

PENTIR ENERGY STORAGE

ARBORICULTURAL IMPACT ASSESSMENT



JSL5028_770
Pentir BESS
Arboricultural Impact
Assessment
V4
April 2024

REPORT

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1 EXECUTIVE SUMMARY

Scope

- 1.1 An arboricultural survey has been undertaken and this report prepared in support of a planning application for a proposed energy storage system in Pentir in the county of Gwynedd, Wales.
- 1.2 Trees were recorded, and information was gathered, to allow them to be considered using guidance contained within BS5837:2012 - *Trees in Relation to Design, Demolition and Construction – Recommendations*.
- 1.3 This assessment identifies any vegetation requiring removal, pruning and how retained trees are to be protected during the implementation of the proposals.

Findings & Recommendations

- 1.4 The principles in BS5837:2012 were used to fully assess the impacts of the Proposed Development on the trees and other vegetation.
- 1.5 A total of 22 individual trees and 14 groups of trees were recorded within the survey area. A further 29 sections of hedgerow or scrub were also recorded, as can be seen on the Tree Constraints Plan (see drawings JSL5028_700-701).
- 1.6 A woodland borders the East side of the site (G11) and this is designated as Plantation on Ancient Woodland Site (PAWS) and therefore requires consideration of its 15m buffer (in accordance with current guidance).
- 1.7 In order to facilitate the proposals, it will be necessary to partially remove one Category B group (G13), to remove 4 individual Category C trees (T18-21), one Category U tree (T17) and 3 small sections of hedgerow (S13, S21 and S23).
- 1.8 No foreseeable additional pruning works to retained trees are envisaged for this development, albeit this should be reassessed by the Site Manager prior to commencement.
- 1.9 Once the tree and hedgerow removals specified have been undertaken, there will be no need to encroach into the Root Protection Area (RPA) of any retained trees, tree groups, shrubs or hedges. By following guidance set out within this report all retained trees should be protected during the works.
- 1.10 The main requirement for tree protection throughout this development will be the installation of the 4m acoustic fence prior to any site preparation or construction activities, as this will form the bulk of the Construction Exclusion Zone (CEZ) required. Supplementary tree protection fencing will fill in any gaps where the acoustic fence is absent, as shown on the Tree Protection Plan (see drawing JSL5028_710).

2 INTRODUCTION

- 2.1 RPS were instructed in August 2023 on behalf of Lightsource bp to provide an arboricultural survey and assessment in support of a planning application to Gwynedd Council (as the 'Local Planning Authority') for the proposed energy storage system in Pentir.
- 2.2 The arboricultural survey was undertaken in accordance with BS5837:2012, as described within the *Survey Methodology* guidance attached to this report at Appendix A.
- 2.3 The purpose of the survey was to gather data on the trees present within the site and to prepare a Tree Constraints Plan (see drawings JSL5028_700-701) that could be used to assess any potential impacts of the Proposed Development.
- 2.4 The *Survey Methodology* guidance at Appendix A explains the process of interpreting the plan and how it is used during the design and impact assessment process.
- 2.5 This report has been prepared to support and expand upon the data presented on the Tree Constraints Plan, in addition to summarising the quality and condition of the tree stock present on the site. If the reader is uncertain of the meaning of any terms used within this assessment, they should refer to the Arboricultural Glossary (see Appendix F).
- 2.6 This report should be read in conjunction with the supplied Tree Constraints Plan (see drawings JSL5028_700-701) and the Tree Protection Plan (see drawing JSL5028_710) and all other relevant Tables (see Tables 1-3) and Appendices as detailed within the table of contents.
- 2.7 During the site tree survey, tree positions were plotted using an OS base map and sub metre GPS data collection device (Trimble Geo 7X). The survey was then later updated to align with a Topographical Survey drawing provided by the client. The data was then collated and presented using AutoCAD in the forms of the Tree Constraints Plan and Tree Protection Plan attached to this report.
- 2.8 The survey and this assessment were carried out by RPS Associate Director (Arboriculture) Thomas Flood who is a Chartered Arboriculturist and Professional Member of the Arboricultural Association.

Limitations

- 2.9 The survey undertaken on the site does **NOT** constitute an in-depth 'Tree Condition Survey', it has been undertaken to aid in the planning application process and has been undertaken to the standards of BS5837:2012.
- 2.10 The findings of this survey are not valid following adverse or unpredictable weather conditions or for any failure due to 'force majeure' or unpredictable events.

3 SITE INFORMATION

- 3.1 The site in which the energy storage system is proposed comprises two fields (SE field to accommodate energy storage and NW field to accommodate access track), located roughly 3 km south-east of Bangor in Wales. The closest postcode being LL56 4QE.
- 3.2 The site comprises a total area of 2.57 hectares with 1.2 hectares of that being within the fenced off energy storage facility.
- 3.3 A check to Gwynedd Council found that no individual trees or tree groups within the site are protected by any Tree Preservation Order (TPO) and there are no Conservation Areas.
- 3.4 Using the '*DataMap Wales*' website from the Welsh Government it has been confirmed that a particular area of trees recorded during the survey, the woodland with the reference G11, is deemed to fall within an area deemed to be Plantation on Ancient Woodland Site (PAWS). This is therefore subject to increased levels of protection, and this has been reflected on the Tree Constraints Plan (see drawings JSL5028_700-701).
- 3.5 The survey area covered a broader area than that of the final site location. The Tree Constraints Plan shows all trees whose data was captured during the survey whereas the Tree Protection Plan (see drawing JSL5028_710) is focused on the specific site pertinent to this application.
- 3.6 In the main, the trees on site were found to be situated around the perimeter of the sections of field covered within the survey area with the main features being three areas of woodland (one coniferous, G1, and the other two mixed deciduous and coniferous, G6 and G11). It should be noted that the only woodland bordering the site is G11 on the eastern boundary. The trees relevant to the application site comprise numerous trees growing along a central ditch where the battery storage area is required (G13, T17-21), trees around the periphery of the field (G12, T13-T16) and various hedgerow sections (S16, S19-23). A selection of photographs taken during the survey can be found at Appendix E.

4 TREE QUALITY ASSESSMENT

Retention Values

- 4.1 All trees inspected were categorised using BS5837:2012 and the attached Tree Constraints Plan (see drawings JSL5028_700-701) shows tree positions, numbers and retention categories. Trees were recorded as individuals and as groups, the data for which can be found in the attached schedules (see Tables 1 and 2). Further information on the survey methodology can be found at Appendix A.
- 4.2 Trees have been surveyed as groups where they can be considered as forming a group as they form cohesive features either aerodynamically (i.e. they form a discrete group feature providing companion), culturally (i.e. they are composed of trees of a similar size, age and species subject to the same management) or visually (i.e. where the value of the trees within the group is as a whole rather than individually).
- 4.3 Where trees have been surveyed as groups the details recorded with respect to condition and retention value intend to represent an average tree within the group; however, on occasion, it must be noted that there will be exceptions within any group that do not conform to the typical character of that group.
- 4.4 The initial stage of a tree survey in accordance to BS5837:2012 looks at the trees on the site in terms of their quality, life expectancy and condition. Trees are then categorised according to their retention value (see Appendix B – BS5837 Cascade Chart for Tree Quality Assessment).
- 4.5 **Category A** trees are those that have been assessed as being of a high quality and value; significant amendments to the Proposed Development should be considered in preference to their removal. These trees are shown in Green on the Tree Constraints Plan.
- 4.6 **Category B** trees are those that have been assessed as being of a moderate quality and value; amendments to the Proposed Development should be considered in preference to their removal. These trees are shown in Blue on the Tree Constraints Plan.
- 4.7 **Category C** trees are those that have been assessed as being of a low quality and value; the loss of these specimens should not be considered as a constraint to development. These trees are shown in Grey on the Tree Constraints Plan
- 4.8 **Category U** trees are those that have been assessed as being in poor condition and having no retention value; these trees should not be a material consideration in the planning process. These trees are shown in Red on the Tree Constraints Plan.
- 4.9 A total of 22 individual trees and 14 groups of trees were recorded within the requested survey area.
- 4.10 The distribution of individual tree retention categories are as follows: 6 Category B; 14 Category C and 2 Category U.

- 4.11 The distribution of tree group retention categories are as follows: 3 Category A; 3 Category B and 8 Category C.

Physiological Condition

- 4.12 Trees considered to be in a good physiological condition are those with crown density and shoot extension growth levels within the expected ranges for their age and species. Generally, these trees, subject to being of a suitable structural condition, can be expected to make a lasting contribution to the site. Additionally, trees within the good condition class are likely to tolerate changes within their growing environment that occur as a result of development; as such their successful retention will be easier to achieve.
- 4.13 Trees considered to be in a fair physiological condition are those specimens exhibiting lower shoot extension growth and reduced crown density than would typically be expected. These specimens have a lower life expectancy than those within the good condition class and will not tolerate significant changes as a result of development as well as those in the good condition class.
- 4.14 Trees considered to be in a poor physiological condition are those exhibiting crown and shoot dieback and significantly reduced crown density. Trees of a poor physiological condition are not likely to make a lasting contribution to the site and whilst their retention in the short term may be beneficial such retention will only be achievable if the trees are fully protected throughout development as they will not tolerate changes in their growing environment.
- 4.15 The distribution of physiological condition across the 22 individual trees was: **11 'good', 10 'fair' and 1 'poor'**.
- 4.16 The distribution of physiological condition across the 19 tree groups was: **6 'good' and 8 'fair'**.

Structural Condition

- 4.17 There were great variations in the structural condition of the trees surveyed; however, tree condition is often largely consistent with expectations for the age, management and species of a tree.
- 4.18 The majority of structural defects that were noted across most of the tree stock on the site, such as minor deadwood in tree crowns, were not considered significant and are unlikely to result in the premature failure of the tree.

