or moribund trees of low vigor.
 - V: Veteran status – where a tree possesses certain attributes relating to veteran trees.
- 2.11 The overall condition of the tree, or group of trees, has been referred to as one of the following. A summary has been noted in the Tree Schedule and discussed in the Report.
- G Good: A tree/trees with little or no defects requiring little, if any attention.
 - F Fair: A tree/trees with minor but rectifiable defects or in the early stages of stress, from which it may recover.
 - P Poor: A tree/trees with major structural and physiological defects or stressed such that it would be very expensive and inappropriate to retain.
 - D Dead: A tree/trees no longer alive. However, this could also apply to those trees that are dying and will be unlikely to recover, or have become dangerous.

2.12 Major defects or diseases and relevant observations have also been recorded under structural condition in Appendix A. The assessment for structural condition has included inspection of the following defects:

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

2.13 Major defects or diseases and relevant observations have also been recorded. Dead wood has been defined as the following:

- | | |
|-----------------------------------|----------------------------|
| • Twigs and small branch material | Up to 5cm in diameter |
| • Minor dead wood | 5cm to 10cm in diameter |
| • Major dead wood | 10cm in diameter and above |

Conditions of Tree Survey

2.14 The survey was completed from ground level only and from within the boundary of the site. Aerial inspection of trees was not undertaken at this stage. Investigations as to the internal condition of a tree have not been undertaken, being also beyond the immediate scope of this assessment. Evaluation of tree condition given within this assessment applies to the date of survey and cannot be assumed to remain unchanged. It may be necessary to review these within 12 months, in accordance with sound arboricultural practice.

Site Plans

2.15 The individual positions of trees and groups of trees recorded in the Arboricultural Assessment have been shown on the Tree Location, Quality and Constraints Plan, Figure 2 (Drawing no. 4355-A-02). The tree quality element shows the relevant British Standard 5837:2012 categories for retention considered for each tree and groups of trees.

- 2.16 The positions of trees are based on a topographical / land survey supplied by the client in a .dwg format for the purpose of plotting the trees and root protection areas (RPA) accurately. The crown extent and RPAs required by the individual and groups of trees are indicated by the tree constraints element of the above plan.
- 2.17 As part of the Arboricultural Impact Assessment a Draft Tree Retention Plan (Drawing no. 4355-A-03) has been prepared which shows those trees for retention and those for removal to facilitate the proposed site layout supplied for the purpose of the assessment. The proposed site layout has been superimposed onto the tree survey data to clearly show the scale / level of impact.

Tree Constraints and Root Protection Area (RPA)

- 2.18 Below ground constraints to future development are represented by the area surrounding the tree that contains sufficient rooting volume to ensure survival of the tree, which need protecting in order for the tree to be incorporated into any future scheme, without adverse harm to the tree or structural integrity of buildings. This is referred to as the RPA and is shown as a circle of a given radius, calculated using the formula below. The circle may be modified in shape to maintain a similar total area depending on the presence of surrounding obstacles to root growth.
- 2.19 Where groups of trees have been assessed, the RPA has been shown based on the maximum sized tree in any one group and so may exceed the RPA required for many of the individual specimens within the group.
- 2.20 A RPA is equivalent to a circle with a radius 12x the stem diameter measured at 1.5 metres above ground level. For trees with more than one stem at this point the RPA is calculated using the mean stem diameter and the formulae as detailed in paragraph 4.6 of the British Standard.

3.0 RESULTS

- 3.1 A total of five individual trees and eighteen groups of trees were surveyed as part of the arboricultural assessment. Trees were surveyed as individual trees and groups / blocks of trees where examples are clearly present either as free standing specimens, or occurring in groups. Refer to Figure 2 – Tree Location, Quality and Constraints Plan (drawing no. 4355-A-02) and Appendix A – Tree Schedule for full details.
- 3.2 Specific details of the individual trees and groups of trees including heights, diameters at breast height (measured at 1.5m), crown spread in metres given as a radial measurement from the stem, age class, comments as to the overall condition at the time of inspection, British Standard category of quality and suitability for retention and the root protection distances have been tabulated in the Tree Schedule - Appendix A. The British Standard element to the assessment derives from the values assigned principally from the individual trees current condition and its contribution in terms of arboricultural quality and landscape value i.e. as being features within the local landscape and their ecological value.
- 3.3 Sub-categories (i), (ii) or (iii), in accordance with British Standard 5837:2012 have been applied in each assessment of category A, B and C trees to reflect the arboricultural, landscape and cultural values respectively.

Results Summary

- 3.4 The table below summarises the trees assessed. For details on each tree refer to the Tree Schedule – Appendix A. The surveyed tree cover has been discussed in more detail following the table.