Age Distribution

- 4.19 Trees assessed as being young (Y) in age are those considered to be less than 10 years old. These trees can generally be considered to have the potential for rapid and significant future growth. Whilst these specimens are not likely to make a substantial contribution to the landscape character of the site at present they will, if retained, provide succession for the eventual removal of mature or over-mature trees as a result of declining physiological or structural condition.
- 4.20 Trees assessed as being semi-mature (SM) are those of more than 10 years old but having attained less than 40% of the maximum lifespan expected for the species. These trees will generally make

some contribution to the current landscape character and appearance of the site and their retention will provide a more immediate succession of mature trees. As with young trees these specimens will have the potential for rapid and significant future growth.

- 4.21 Early-mature trees (EM) are those considered to have reached between 40% and 70% of their ultimate life expectancy. These trees are generally not considered to have a significant potential for future growth though they will increase in size at a slower rate than young and semi-mature trees.
- 4.22 Mature trees (M) are those considered to have reached between 70% and 100% of their species life expectancy. These trees will have little future growth potential and they have generally reached their maximum expected size for the location. These trees will generally make the highest contribution to the landscape character of the site at this time; however, a tree stock over dominated by mature trees will require careful management to ensure that a continuation of canopy cover can be achieved.
- 4.23 Over-mature trees (OM) are those considered to have existed for longer than typical of their species. They do not have the potential to increase in size and may in fact reduce in size as their crowns begin to break up. These trees will often make a significant contribution to the landscape character of the site and are likely to have ecological value. However, the retention of these trees within new development must be carefully planned as they are approaching the end of their useful life expectancy and they will often have structural defects. Where over-mature trees are to be retained in new development it is essential that access is available for their eventual removal.
- 4.24 Veteran trees (V) are those that show features of biological, cultural or aesthetic value that are characteristic of an individual surviving beyond the typical age range for the species. These trees have negligible potential to increase in size. Veteran trees are usually of a high ecological value and they will require sensitive management where they are to be retained in new development. As such it is again essential that they are located in areas where access is available to undertake management operations and where there is a reduced risk of harm occurring from failure of the trees.
- 4.25 The distribution of age classes recorded in the 22 individual trees present is: **10 young, 7 semi-mature, 4 early mature and 1 mature.**
- 4.26 The 19 tree groups recorded had maximum age class distribution of: **6 young, 2 semi-mature, 3 early mature and 3 mature.**

Species

- 4.27 A list of the tree and shrub species recorded during the survey are listed below. Please see the survey schedules (Tables 1-3) and Tree Constraints Plan (see drawings JSL5028_700-701) for more information on where these species are distributed within the survey area:

BOTANICAL NAME*Acer pseudoplatanus**Alnus glutinosa**Betula pendula**Betula pubescens**Corylus avellana**Crataegus monogyna**Fraxinus excelsior**Larix decidua**Picea sitchensis**Pinus sylvestris**Prunus spinosa**Quercus cerris**Quercus petraea**Rosa canina**Salix caprea**Sorbus aucuparia**Ulex europaeus***COMMON NAME**

Sycamore

Common alder

Silver birch

Downy birch

Hazel

Hawthorn

Common Ash

European larch

Sitka spruce

Scots pine

Blackthorn

Turkey oak

Sessile Oak

Dog rose

Goat Willow

Rowan

Gorse

5 CONSTRUCTION REQUIREMENTS

- 5.1 The Proposed Development is for an energy storage project. The Proposed Development will consist of an ESS (Energy Storage System) and all ancillary infrastructure and associated works. It will also include landscaping and ecological enhancement areas. The energy storage project will have a storage capacity of 57MWac.
- 5.2 The ESS will comprise batteries, Heating Ventilation and Air Conditioning (HVAC) units, a combined Power Conversion System (PCS), transformer units, a BESS Intake/customer substation, and associated electrical infrastructure. The Proposed Development will comprise the following components:
- 26 x Battery Blocks (each comprised of 4x BESS Enclosures),
 - 5 x Twin MV Skid (each comprised of 2 x Power conversion systems and 1 x MV transformer),
 - 3 x Single MV Skid (each comprised of 1 x Power conversion systems and 1 x MV transformer),
 - 1 x Monitoring House,
 - 1 x Backup Generator,
 - 1 x BESS Intake Substation,
 - 1 x Transformer,
 - 1 x GRP,
 - 3 x Spares containers (1 x 20-foot, 2 x 40-foot), and
 - 10 x CCTV cameras mounted on posts.
- 5.3 There will be security fencing around the BESS compound which will function to restrict unauthorised access into the compound and to deter theft or vandalism. Fencing is typically welded mesh with metal posts, combined with CCTV at approximately 2.5-3.0m high.
- 5.4 There will be one access/egress point to the site via the proposed track off Pennant Fodolydd Lane to the west. This will extend across a field border in a south-east direction before entering the main body of the site.
- 5.5 The construction process will need to be monitored during its progress and this Arboricultural Impact Assessment should be used as the document provided to guide the construction process.
- 5.6 Reference to this document should form part of any method statement regarding the proposed construction works. This will show an understanding of the issues and actions required to protect the trees. Areas of machinery exclusion have been shown on the Tree Protection Plan (see drawing JSL5028_710) to help in the production of these statements.

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- 5.7 Throughout the construction process the AIA will be used to guide the process and inform the Risk Assessment Method Statements ensuring that the Health and Safety of the personnel undertaking the construction activities are controlled and appropriate for the specific nature of each phase of the works.'
- 5.8 The following sections detail the below and above ground constraints concerning trees that will be encountered during the development.

6 ARBORICULTURAL IMPACT ASSESSMENT

Introduction

- 6.1 The construction process will need to be monitored during its progress and this Arboricultural Impact Assessment should be used as the document provided to guide the construction process.
- 6.2 Trees have finite energy reserves, developed each year throughout the growing season, which are utilised for biological processes such as growth and defence against pests or diseases throughout the following year.
- 6.3 Any development in proximity to trees has the potential to cause harm to those trees unless control measures are identified and acted upon; as such it is essential to consider the relationship between the Proposed Development and the retained trees to identify what precautions are necessary, proportionate and appropriate.
- 6.4 Development has the potential to impact upon the above ground and below ground parts of trees.
- 6.5 Whilst some damage that can occur, such as physical damage to the trees stems and branches from machinery movements, is clearly visible the impact from other aspects of work common on development sites which can have a significant effect upon the continued health of trees are not always immediately evident.
- 6.6 Damage that is not immediately evident, but which can cause long term harm to retained trees includes things such as damage to the soil structure by compaction causing root damage and levels changes altering the water table and affecting moisture availability.
- 6.7 To minimise the potential for harm to occur to retained trees all works should be carried out with regard to the Tree Protection Measures detailed within this report.
- 6.8 In general, it can be seen that, by adopting appropriate methods of working, precautionary and protective measures, significant harm to retained trees can be avoided.
- 6.9 In particular the establishment of a Construction Exclusion Zone (CEZ) by erection of Tree Protection Fencing will minimise the potential for harm to occur to retained trees.

Tree Removal

- 6.10 In order to facilitate the development proposals, there will be a requirement to remove certain trees within the site. The required removals are listed below:

Category B

Partial removal of group G13 (amounts to approximately half)

Category C

4 individual trees (T18-21)

Category U

1 individual tree (T17)

Scrub / Shrub Areas

Removal of 3 small sections of hedgerow (S13, S21 and S23)

- 6.11 Approximately half of the Category B group G13 will require removal to facilitate the Proposed Development, however it can be noted here that the northern half of the group (that which requires removal) are less valuable to those in the southern half, albeit part of the same group.
- 6.12 The loss of Category C trees are generally not to be considered a significant constraint to development, certainly where in small numbers, as is the case here. The loss of a Category U tree is inconsequential due to Category U trees being in poor condition (or dead) and therefore they would likely need to be removed in the near future anyway.
- 6.13 The areas of hedgerow to be removed are small and of little consequence as far as arboriculture is concerned, albeit they may provide some degree of habitat / connectivity value.
- 6.14 There will be some new planting within the site and this should offset the tree removals referred to above.
- 6.15 The above removals can be seen in red on the Tree Protection Plan whereas retained trees and hedgerows are shown in green (see drawing JSL5028_710).

Arboricultural Implications

- 6.16 To ensure that the trees can be successfully integrated within the Proposed Development the following factors have been considered or require consideration.

Root Protection Areas (RPA)

- 6.17 Root Protection Areas (RPA) for each tree surveyed have been determined in accordance with BS5837:2012 Section 4.6 Root Protection Area in the Standard and a schedule of RPA is attached to this report as Table 2.
- 6.18 Initial RPA for the trees were plotted onto the Tree Constraints Plan (see drawings JSL5028_700-701) and has been used to produce all relevant tree plans in this statement.
- 6.19 Areas where trees are located on site have been identified and the RPA information of these trees has been used in the design of the tree protection.
- 6.20 Following the removal of the specified trees and hedge sections, the vast majority of works will be undertaken outside of the RPA of all retained trees, groups, shrubs and hedgerows.
- 6.21 For the construction of the perimeter acoustic fence around the battery storage facility, it is assumed (and recommended) that this be installed **prior** to any site preparation and construction

activities on site as it will act as the primary Construction Exclusion Zone (CEZ). This will hence provide the main protective measure for protection of trees and their RPA during the development.

- 6.22 In the limited area where the access track will enter the field containing the energy storage facility there is no acoustic fence proposed and therefore this will be supplemented by secondary fencing (e.g. Heras style). This will ensure that exposed areas of retained hedge are protected during the installation of the track and throughout its subsequent use during construction. The locations of both primary and secondary CEZ can be seen on the Tree Protection Plan (see drawing JSL5028_710).

Existing Canopy Spreads

- 6.23 Where the RPA for retained trees do not extend to the edge of existing canopy spreads, it is possible that those parts of the trees extending beyond the RPA fencing may sustain damage during construction.
- 6.24 A preliminary assessment has been carried out regarding the requirement to prune any retained trees on site. This has been done by cross referencing potential conflict between tree canopies and site works shown on the Tree Protection Plan with the recorded canopy heights for the trees. It can be seen that there should be little requirement (if any) to prune retained tree canopies to facilitate the development proposals.
- 6.25 All pruning requirements should, however, be checked prior to the implementation of the development to ensure that there remains suitable clearance from the erection of all site security (primary) fencing and the Heras-style fencing (secondary) shown on the Tree Protection Plan (see drawing JSL5028_710) as well as the proposed construction works.

Level Changes

- 6.26 Trees can be profoundly impacted by changes to ground levels within their RPA, both cutting and filling, and this is a factor that has been considered in this assessment and would be mitigated for through the retention of existing ground levels within RPA.
- 6.27 It is therefore a requirement that no earthworks be undertaken within the CEZ as indicated on the Tree Protection Plan (see drawing JSL5028_710). It is considered that this will be feasible given the nature of the development and the positioning of the majority of trees to the boundary of the site.
- 6.28 Should, for any reason, development plans change and there becomes a need to adjust levels within any RPA then it would require further assessment by the Arboricultural Consultant as to the likely impacts this would have on retained trees.

Connections

- 6.29 The grid connection is not forming part of this application and will be subject to a separate application.
- 6.30 It is considered at this stage that any future proposals for grid connections will take account of trees and their RPA and should allow for working methods that will minimise damage to trees. For

example, reference to documents such as NJUG Volume 4 - Guidelines for the planning, installation and maintenance of drainage in proximity to trees. (National Joint Utilities Group 2007) may be suitable.

Planning of Site Operations

- 6.31 Planning of site operations will take sufficient account of trees to ensure that no access and movement of material into and around the site impact on trees. Consequently, any movement of plant or materials in proximity to trees will be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is always maintained.
- 6.32 All materials or fluids will not be stored within or near the RPA of retained trees, particularly those whose accidental spillage would cause contamination and damage to a tree. Fluids must be handled well away from the outer edge of the RPA of trees.
- 6.33 Correct planning of access routes and storage areas prior to start on site will ensure no impacts from these activities will occur. It is considered that there should be ample space away from trees for purposes of storage.

7 PRE-DEVELOPMENT WORKS

Tree Removal

- 7.1 In order to facilitate the proposals contained within this assessment, it will be necessary to partially remove one Category B group (G13), to remove 4 individual Category C trees (T18-21), one Category U tree (T17) and 3 small sections of hedgerow (S13, S21 and S23).
- 7.2 All of these removals can be seen in red on the Tree Protection Plan (see drawing JSL5028_710).

Tree Pruning

- 7.3 There are currently no foreseeable conflicts with retained tree canopies from this development.
- 7.4 However, requirement for pruning works should be reassessed prior to the development commencing and in the event that any minor tree works are required, these can follow the following guidance. If for whatever reason more significant pruning works are required, this should be assessed by the Arboricultural Consultant.

Standard of Work

- 7.5 All tree works should be carried out in accordance with BS3998:2010 Tree Work - Recommendations and latest arboricultural best practice.
- 7.6 All tree work should be carried out by suitably qualified, competent and insured arboricultural contractors.
- 7.7 All green and woody waste generated by the tree works shall be removed from site and disposed of in an environmentally sustainable manner.
- 7.8 Burning of green waste is not an applicable form of disposal.

Timing of Works

- 7.9 All tree works shall be completed prior to commencement of any construction works on the site. All works shall be timed to have regard to the phenological cycles of protected species that are associated with trees; notably birds and bats.

Tree Protection Barriers

- 7.10 The acoustic fence proposed (see drawing JSL5028_710) will form the primary means of tree protection fencing and will be supplemented by Heras style fencing where necessary. These should be erected to the position shown on the Tree Protection Plan (see drawing JSL5028_710) during the pre-development periods. It is therefore imperative that the site acoustic fence is installed prior to any site preparation / construction works.

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- 7.11 To ensure successful tree protection during this process, all operatives should be briefed on the need to pay full regard to existing trees and all operations adjacent to trees should be properly supervised. This will ensure the works will not adversely affect the trees.
- 7.12 Once the protective barriers are in place they must remain in situ throughout the course of the development until the completion of all works associated with that section of the site.
- 7.13 Copies of the Tree Protection Plan (see drawing JSL5028_710) shall be placed in the site office for reference by all site staff.
- 7.14 The secondary supplementary protective fencing barrier is to be constructed in accordance with the specification detailed at Appendix C.
- 7.15 Signs detailing the purpose of the protective fencing shall be attached to the fencing at 10m intervals. Such signs should be weatherproof and shall be substantially in the form of the specimen provided at Appendix D. Signs must be replaced as necessary should they be removed or become illegible.
- 7.16 Following erection of the protective fencing and prior to commencement of the development it is recommended that an inspection of the site is arranged to confirm fencing has been installed in accordance with the Tree Protection Plan and any relevant conditions that may be attached to a grant of planning consent for the development.

8 CONSTRUCTION WORKS

Construction Exclusion Zone

- 8.1 The Construction Exclusion Zone (CEZ), as defined by the acoustic fence position **and** supplementary Heras style fencing, shall be regarded as sacrosanct, and the supplementary protective fencing shall not be moved or taken down at any time until such a point as it becomes superfluous.
- 8.2 Within the CEZ there must be no mechanical digging or scraping, no alteration to existing ground levels including soil stripping, no earthworks, no handling or discharge of any chemical substance, concrete washings or of any fuels.
- 8.3 Furthermore, vehicular or pedestrian access and the storage of any materials is prohibited within the CEZ.
- 8.4 Additionally, no materials that may contaminate the soil such as concrete mixings, diesel oil and vehicle washings shall be discharged within 10m of the stem of any tree and no fires shall be lit within 10m of the maximum extent of a trees crown.

Site Compounds and Materials Stores

- 8.5 Activities related to the establishment of a temporary site compound have the potential to impact upon retained trees by various means. In particular the storage and mixing of chemicals and materials such as concrete can have a damaging effect on tree health if precautions are not taken.
- 8.6 To prevent harm occurring to trees provision for materials storage, site offices, deliveries and other related activities should be made available in areas away from retained trees.
- 8.7 The offices, parking of site and contractor vehicles, along with secure storage will be provided in an area away from retained trees and this area will be directly controlled by the Site Manager. If the Site Manager is unsure as to the best place to locate these facilities, then advice should be sought from the Arboricultural Consultant prior to mobilising.
- 8.8 While the avoidance of any RPA during this must be considered of paramount importance, it is also the case that the 15m Ancient Woodland buffer zone (as shown on all drawings associated with this report) must be avoided.

Monitoring

- 8.9 Following installation of all fencing measures prior to commencement of the construction phase, an inspection of the site by either the Council's Tree Officer or the Arboricultural Consultant should be arranged to confirm fencing has been installed in accordance with the Tree Protection Plan (see drawing JSL5028_710).

Reporting

- 8.10 During the construction phase of the development, the Site Manager will be responsible for liaising with the Council Tree Officer on all arboricultural issues. Should any arboricultural issues become apparent during the works the Site Manager should immediately contact the appointed Arboricultural Consultant or the Council's Tree Officer for advice upon how to proceed.

Tables

TABLE 1: TREE DATA SCHEDULE

TABLE 2: GROUP DATA SCHEDULE

TABLE 3: SCRUB, SHRUB & HEDGE SCHEDULE

Key to Inspection Report Form

Species	Genus and variety
Height	Measured Clinometer Reading or Estimated Height in Metres
Girth (dbh @ 1.5m)	Diameter measured in cms, or estimated, where multi stemmed below 1.5m the diameter is taken as that just above the root flare
Spread (m)	Canopy height estimated in metres above ground level
Canopy height (m)	Crown Spread, radius estimated in metres
Physiological Condition	Good, Fair, Poor, Dead
Age Class	Y – Young MA – Maturing (Middle Aged) M – Mature OM - Over mature V – Veteran
Useful Life Expectancy (years)	10, 10-20, 20-40, 40+
BS Categorization	See Cascade Appendices 2