Table 2: Summary of Trees by Retention Category

	Individual Trees	Total	Groups of Trees	Total
Category U - Unsuitable	0	0	0	0
Category A (High Quality / Value)	T5	1		0
Category B (Moderate Quality / Value)			TG8, TG9, TG9 (a), TG10, TG11,	5
Category C (Low Quality / Value)	T1, T2, T3, T4	4	TG1, TG2, TG3, TG4, TG5, TG6, TG7, TG12, TG13, TG14, TG15, TG16, TG17	13

- 3.5 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 TG1, TG3, TG6, a large part of TG13, TG14, TG15, TG16 and TG17.
- 3.6 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.
- 3.7 Other species that also occurred throughout the above areas were hawthorn *Crataegus monogyna* and common ash *Fraxinus excelsior*, all of equally small overall dimensions.
- 3.8 TG4, TG5 and T2 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. T2, part of the hedgerow was multiple leadered in form as a result of previous hedgerow management. The crown contained numerous broken branches and pieces of dead wood.
- 3.9 TG7 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.
- 3.10 TG8 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.

- 3.11 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. In particular, TG9 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*.
- 3.12 TG9a and the south easternmost part of TG13 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.
- 3.13 TG11 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.
- 3.14 TG13, including TG12 formed a concentrated belt of trees extending along the entire length of the sites southern boundary. The eastern end of the group has already been described above. The group designation also included road side 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 particular material was largely shrubby in form and multiple stemmed from ground level of small dimensions between 1 - 4m in height.
- 3.15 Individual tree T1 was an early mature English oak of approximately 6m in height positioned along the northern boundary within TG4. The specimen displayed a small number of broken branches yet otherwise showed no other obvious defects.
- 3.16 Trees T3 and T4 were hawthorn of approximately 4 and 6m in height characteristic of the species and having self set in opportunistic places.
- 3.17 T5 was a mature English oak and a prominent feature along the tree belt lining Aberderfyn Brook (TG9). The specimen was approximately 12m in height. Being typically characteristic of an open grown specimen it displayed a domed, evenly balanced form.
- 3.18 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 A.

4.0 ARBORICULTURAL IMPACT ASSESSMENT

- 4.1 The following section presents a summary of the tree survey in terms of the collective results and offers discussion of particular trees and groups recorded in the context of any proposed development in the form of an Arboricultural Implications Assessment.

Category U - Unsuitable

- 4.2 There were no trees found to be category U i.e. being those that displayed a poor structural condition or to have less than ten years safe future contribution.

Retention Category A – High Quality and Value

- 4.3 A single tree, T5 was assessed as being of high arboricultural quality and provided a high level of amenity value to be considered retention category A. Any specimen considered as being within the scope of this category's definition are carefully assessed for their inclusion. In accordance with the British Standard, category A specimens are those considered to have overall higher quality than those of category B status due to their good condition and for possessing a greater remaining life expectancy. It would be concluded that T5 demonstrates potential to contribute for a minimum of 40 years to the future amenity value of the site and therefore the retention and protection of this particular specimen in the proposals would be highly desirable.

Retention Category B – Moderate Quality and Value

- 4.4 Following the assessment five groups of trees were considered as retention category B. In accordance with the British Standard, category B specimens or groups are those considered to have overall higher quality than those of category C due to their good condition and a greater remaining life expectancy. It would be concluded that trees assigned category B status demonstrate potential to contribute for a minimum of 20 years to the future amenity value of the site and therefore the retention and protection of such specimens in the proposals would be desirable.

Retention Category C – Low Quality and Value

- 4.5 Following the assessment four of the individual trees and the remaining thirteen groups of trees were considered as retention category C. In accordance with the British Standard, category C specimens are those that would be considered as having a limited contribution in terms of their future visual amenity, 10 – 20 years, due to either their current age or the number and types of defects present.
- 4.6 Most of the category C trees present within the assessment were considered as having a low future amenity value and would only be contributing in the short term to the proposed development.

- 4.7 It would however generally be encouraged that the category C specimens be retained, where possible and suitable within the context of the proposals, to provide an instant level of maturity and continuity in tree cover. This would specifically enhance the amenity value of any proposals whilst any new replacement landscaping becomes established. Once new landscaping has become fairly established there would be justification to remove those category C specimens if required.