Table 1: Individual Tree Schedule

Tree No.	Species	Diameter (mm)*	Height	Crown Spread				Crown Height	First Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
				N	S	E	W								
T1	Quercus petraea (Sessile oak)	245	5	1	2.5	3	2.5	0.5	South	0	SM	Fair	10-20	Epicormics growth on stem & crown. Hanging branches in the crown. Twin stemmed oak. Heavily flailed on north side.	C2
T2	Salix caprea (Goat willow)	170	8	3.5	1.5	3	2.5	2	NW	2.5	SM	Fair	10-20	Stem cavity of majorextent. Deadwood in the crown of minor extent. Hazard beam noted in limbs. Tree has no long term potential.	C1
T3	Salix caprea (Goat willow)	150	7	3.5	1	3	1.5	2	NE	0.5	Y	Fair	10-20	Heavily suppressed crown. Bifurcated stem formed at 1metres.	C1
T4	Quercus cerris (Turkey oak)	400	13	6	6	7	2	3	North	3	EM	Good	20-40	Trifurcated stem formed at 3.5 metres. Deadwood in the crown of minor extent. Restricted inspection due to access and vegetation. Located off site. Growing on edge of plantation with on-site ditch on east side.	B2
T5	Quercus cerris (Turkey oak)	320	12	3	3	4	2	3	North	2	EM	Good	20-40	Bifurcated stem formed at 2metres. Restricted inspection due to access and vegetation. Growing on edge of plantation with on-site ditch on east side.	B2
T6	Alnus glutinosa (Common alder)	110	8	2	1.5	2	1.5	2	SW	0.5	Y	Good	10-20	Deadwood in the crown of minor extent. Young self seeded alder growing adjacent ditch.	C1
T7	Quercus petraea (Sessile oak)	230	9	1	3	3	3	2	East	2	SM	Good	20-40	Oak growing atop hedge bank. Bark damage to stem but mostly occluded.	B1
T8	Crataegus monogyna (Hawthorn)	160	5	0.5	1	2.5	3	1.5	East	1.5	Y	Fair	10-20	Heavily suppressed crown. Restricted inspection due to ivy. Twin stemmed hawthorn on hedge bank.	C2
T9	Betula pendula (Silver birch)	150	7	2	2	2	2	2	South	1	Y	Good	10-20	Young birch.	C1
T10	Salix caprea (Goat willow)	260	5	4	2	4	5	0	North	0	SM	Good	10-20	Epicormics growth on base. Included main stem union. Hanging branches in the crown. Multi stemmed willow.	C2
T11	Salix caprea (Goat willow)	150	4	2.5	1	2	2	1.5	North	0	Y	Fair	10-20	Multi stemmed willow.	C2
T12	Salix caprea (Goat willow)	240	5	3	1.5	2.5	3	0	NE	2	SM	Fair	<10	Restricted inspection due to vegetation. Severe bark damage to stem. Fractured hung up stem.	U
T13	Betula pendula (Silver birch)	215	7	3	1.5	3.5	1.5	1.5	NE	1.5	SM	Good	10-20	Restricted inspection due to vegetation. Multi stemmed birch on field boundary.	C2

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Tree No.	Species	Diameter (mm)*	Height	Crown Spread				Crown Height	First Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
				N	S	E	W								
T14	Quercus petraea (Sessile oak)	540	7	6	4.5	5	4	2	South	2	M	Good	20-40	Stem cavity of moderate extent. Deadwood in the crown of minor extent. Stunted form.	B1
T15	Betula pubescens (Downy birch)	390	8	6	3	2.5	4.5	2	SE	2	EM	Good	20-40	Deadwood in the crown of minor extent. Bark damage to scaffold limbs but remains viable tree.	B1
T16	Alnus glutinosa (Common alder)	270	9	3	0	3	2	2	North	2	EM	Fair	20-40	Asymmetric formed crown. Deadwood in the crown of minor extent.	B2
T17	Salix caprea (Goat willow)	110	3	2	0	2	1	1.5	NE	1	Y	Poor	<10	Deadwood in the crown of moderate extent. Previous branch failures noted. General poor form to tree. Tree has no long term potential. Leans north.	U
T18	Salix caprea (Goat willow)	135	4	3	0	2.5	1.5	2	NE	0.5	Y	Fair	10-20	Deadwood in the crown of minor extent. Leans north.	C2
T19	Betula pendula (Silver birch)	185	7	2.5	1	2	2	2.5	SE	2	SM	Good	10-20	Deadwood in the crown of minor extent. Twin stemmed birch. Ditch on east side.	C2
T20	Betula pendula (Silver birch)	90	4	2	0	1.5	0.5	2	NE	2.5	Y	Fair	10-20	Heavily suppressed crown. Hanging branches in the crown. Previous branch failures noted. Ditch on east side.	C2
T21	Betula pendula (Silver birch)	150	5	2	1	1.5	2	2.5	SW	1	Y	Fair	10-20	Bark damage. Deadwood in the crown of minor extent. Ditch on west side.	C2
T22	Quercus petraea (Sessile oak)	90	3	2	1	1.5	1.5	2	East	1.5	Y	Good	10-20	Epicormics growth on stem. Young oak.	C1

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied



Table 2: Tree Group Schedule

Group No.	Species	Average Height (m)	Min/Max DBH (mm)	Average Crown Spread	Ave. Crown Height	Max. Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
G1	Picea sitchensis (Sitka spruce)	20	150 400	4	2	M	Good	40+	Sitka spruce plantation. Heavily suppressed form. Deadwood present of minor extent. Previous branch failure. Off site tree group. Restricted inspection due to no access.	A2
G2	Quercus petraea (Sessile oak) Sorbus aucuparia (Rowan)	7	100 150	2	3.5	Y	Fair	10-20	Predominantly young oak group. Flailed on north side. Deadwood present of minor extent. Hanging branches. Pruning wounds present.	C2
G3	Betula spp. (Birch species) Crataegus monogyna (Hawthorn)	7	50 120	1.5	2	Y	Good	10-20	Area of young self-seeded birch and willow, occasional hawthorn. Heavily suppressed form. Deadwood present of minor extent. Restricted inspection due to vegetation. Group of general poor form.	C2
G4	Betula spp. (Birch species) Alnus glutinosa (Common alder)	8	100 230	2.5	2	SM	Fair	10-20	Area of young self seeded birch and willow. Bark damage to some trees from animal browsing. Heavily suppressed form. Deadwood present of minor extent. Group of general poor form.	C2
G5	Betula spp. (Birch species)	8	100 170	2.5	2	Y	Fair	10-20	Area of young self seeded birch and willow. Heavily suppressed form. Group of general poor form.	C2
G6	Larix decidua (European larch) Acer pseudoplatanus (Sycamore) Quercus spp. (Oak species)	18	150 380	6	3	M	Good	40+	Mixed deciduous and conifer woodland. Substantial ditch on west side within site, likely to have restricting root encroachment into site. Deadwood present of moderate extent. Restricted inspection due to no access.	A2
G7	Alnus glutinosa (Common alder)	8	100 150	2	2	Y	Fair	10-20	3 x young alder group in bramble. Restricted inspection due to vegetation.	C2
G8	Salix caprea (Goat willow)	8	80 170	3	1.5	Y	Fair	10-20	Low quality young self seeded willow growing along ditch. Bark damaged.	C2

Group No.	Species		Average Height (m)	Min/Max DBH (mm)	Average Crown Spread	Ave. Crown Height	Max. Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
G9	Salix caprea (Goat willow)	Betula pendula (Silver birch)	8	80 100	2	2	Y	Fair	10-20	Low quality young self seeded willow/birch growing adjacent field boundary. Bark damage to some trees. Heavily suppressed form. Deadwood present of minor extent. Previous branch failure. Restricted inspection due to vegetation.	C2
G10	Salix caprea (Goat willow)	Betula pendula (Silver birch)	6	100 230	3	0.5	SM	Fair	10-20	Mixed self seeded willow and birch group. Heavily suppressed form. Deadwood present of minor extent. Previous branch failure. Restricted inspection due to vegetation.	C2
G11	Acer pseudoplatanus (Sycamore) Fraxinus excelsior (Ash) Pinus sylvestris (Scots pine)	Betula pubescens (Downy birch) Larix decidua (European larch) Quercus spp. (Oak species)	18	150 380	7	2.5	M	Good	40+	Mixed deciduous and conifer woodland. Substantial ditch on north side within site, likely to have restricted root encroachment into site. Heavily suppressed form. Deadwood present of moderate extent. Restricted inspection due to no access.	A2
G12	Salix caprea (Goat willow) Quercus petraea (Sessile oak) Acer pseudoplatanus (Sycamore)	Betula pubescens (Downy birch) Alnus glutinosa (Common alder)	8	150 300	5	1.5	EM	Fair	20-40	Mixed deciduous group outside field boundary with ditch to south. Deadwood present of moderate extent. Hanging branches. Previous branch failure. Off site tree group. Restricted inspection due to no access.	B2
G13	Salix caprea (Goat willow) Alnus glutinosa (Common alder)	Quercus petraea (Sessile oak) Betula pendula (Silver birch)	10	100 300	5	2	EM	Good	20-40	Row of mixed deciduous trees growing either side of ditch. Heavily suppressed form. Deadwood present of moderate extent. Hanging branches. Previous branch failure. Restricted inspection due to vegetation.	B2
G14	Betula pendula (Silver birch) Corylus avellana (Hazel) Salix caprea (Goat willow)	Acer pseudoplatanus (Sycamore) Quercus petraea (Sessile oak) Crataegus monogyna (Hawthorn)	11	100 200	4.5	3.5	EM	Good	20-40	Mixed roadside deciduous group. Heavily suppressed form. Deadwood present of minor extent. Pruning wounds present. Restricted inspection due to no access.	B2

Table 3: Shrubs and Scrub Schedule

Section No.	Species	Height (m)	Comments
S1	Ulex europeus (Gorse)	2.5	Hedgerow section comprising Gorse.
S2	Salix caprea (Goat willow) Betula pendula (Silver birch)	8	Young self-seeded birch and willow alongside field boundary.
S3	Salix caprea (Goat willow)	2.5	Fallen live willow stem.
S4	Betula spp. (Birch species) Salix caprea (Goat willow)	2	New self-seeded birch and willow growth.
S5	Salix caprea (Goat willow)	3.5	Thicket of young willow stems.
S6	Salix caprea (Goat willow)	3.5	Thicket of young willow stems.
S7	Salix caprea (Goat willow) Betula pendula (Silver birch)	3.5	Thicket of young willow/birch stems.
S8	Salix caprea (Goat willow)	2.5	Thicket of young willow stems.
S9	Betula pendula (Silver birch)	4	Young self seeded birch.
S10	Salix caprea (Goat willow)	4.0	Young self seeded willow.
S11	Betula spp. (Birch species) Salix caprea (Goat willow)	2.0	New self-seeded birch and willow growth.
S12	Salix caprea (Goat willow)	5	Area of young self-seeded willow growth.
S13	Salix caprea (Goat willow) Ulex europeus (Gorse)	4	Hedgerow section. Gaps in places and predominantly willow.
S14	Salix caprea (Goat willow)	4.0	Mass of young self seeded willow stems.
S15	Salix caprea (Goat willow)	4.0	Mass of young self seeded willow stems.
S16	Salix caprea (Goat willow) Crataegus monogyna (Hawthorn)	4.0	Hedgerow section. Gaps in places and predominantly willow.
S17	Salix caprea (Goat willow)	4	Mass of young self seeded willow stems in waterlogged area.
S18	Crataegus monogyna (Hawthorn)	3.0	Suppressed hawthorn adjacent boundary wall.
S19	Crataegus monogyna (Hawthorn) Prunus spinosa (Blackthorn) Rosa canina (Dog rose)	2.5	Hedgerow section. Regularly managed.

Section No.	Species		Height (m)	Comments
S20	Crataegus monogyna (Hawthorn) Rosa canina (Dog rose)	Prunus spinosa (Blackthorn)	2.5	Hedgerow section. Regularly managed.
S21	Crataegus monogyna (Hawthorn) Rosa canina (Dog rose)	Prunus spinosa (Blackthorn) Ulex europeus (Gorse)	2.5	Hedgerow section. Regularly managed.
S22	Crataegus monogyna (Hawthorn) Rosa canina (Dog rose)	Prunus spinosa (Blackthorn)	2.5	Hedgerow section. Regularly managed.
S23	Crataegus monogyna (Hawthorn) Rosa canina (Dog rose)	Prunus spinosa (Blackthorn) Ulex europeus (Gorse)	2.5	Hedgerow section. Regularly managed.
S24	Crataegus monogyna (Hawthorn) Rosa canina (Dog rose)	Prunus spinosa (Blackthorn) Ulex europeus (Gorse)	2.5	Hedgerow section. Regularly managed.
S25	Salix caprea (Goat willow)		3.5	Willow hedgerow. Gaps in places.
S26	Salix caprea (Goat willow)	Crataegus monogyna (Hawthorn)	3.5	Willow / hawthorn. Gaps in places.
S27	Salix caprea (Goat willow)	Betula pendula (Silver birch)	4	Willow and birch growing on field boundary.
S28	Ulex europeus (Gorse) Salix caprea (Goat willow)	Betula pendula (Silver birch) Fraxinus excelsior (Ash)	4.0	Gorse, willow, birch and ash growing on field boundary.
S29	Salix caprea (Goat willow)		3	Clump of willow.

Figures

JSL5028_700-701: TREE CONSTRAINTS PLAN

JSL5028_710: TREE PROTECTION PLAN



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Key

- Tree survey boundary
- Application site boundary
- Individual tree with numbered reference. Canopy spread to NSEW. BS5837:2012 tree quality category colour as shown below (Table 1).
- Tree group with numbered reference. Canopy extent (average for group). BS5837:2012 tree quality category colour as shown below (Table 1).
- Dense Tree Group with numbered reference. Canopy extent (average for group). Hatch colour represents BS5837:2012 tree quality category colour (Table 1). **Magenta** dash line = RPA. **Light green** dash line = average canopy extent
- Ancient Woodland (Plantation on Ancient Woodland)
- 15m buffer from Ancient Woodland (PAWS) where no development should be undertaken
- BS 5837:2012 Tree Quality Categories - Table 1**
- Category A - High quality
- Category B - Moderate quality
- Category C - Low quality
- Category U - Unsuitable for retention
- Tree Root Protection Area (RPA) calculated in accordance with Section 4.6 - BS5837:2012
- Scrub/Hedge/Shrubs/Saplings with numbered reference and RPA.



NOTES:
 • Refer to RPS Tree Schedule for further details.
 • Survey based on a visual inspection from the ground and is not intended as a full arboricultural inspection.
 • Plan produced in accordance with recommendations set out in BS 5837:2012 - 'Trees in Relation to design, development and construction'.
 • Due to the legal protection afforded to breeding birds vegetation removal should not take place during the bird nesting period, generally, although not restricted to, March - August inclusive.
 • Survey carried out using sub-metre GPS survey device.
 • Topographical Survey provided by client.

0m 10 20 30 40 50m
 SCALE 1:500

C	Added new RLB. Changed colour of Survey boundary	TF	DC	Dec 23
B	Adjusted to align with topo	TF	DC	Nov 23
A	First issue (WIP)	TF	DC	Oct 23
Rev	Description	By	CB	Date

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Client: **Lightsource BP**

Project: **Pentlr BESS**

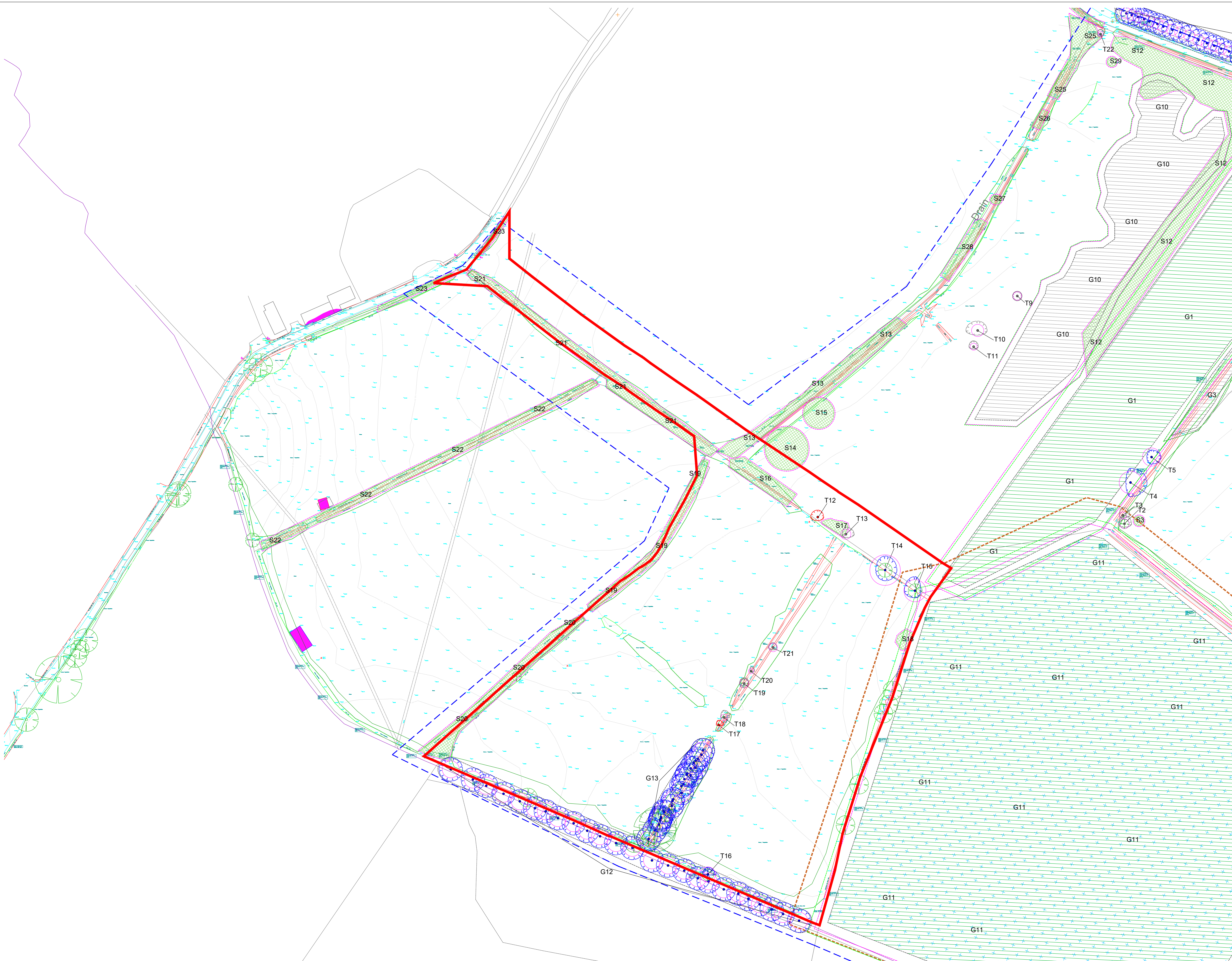
Title: **Tree Constraints Plan**

Status: **For planning** Drawn By: **TF** PM/Checked by: **DC**

Job Ref: **JSL5028** Scale @ AD: **1:500** Date Created: **Oct 23**

RPS Drawing / Figure Number: **700** Rev: **C**

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Key

- Tree survey boundary
- Application site boundary
- Individual tree with numbered reference. Canopy spread to NSEW. BS5837:2012 tree quality category colour as shown below (Table 1).
- Tree group with numbered reference. Canopy extent (average for group). BS5837:2012 tree quality category colour as shown below (Table 1).
- Dense Tree Group with numbered reference. Canopy extent (average for group). Hatch colour represents BS5837:2012 tree quality category colour (Table 1). Magenta dash line = RPA. Light green dash line = average canopy extent
- Ancient Woodland (Plantation on Ancient Woodland)
- 15m buffer from Ancient Woodland (PAWS) where no development should be undertaken
- BS 5837:2012 Tree Quality Categories - Table 1
 - Category A - High quality
 - Category B - Moderate quality
 - Category C - Low quality
 - Category U - Unsuitable for retention
- Tree Root protection area (RPA) calculated in accordance with Section 4.6 - BS5837:2012
- Scrub/Hedges/Shrubs/Saplings with numbered reference and RPA.