Arboricultural Impact Assessment (AIA)

- 4.8 The AIA has been based upon the Illustrative Masterplan (FPCR Environment and Design Limited drawing number 4355-P-05 Rev F) and seeks to outline the potential impact that the proposals would have on the existing trees. The above drawing shows the proposals to re-develop the site for mixed use including both residential and employment uses set amongst a green infrastructure. The development would require vehicle access points, and this would be in the form of a new roundabout on the Bangor Road (southern boundary) and a northerly access forged off Hafod Road. The scheme would also include a local store and children's play area. The green infrastructure being proposed is extensive and would incorporate areas of tree planting; new ponds as part of flood attenuation; retained and new public footpaths and opportunities for the creation of new habitat.
- 4.9 The arboricultural implications arising from implementing the above site layout are set out below. Clearly however, following the survey any final tree retentions will need to be reconciled with the advice contained in the report.
- 4.10 To facilitate the above plan there would be need to remove all or part of the following trees and tree groups.
- 4.11 TG1 would be removed to accommodate the residential provision. The group was 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.
- 4.12 Part of TG3 would be removed (southernmost extent), to accommodate residential provision, although it would be possible to retain a proportion of the northerly section closest to the boundary within the green infrastructure proposals. As TG1, the group was assessed as retention category C for mostly being self-seeded material and therefore its removal from the site should not raise any objection from an arboricultural perspective due to its limited value.
- 4.13 The majority of TG5 would need to be removed to accommodate further residential provision, although the western most extent would be incorporated into part of the buffer landscaping. TG5 contained hawthorn and goat willow forming the original field boundary hedgerow and therefore for its relatively low arboricultural value, was considered as retention category C. Considering on balance the scheme will be providing a high amount of new green infrastructure including hedgerows and tree planting, the loss of TG5 should not raise any significant objections.
- 4.14 TG6 will be removed to accommodate residential provision. The group consisted of once again self-seeded material and therefore for similar reasons given above, there should not be any significant objections from an arboricultural perspective to its loss.

- 4.15 A small portion of the southerly extent of TG9 would need to be removed 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.
- 4.16 In addition to the above, a small proportion of the main tree cover of TG9 would however need to be removed in order to facilitate the opening required for the proposed vehicular access point leading from the new roundabout. Despite being of category B grade, the overall impact arising from the amount of tree cover to be removed would be considered low as the majority of TG9 would be retained and new tree planting would suitably mitigate for the loss of trees. The proposals at this stage are of an illustrative nature. At the detailed design stage for the road, any tree losses for the opening would be kept to an absolute minimum to just those required for the gap itself and working room for the road corridor.
- 4.17 Similarly as for TG9, the easternmost part of TG13 would need to be removed to accommodate the employment provision as well as to facilitate the opening required for the proposed vehicular access point leading off Bangor Road. For the most part, tree cover described as TG13 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. The material towards the far eastern end of the group was of more substantial size, however is to be retained as part of the green infrastructure.
- 4.18 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.
- 4.19 Tree groupings TG14 and TG15 will be incorporated into the green infrastructure proposals. The nature of the tree cover of these particular groups of trees at present is over grown 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.
- 4.20 TG16 would also need to be removed. The group comprised is mostly hawthorn and goat willow of self-seeded nature similar to other regenerated parts of the site. If it is possible to retain small pockets of the tree cover as part of the layout at the detailed design scheme, this would be recommended. As for much of the other material to be removed across the site, TG16 was also regarded as category C and therefore loss of all or parts of if necessary should not raise any significant objection on arboricultural grounds.
- 4.21 The only individual tree to be removed would be T3, 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.

Mitigation for Tree Losses

- 4.22 Any new tree planting would need to be in harmony with the site ecology and therefore it would be recommended that planting proposals are considered in conjunction with the appointed ecologists to advise on such matters.
- 4.23 New tree planting should form an integral part of any new development and be considered at the design stages of emerging layouts. Proposals for new tree planting should be appropriate for the future use of the site and not only improve and enhance the existing tree population, but to be complementary to the local landscape character and being suited to the sites contextual surroundings.

The purpose and function of any 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. Therefore it may be necessary to seek advice from a landscape architect where required to assist with integrating structural landscaping with the built elements of the development.

- 4.24 As part of the development proposals it is recommended that any supporting landscaping scheme should seek to provide an adequate quantity of tree planting to suitably mitigate for the loss of trees required to facilitate the development. The landscaping scheme should consider providing tree planting in the following situations; new amenity planting as part of any proposed road infrastructure; private gardens; areas of incidental open space; new public parks and larger areas of open space; and structural buffer planting where appropriate.
- 4.25 Future landscaping schemes 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.
- 4.26 Careful consideration would need to be given to the following: ultimate height and canopy spread, form, habit, density of crown, potential shading effect, colour and maintenance requirements in relation to both the built form of the new development and the retained landscape features. Species choices should therefore carefully be selected to be suitable to the new environment for example using small to medium sized species in restricted spaces and larger trees where space permits i.e. in areas of open space and areas of structural landscape buffer planting.
- 4.27 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. Wherever possible, following discussions with the developer and utility company concerned, particularly on new development sites, common service trenches should be specified to minimise land take associated with underground service provision and to facilitate access for future maintenance.

Tree Management

- 4.28 Once a layout for the development has been finalised and a review of the relationship between the layout with the retained trees has been undertaken, a qualified arboriculturalist should prepare a schedule of tree works listing all the trees requiring work (making use of reference numbers), accompanied by a plan showing the location of each tree.

- 4.29 The schedule of work should make consideration of the following:
- Trees for removal to facilitate the development;
 - Remedial tree work to include those works required to establish acceptable levels of risk and management in the context of the proposed future land use i.e. category U trees to be retained by virtue of their contribution to the ecological value of a site and for objectives associated with bio-diversity;
 - Access facilitation pruning;
 - Pre-emptive root pruning
- 4.30 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 arboriculturalist or arborists to identify any potential public health and safety risks and to agree remedial works as required.
- 4.31 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.
- 4.32 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.

General Design Principles in Relation to Retained Trees

- 4.33 At the detailed design stages closer assessment of the distance of proposed development in relation to the calculated RPA of trees proposed for retention should be made and modifications to the layouts made where conflicts are excessive especially where there may be changes in ground levels across an area required as part of the proposals. Should there be areas where it is not possible to modify the layout to avoid RPAs, it would be required that consideration is given to using "no-dig" methods of construction prior to decisions being made as to remove the tree (s) concerned. This can be used particularly in the case of footways and driveways. Details of such can be made available upon request.
- 4.34 In addition, when considering layouts in relation to calculated RPAs for retained trees, an important element of detailed design would be to consider the eventual positioning of any utility services that may be required to supply the new development prior to its installation, as recommended by the guidance given in section 7.7 *Underground and above-ground utility apparatus* of BS5837 Services, where possible, should not encroach upon RPAs of retained trees. If below-ground services are proposed within or close to the calculated RPAs modifications to the alignment of service routes may need to be made to retain, where possible, the full extent of the RPA as to minimise adverse effects on root stability and overall tree-health.

- 4.35 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 / maintenance following construction and where possible should be grouped together, to minimise future disturbance to roots. If services are required within the RPA, the extent of this encroachment should be re-assessed at the time and appropriate method statements produced accordingly for any installation methods to ensure the successful incorporation of the trees without resulting in damage to roots and vice versa from the services themselves or tree roots.
- 4.36 Additionally in design, account should be taken of the foundation construction of existing and proposed nearby structures where existing and new trees are concerned. Any new planting should not compromise the structural performance of foundations. Where dwellings come into close proximity of trees, a proprietary root barrier may be required to prevent conflicts between the two and future issues relating to soil condition.

5.0 TREE PROTECTION MEASURES

- 5.1 Retained trees will be adequately protected during works ensuring that the calculated RPA 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 should 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

- 5.2 All trees retained on site will be protected by barriers or ground protection around the calculated RPA or other defined constraints and as indicated on Figure 3 of this report as prepared in accordance with section 6 and 7 of BS5837.
- 5.3 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 should be regarded as a construction exclusion zone. Fencing and barriers should not be removed or altered without prior consultation with the project arboriculturalist.
- 5.4 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.
- 5.5 Where it has been agreed, construction access may take place within the RPA if suitable ground protection measures are in place. This may comprise single scaffold boards over a compressible layer laid onto geo-textile materials for pedestrian movements. Vehicular movements over the RPA will require the calculation of expected loading and the use of proprietary protection systems.
- 5.6 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

- 5.7 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.
- 5.8 In most situations fencing should comprise a scaffold framework comprising a vertical and horizontal framework, well braced to resist impacts. For particular areas where construction activity is anticipated to be of a more intense nature higher fencing may be necessary.

Where site circumstances and the risk to retained trees do not necessitate the default level of protection an alternative will be specified. The standard fencing specification as recommended in BS5837 has been illustrated in Appendix B.

- 5.9 It may be appropriate on some sites to use temporary site offices as components of the protection barriers.