NOTES:

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- Due to the legal protection afforded to breeding birds vegetation removal should not take place during the bird nesting period, generally, although not restricted to, March - August inclusive.
- Survey carried out using sub-metre GPS survey device.
- Topographical Survey provided by client.

SCALE 1:500

Rev	Description	By	CB	Date
C	Added new RLB. Changed colour of Survey boundary	TF	DC	Dec 23
B	Adjusted to align with topo	TF	DC	Nov 23
A	First issue (WIP)	TF	-	Oct 23

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Project: **Pentlr BESS**

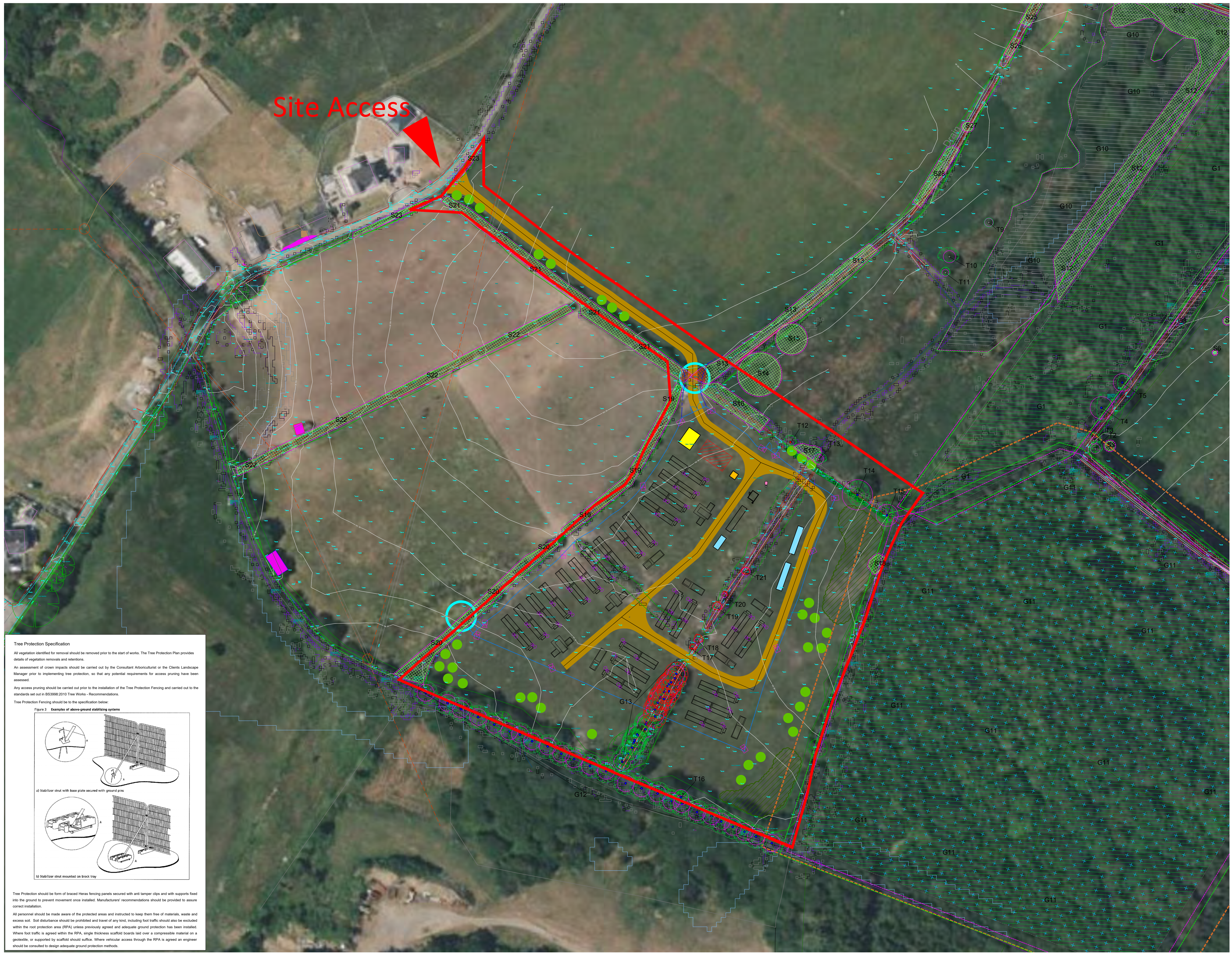
Title: **Tree Constraints Plan**

Status:	Drawn By:	PM/Checked by:
For planning	TF	DC

Job Ref:	Scale @ AD:	Date Created:
JSL5028	1:500	Oct 23

RPS Drawing / Figure Number:	Rev:
701	C

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- Key**
- Application site boundary
 - Individual tree or grouped tree to be retained
 - Individual tree or grouped tree to be removed
 - Dense Tree Group with numbered reference. Canopy extent (average for group). Hatch colour represents BS5837:2012 tree quality category (Table 1). Magenta dash line = RPA, Light green dash line = average canopy extent
 - Ancient Woodland (Plantation on Ancient Woodland)
 - 15m buffer from Ancient Woodland (PAWS) where no development should be undertaken
 - BS 5837:2012 Tree Quality Categories - Table 1**
 - Category A - High quality
 - Category B - Moderate quality
 - Category C - Low quality
 - Category U - Unsuitable for retention
 - Tree Root protection area (RPA) calculated in accordance with Section 4.6 - BS5837:2012
 - Scrub/Hedge/Shrubs/Saplings to be retained
 - Scrub/Hedge/Shrubs/Saplings requiring removal
 - Site security fencing - to be installed prior to construction phase so as to act as primary Construction Exclusion Zone (CEZ) for trees
 - Secondary CEZ - Protective fencing (e.g. Heras style) to provide CEZ where site security fence is absent. To be assembled in accordance with Section 6.2 - BS5837:2012 (see inset for example barriers)



NOTES:

- Refer to RPS Tree Schedule for further details.
- Survey based on a visual inspection from the ground and is not intended as a full arboricultural inspection.
- Plan produced in accordance with recommendations set out in BS 5837:2012 - "Trees in Relation to design, demolition and construction".
- Due to the legal protection afforded to breeding birds, vegetation removal should not take place during the bird nesting period, generally, although not restricted to, March - August inclusive.
- Survey carried out using sub-metre GPS survey device.
- Topographical Survey provided by client.

SCALE 1:500

Rev	Description	By	CB	Date
C	Update to latest layout	TF	TF	Apr 24
B	Update to latest layout	TF	DC	Dec 23
A	First issue	TF	DC	Nov 23

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Project **Pentlr BESS**

Title **Tree Protection Plan**

Status **For planning** Drawn By **TF** PM/Checked by **DC**

Job Ref **JSL5028** Scale @ A0 **1:500** Date Created **Nov 23**

RPS Drawing / Figure Number **710** Rev **C**

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Tree Protection Specification

All vegetation identified for removal should be removed prior to the start of works. The Tree Protection Plan provides details of vegetation removals and relocations.

An assessment of crown impacts should be carried out by the Consultant Arboriculturist or the Clients Landscape Manager prior to implementing tree protection, so that any potential requirements for access pruning have been assessed.

Any access pruning should be carried out prior to the installation of the Tree Protection Fencing and carried out to the standards set out in BS3998:2010 Tree Works - Recommendations.

Tree Protection Fencing should be to the specification below:

Figure 3 Examples of above-ground stabilizing systems

a) Stabilizer strut with base plate secured with ground pins

b) Stabilizer strut mounted on brick tray

Tree Protection should be form of braced Heras fencing panels secured with anti tamper clips and with supports fixed into the ground to prevent movement once installed. Manufacturers' recommendations should be provided to assure correct installation.

All personnel should be made aware of the protected areas and instructed to keep them free of materials, waste and excess soil. Soil disturbance should be prohibited and travel of any kind, including foot traffic should also be excluded within the root protection area (RPA) unless previously agreed and adequate ground protection has been installed. Where foot traffic is agreed within the RPA, single thickness scaffold boards laid over a compressible material on a geotextile, or supported by scaffold should suffice. Where vehicular access through the RPA is agreed an engineer should be consulted to design adequate ground protection methods.

Appendix A

Survey Methodology

General

This report was authored by Thomas Flood BSc (Hons) MICFor MArborA, Principal Arboriculturist, of RPS.

The report and survey were carried out in general accordance with the requirements set out in BS 5837:2012 "Trees in Relation to Design, Demolition and Construction – Recommendations".

Trees were inspected from ground level during a site visit. All data was recorded electronically within a ArcPad software and then it was imported into an MS Access database. Individual tree numbers and locations were plotted by eye on to a drawing at the time of the survey. Tree positions were then related to a Topographical survey of the site provided, where not shown on the topographical survey tree positions have been plotted by eye only and require confirmation.

Trees were not climbed or inspected below ground level and inaccessible trees will have best estimates made about the location, physical dimensions and characteristics.

The locations of the trees were based upon topographic survey of the site provided by the client.

The survey assesses individual trees and groups of trees for quality and benefits within the context of the Proposed Development. The quality of each tree or group of trees has been recorded by allocating it to one of four categories as described the table below. These categories have been differentiated on the Tree Constraints Plan (see drawings JSL5028_700-701).

The survey information was recorded on the attached schedule (Table 1) in general accordance with the guidance contained within Section 4 of BS5837:2012 "Trees in Relation to Design, Demolition and Construction - Recommendations".

Tree Constraints Plan

The Tree Constraints Plan (see drawings JSL5028_700-701) is designed to show the influence that the trees have upon the site by virtue of their size and position. The plan seeks to act as a design tool that shows both the above and below ground constraints presented by the trees.