Ground Protection

- 5.10 Where it has been agreed, construction access may take place within the RPA if suitable ground protection measures are in place. Guidance on examples of appropriate ground protection for several different scenarios is provided in section 6.2.3 of BS5837. The location of and design for temporary ground protection will be shown on the tree protection plan and should be detailed as part of an Arboricultural Method Statement once planning condition is given. In all cases, the objective is to avoid compaction of the soil which can arise from a single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

Protection outside the exclusion zone

- 5.11 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.
- 5.12 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 to be a construction exclusion zone.
- 5.13 Wide or tall loads etc should not come into contact with retained trees. Banksmen should supervise transit of vehicles where they are in close proximity to retained trees.
- 5.14 Oil, bitumen, cement or other material that is potentially injurious to trees should not be stacked or discharged within 10m of a tree bole. No concrete mixing should be done within 10m of a tree. Allowance should be made for the slope of ground to prevent materials running towards the tree.
- 5.15 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.
- 5.16 Notice boards, telephone cables or other services should not be attached to any part of a retained tree.
- 5.17 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

- 5.18 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 RPA.
- 5.19 Any trees which are to be retained and whose RPAs may be affected by the development should be monitored to identify any alterations in quality with time and to assess and undertake any remedial works required as a result.

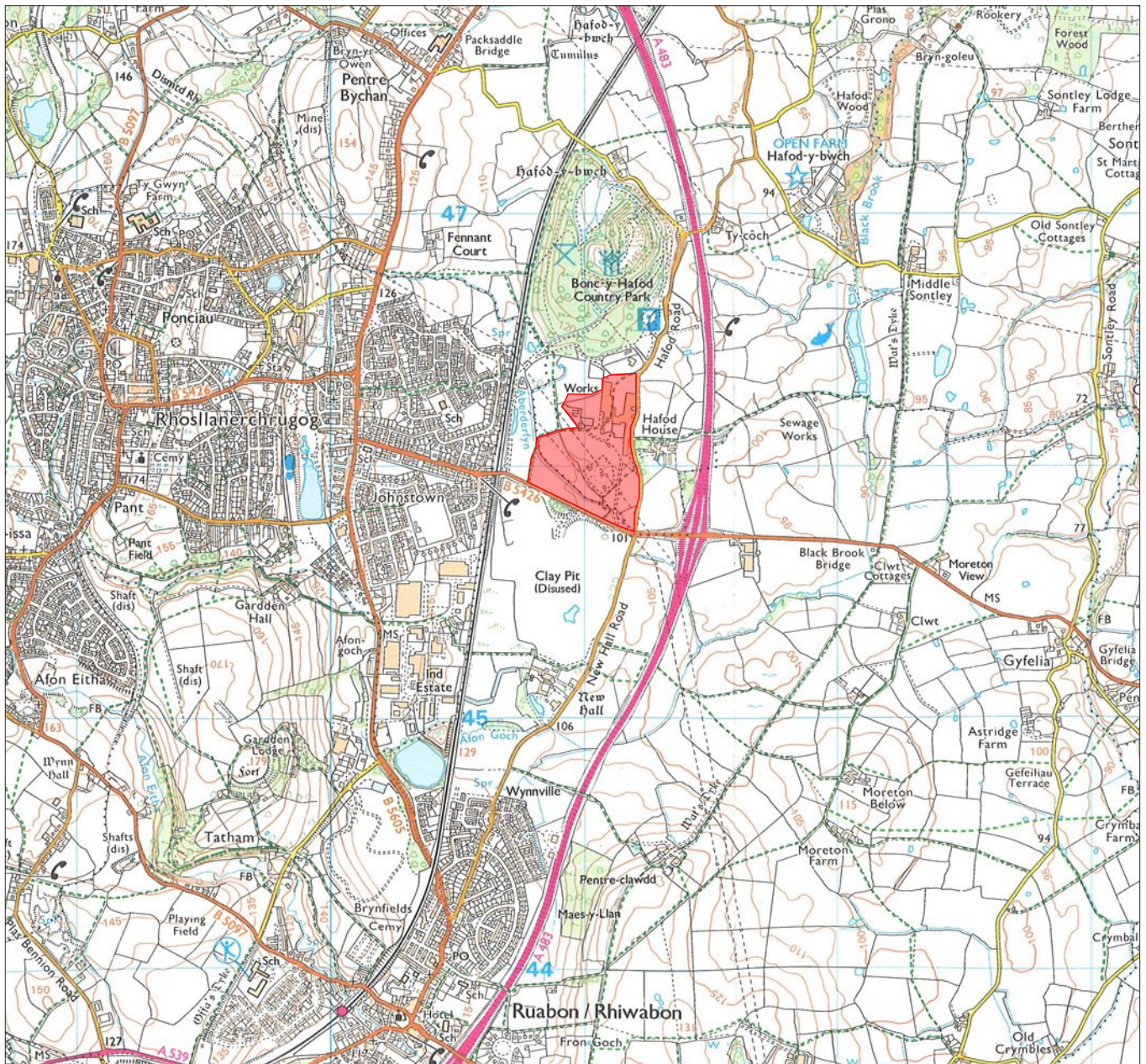
Protection for Aerial Parts of Retained Trees

- 5.20 Where it is deemed necessary to operate a wide or tall load, plant bearing booms, jibs and counterweights or other such equipment as part of the construction works it is best advised that appropriate, but limited tree surgery, be carried out beforehand to remove any obvious problem branches. 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 arboriculturalist.
- 5.21 It is strongly advised that a pre-commencement site meeting is held with contractors who are responsible for operating machinery, as described above, 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.
- 5.22 In the event of having caused any such 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 to correct the damage, upon completion of development.

6.0 CONCLUSION

- 6.1 The proposed development as per the Illustrative Masterplan has been designed to accommodate the natural features of the site and therefore would retain the main hedgerow networks and concentrations of more established mature trees. The proposals would therefore retain the vast majority of the higher quality surveyed tree cover which will include retention of the only category A tree. Tree losses to facilitate the proposals would be restricted to the lower grade material on site most of which was of self seeded origin, having naturally colonised areas of open ground over time. Such losses would be more than adequately mitigated through the delivery of the comprehensive green infrastructure of which includes extensive new tree planting. This will provide a net gain in tree cover in terms of amount and diversity of species across the site and would ultimately be of higher quality than currently present.
- 6.2 Parts of the site would be designed as open space and therefore trees would be retained for their contribution to the landscape.
- 6.3 At the detailed design stages, attention would need to be paid to the residential layouts and the juxtaposition of trees to dwellings as to ensure successful integration of the retained tree cover with the new housing areas. In some cases, of trees in close proximity to both the built element and those within the park / open spaces, tree surgery may need to be considered to address issues of dead / defective branch material in view of public safety.

- 6.4 Overall, the development would not be considered as having an adverse effect on the local tree population as losses would be minimal and restricted to low quality trees. The development would provide extensive areas of new broadleaved tree planting which would improve and enhance the current tree population thereby ensuring continuation of tree cover in the local landscape for the future.
- 6.5 The Project is considered to be arboriculturally sound in terms of reducing the conflict between the residential development element and the retained tree cover by providing good stand – off distances between the larger trees and the built elements. The existing mature trees are mostly to be retained within areas designated for their environmental/recreational value representing a minimal change from the historic growth environment.



Assessment Boundary



Gladman Developments Ltd

Bangor Road,
Johnstown, Wrexham

SITE LOCATION PLAN

1:25000 @ A4

NGJ

18.02.2013

Figure 1

4355-A-01

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J:\4300\4355\Arboriculture\Site Location Plan-Figure 1.cdr

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KEY

Category U - Unsuitable for Retention
(BS 5837:2012)

Category A - Trees of High Quality
(BS 5837:2012)

Category B - Trees of Moderate Quality
(BS 5837:2012)

Category C - Trees of Low Quality
(BS 5837:2012)

Root Protection Area
(Calculated according to BS 5837:2012 formulae)

T1

TG1

Tree Number
Tree Group Number

Group Hatching
Colour Indicates BS Category



NOTES

All dimensions to be verified on site. Do not scale this drawing. All discrepancies to be clarified with project Arboriculturalist. Drawing to be read in conjunction with Arboricultural Assessment and Appendix A - Tree Schedule .

Drawing produced in colour, a monochrome copy should not be relied upon, and is based on digital information supplied by the client in dwg format. The exact position of trees are to be checked and verified on site prior to construction.

Trees are living organisms that change over time, the condition of all trees illustrated herein, are to be checked by a qualified arboriculturalist or tree surgeon should works commence 12 months after the time of this survey. Please note that no works should be undertaken to any trees illustrated herein without first obtaining the proper authorisation to do so.

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-	11.05.2012	Draft	TJR
rev	date	description	by



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project
Bangor Road,
Johnstown, Wrexham

drawing title
TREE LOCATION, QUALITY AND
CONSTRAINTS PLAN - FIGURE 2

scale
1:2500 @ A3

drawn
TJR

date
May 2012

drawing number
4355-A-02

rev
-



KEY

Tree to be Retained

Tree to be removed to facilitate the proposals

Category U - Unsuitable for retention on arboricultural grounds

Root Protection Area
(Shown for retained trees only)

T1 (A)
TG1 (A)

Individual / Group Number and BS Category

Indicative Shade Pattern (where appropriate)