The information provided within this section of the report is to assist in the interpretation of the Tree Constraints Plan and aims to ensure that those trees selected for retention can be successfully integrated within the Proposed Development.

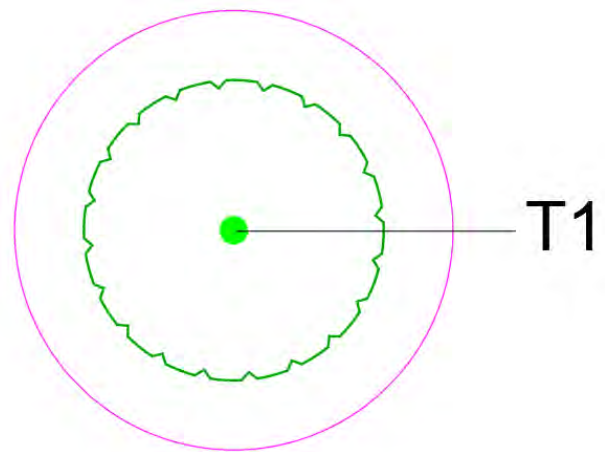
REPORT

It should be noted that some of the tree positions shown on the plan have been plotted using the provided topographical survey and others by eye to an Ordnance Survey base map and as such should be considered to be of a provisional nature.

Root Protection Areas

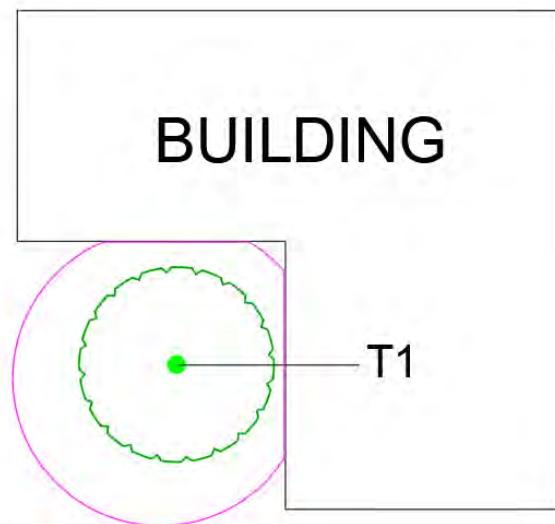
Root Protection Areas for each tree and group of trees surveyed have been determined in accordance with BS5837:2012 and a schedule of Root Protection Areas is attached to this report as Table 2.

As shown to the right, Root Protection Areas (RPA's) for the trees, where no significant constraints to root development are considered to be present, have been plotted onto the Tree Constraints Plan as circles, with the tree located centrally, extending to encompass the area of ground, and thus the rootable soil volume, required for protection.



Where tree root spread is considered to have been influenced by site conditions the trees RPA's have been plotted to the Tree Constraints Plan as a polygon. The plotted polygon is of the **same area** as it would be as a circle and its shape reflects an arboricultural assessment of likely root distribution.

An example of a polygonal RPA, considered appropriate due to the presence of a building in close proximity to a tree, is shown to the right.



Where possible all development, including new hard landscaping, shall be situated outside of the retained trees designated Root Protection Areas.

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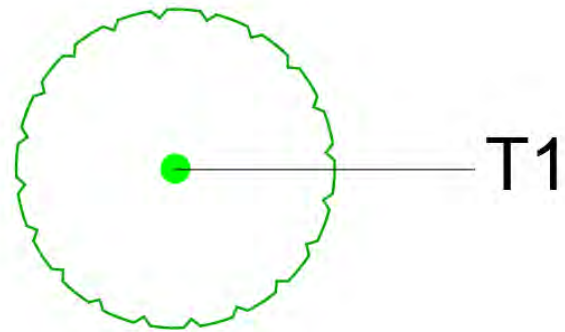
Existing Canopy Spreads

The existing canopy spreads of the trees on site are shown on the Tree Constraints Plan as depicted here.

The current spread of the tree is a constraint due to its dominance, size and movement in strong winds.

It will typically be unacceptable to design any built development within the current spread of a tree.

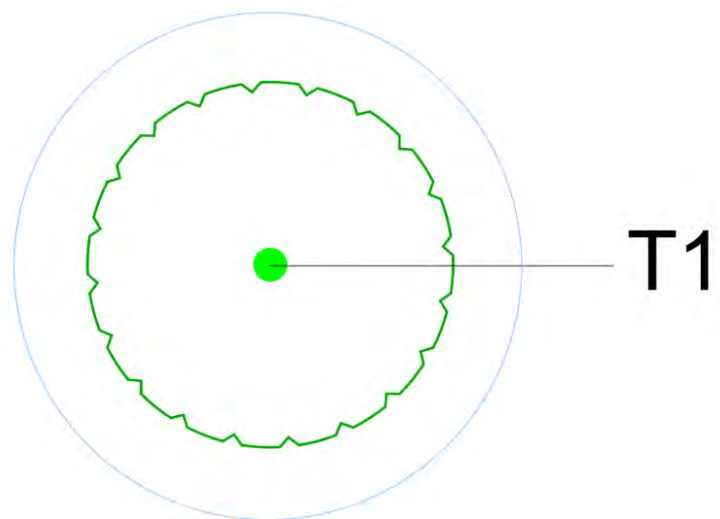
Where built development is proposed in close proximity to existing trees consideration should be given to the amount of working space required to allow its construction.



Future Tree Growth

Some of the trees surveyed are not yet mature and they have the potential for future growth. Where these are to be retained consideration to their ultimate crown spread should be given as future branch growth may result in interference with Proposed Development, damage to branches and the need for a tree pruning regime.

To facilitate assessment of future tree growth maximum expected canopy spreads have been marked on the Tree Constraints Plan (see drawings JSL5028_700-701) as shown here.



The area of mature tree spread is estimated by the arboriculturist and is their best judgement of mature crown spread based on experience and with regard to the current tree growth observed on the site.

Within the area of maximum branch spread construction activities should be restricted for the long-term health and vigour of the trees.

In this respect it is considered that within the area of maximum branch the construction of utility buildings, such as single storey garages or sheds and the installation of hard surfaces would generally be an appropriate form of construction, however, should car parking be proposed beneath the ultimate spread of trees the likelihood of fruit fall, leaf litter or sap exudate causing a nuisance must be considered.

In addition, it is important to consider the likelihood of damage to trees or structures that may be caused by continuous whipping of branches in windy conditions. In such circumstance's branches may have to be repeatedly cut back which will introduce wounds in the tree and may spoil its form or shape. In general terms trees should not be retained upon the basis that their ultimate branch spread can be significantly controlled by periodic pruning.

Canopy Height / Clearance

The height and growth direction of the lowest branch of each tree is recorded in the Tree Data Schedule contained within this report as Table 1, the lowest branch height of a tree is shown on the Tree Constraints Plan. Additionally, the vertical clearance of the trees canopy above ground level is recorded within the Tree Data Schedule.

The two figures can be used to inform the extent to which a trees crown may be at risk of damage during development as a result of vehicular or plant movements within the site and to assess the need for additional protective measures to be implemented to protect low branches.

In particular it should also be noted that where the Root Protection Areas for retained trees do not extend to the edge of existing canopy spreads it is possible that those parts of the trees extending beyond the RPA fencing may sustain damage during construction. Where this occurs, there are two primary options available to manage and minimise the potential for damage to tree canopies to occur during development and these may be used singularly or in combination. The first option is to create a Construction Exclusion Zone (CEZ), by the erection of protective fencing, around the full extent of the trees. The second is to undertake pre-development pruning works to the trees to reduce the potential for branch damage to occur.

Appendix B

BS5837 Cascade Chart for Tree Quality Assessment

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Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<input type="checkbox"/> Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) <input type="checkbox"/> Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline <input type="checkbox"/> Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i>			Dark Red
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	Light Green
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	Mid Blue
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	Grey

Cascade chart for tree quality assessment

Appendix C

Tree Protection Barriers

Root Protection Area Barrier Details

Since trees are living organisms which interact with their immediate environment any changes made to their surroundings may have a bearing on that trees future. Developing a site will undoubtedly place any trees within close proximity under some level of stress, which could predispose them to infection. The aim of this method statement is to limit the amount of stress induced by introducing protection measures.

The most effective way of offering protection is by erecting protective barriers set at a distance from the tree stem using the methods given within BS 5837: 2012 Trees in Relation to Design, Demolition and Construction. Barriers should be braced and constructed to resist impacts; see Figures 1 & 2 below for barrier specifications. Barriers can be of an alternative specification to that within the BS5837:2012 provided it is approved by the Local Planning Authority Tree Officer.

Barriers should be erected before any works commence on site with the exception of recommended tree work. Areas of retained and future structure planting should be similarly protected.

All personnel should be made aware of the protected areas and instructed to keep them free of materials, waste and excess soil. Soil disturbance should be prohibited and travel of any kind, including foot traffic should also be excluded within the root protection area (RPA) unless previously agreed and adequate ground protection has been installed.

Where foot traffic is agreed within the RPA, single thickness scaffold boards laid over a compressible material on a geotextile or supported by scaffold should suffice. Where vehicular access through the RPA is agreed an engineer should be consulted to design adequate ground protection methods.