N

Scale 1:2500 @ A3

0

50

100

150m

NOTES

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-	16.07.13	First Issue	EC
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drawing title
TREE RETENTION PLAN
FIGURE 3

scale
1:2500 @ A3

drawn
EC

date
July 2013

drawing number
4355-A-03

rev
-

CAD file: J:\4300\4355\ARB\Fig 3 Tree Retention Plan Rev F 2.dwg

Appendix A

Tree Schedule

Key	Measurements	Age Class	Quality Assessment of Retention Category	RPA Radius (m) - Root Protection Area
	Crown - Crown spread measured radially from the main stem (in metres)	YNG - Young SM - Semi-mature EM - Early Mature	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 ten years.	- The RPA is given in metres as a radial measurement from the stem. - The RPA is calculated using the formulae described in paragraph 4.6.1 of British Standard 5837: 2012 'Trees in relation to design, demolition and construction - Recommendations'.
	Height - Height to the tallest point measured (in metres)	M - Mature OM - Over-mature	Category A - Trees of high quality with an estimated remaining life expectancy of at least 40 years.	
	DBH - Stem diameter measured at 1.5m above ground level (in mm)	Overall condition	Category B - Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.	
	Est - Estimated stem dia. Avg - Average stem dia. Max - Maximum stem dia. Stool - Coppice stool	G - Good F - Fair P - Poor D - Dead	Category C - Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter of below 150mm.	
			Sub-Categories: (i) - Mainly arboricultural value (ii) - Mainly landscape value (iii) - Mainly conservation value	

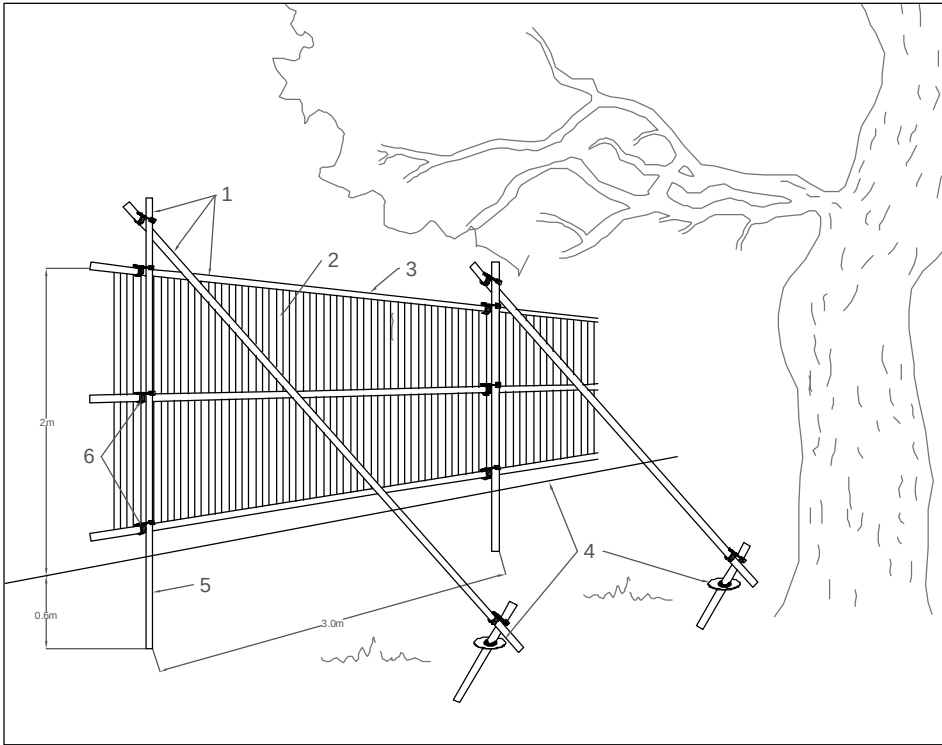
Tree No	Species	Height	DBH	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA Radius (m)	BS5837 Category
INDIVIDUAL TREES									
T1	English Oak Quercus robur	6	240	3	EM	F	Broken branches in the lower crown	2.9	C (i)
T2	Crab Apple Malus sylvestris	6	est 400	3	M	F	Multiple leadered specimen due to previous hedgerow management Broken branches and dead wood within the crown Hedgerow specimen	4.8	C (i)
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	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	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	8.9	A (ii)
GROUPS OF TREES									
TG1	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	1.2	C (ii)

Tree No	Species	Height	DBH	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA Radius (m)	BS5837 Category
TG2	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	1.8	C (ii)
TG3	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	1.8	C (ii)
TG4	4 Hawthorn Crataegus monogyna	5	est 350	3	M	P	Old boundary hedge features Dense crown forms and typically characteristic of the species All stems have been subjected to damage, evident by cavities and areas of rot / decay / dysfunction	4.2	C (ii)
TG5	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	4.2	C (ii)
TG6	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	1.8	C (ii)

Tree No	Species	Height	DBH	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA Radius (m)	BS5837 Category
TG7	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	5.4	C (ii)
TG8	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	2.4	B (ii)
TG9	Hawthorn Crataegus monogyna Common Ash Fraxinus excelsior Blackthorn Prunus spinosa Wild Cherry Prunus avium	6 to 10	max est 600	4	M	F	Group comprises trees present within a well established internal hedgerow Continuous length of hedgerow Various species present	#VALUE!	B (ii)
TG9 (a)	Common Ash Fraxinus excelsior Silver Birch Betula pendula Common Alder Alnus glutinosa	14	max 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	8.6	B (ii)
TG10	1 Common Ash Fraxinus excelsior 2 Goat Willow Salix caprea 1 Hazel Corylus avellana 3 Silver Birch Betula pendula 3 English Oak Quercus robur	10	max 500	6	EM	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	6.0	B (ii)

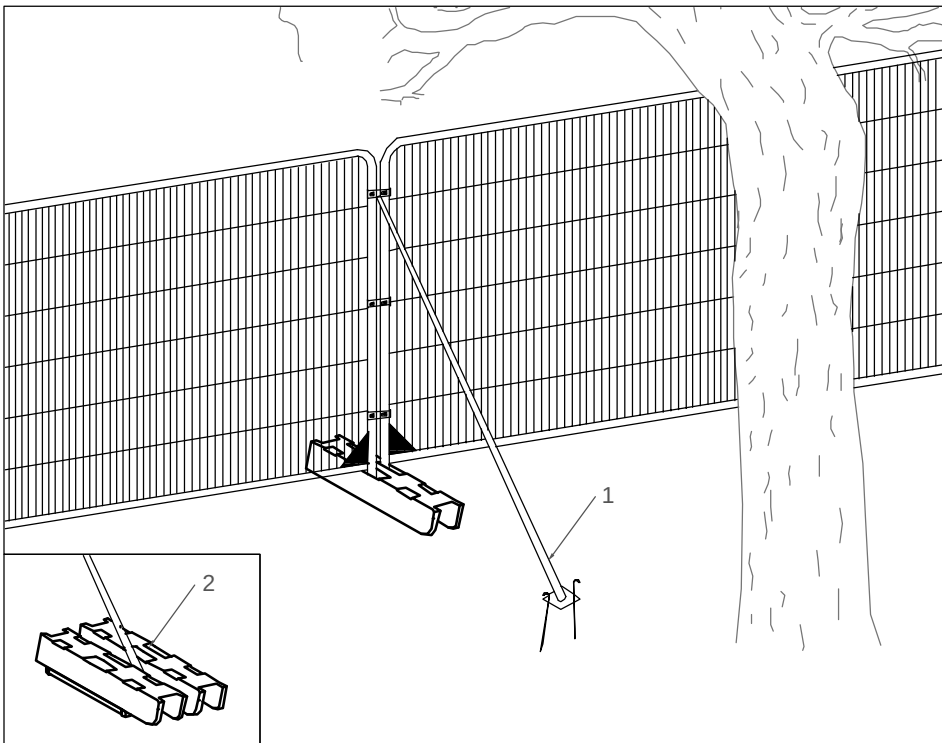
Tree No	Species	Height	DBH	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA Radius (m)	BS5837 Category
TG11	Silver Birch Betula pendula Goat Willow Salix caprea Hawthorn Crataegus monogyna English Oak Quercus robur Sycamore Acer pseudoplatanus Common Ash Fraxinus excelsior	10	max 500	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	6.0	B (ii)
TG12	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	6.0	C (ii)
TG13	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	3.6	C (ii)
TG14	Common 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	4.8	C (ii)

Tree No	Species	Height	DBH	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA Radius (m)	BS5837 Category
TG15	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	3.0	C (ii)
TG16	Goat Willow Salix caprea Hawthorn Crataegus monogyna	6	est 250	3	EM	F	Similar to TG14 and TG15 above	3.0	C (ii)
TG17	Silver Birch Betula pendula	6	est max 200	2	EM	F	Area separated for grouping due to similar species composition Mostly regeneration of silver birch Dense spacing All self-set material	2.4	C (ii)



Default specification for protective barrier

1. Standard scaffold poles
2. Heavy gauge 2m tall galvanised tube and welded mesh 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



Above ground stabilising systems

1. Stabiliser strut with base plate secured with ground pins
2. Stabiliser strut mounted on block tray

NOTES

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APPENDIX B

PROTECTIVE FENCING SPECIFICATIONS

CAD file: S:\Arb resources\Basic Templates\NEW ARB\Appendix B - Protective Fencing.dwg