Suggested Barrier Specification (as per BS5837: 2012)

Figure 1

Figure 2 Default specification for protective barrier

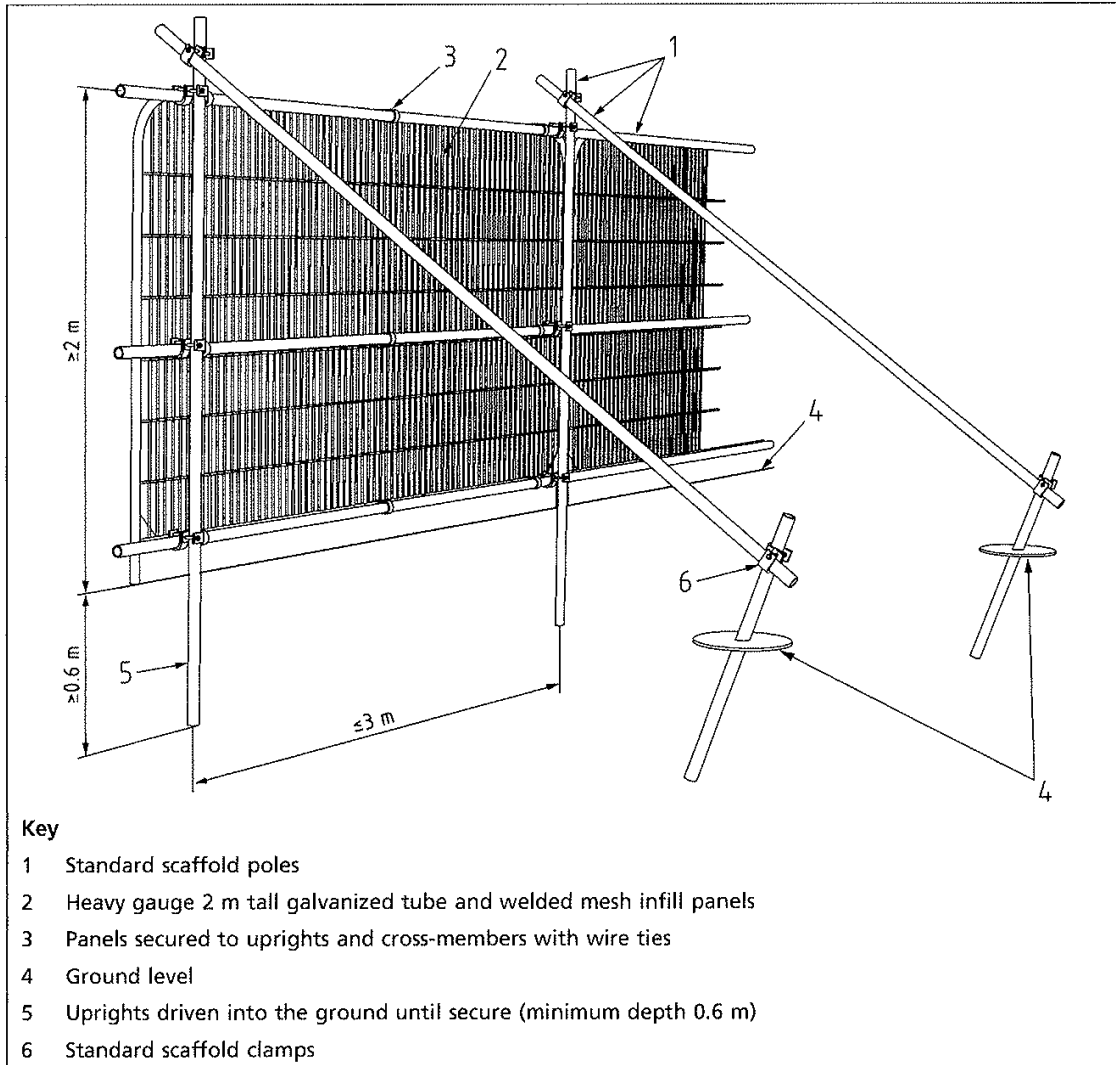
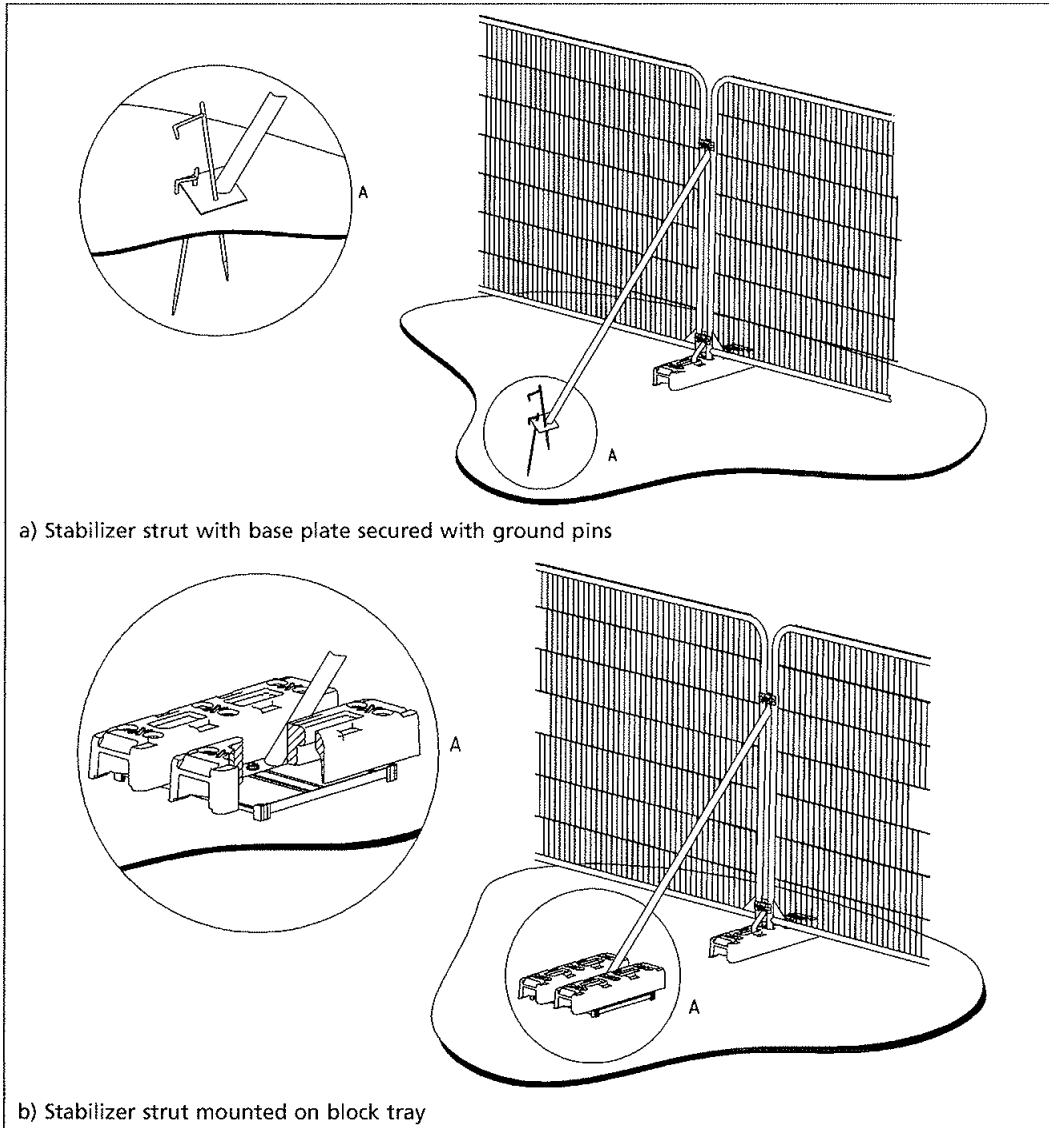


Figure 2.

Figure 3 Examples of above-ground stabilizing systems



Appendix D

Construction Exclusion Signage – Example



Appendix E

Site Photographs



Photo 1: View looking East from site toward G11 (Plantation on Ancient Woodland Site)



Photo 2: View looking East along southern boundary of site.
Off-site group G12 (right).



Photo 3: View looking West along south side of hedgerow S21 (right) with part of S23 visible in the background (left). The access track is proposed to run close to the North side of S21.

Appendix F

Arboricultural Glossary

Abiotic Factors - Non-living factors of the environment, including temperature & wind.

Age-class - A general classification of the tree into either - young, semi-mature/maturing, mature, over-mature, or senescent.

Apical Bud/Shoot – The apical bud, also known as the leading shoot, is responsible for shoot extension and is dominant.

Apical Dominance – A singular, leading shoot remains dominant.

Arboreal - In connection with, or in relation to, trees.

Arboriculturist – Person who has, through relevant education, training and experience, gained recognised qualifications and expertise in the field of trees in relation to construction.

Arboricultural Impact Assessment (AIA) – Study, undertaken by an arboriculturist, to identify, evaluate and possibly mitigate the extent of direct and indirect impacts on existing trees that may arise as a result of the implementation of any site layout proposal.

Arboricultural Method Statement (AMS) – Methodology for the implementation of any aspect of development that has the potential to result in the loss of or damage to a tree. Note The AMS is likely to include details of an on-site tree protection monitoring regime.

Biotic factors - Living factors. For example, animals and pathogens.

Bottle Butt – Term used to describe shape of stem base, usually associated with an internal defect – refer to 'Reaction Wood' below.

Branch union/junction - The point at which a branch joins a larger stem. Can be a point of weakness, especially in certain species.

Cambium - A lateral meristem (see below) in vascular plants located just beneath the bark responsible for secondary growth, e.g. production of annual growth rings.

Canker – A clearly defined area of dead and sunken or malformed bark, caused by bacteria or fungi. Can have a bearing on structural integrity of infected limb(s) depending on size and location.

Chlorosis/Chlorotic – Abnormal yellow or yellow-green coloration of usually green leaves. Essentially a reduction of chlorophyll levels often as a result disease or nutrient deficiency.

Co-dominant stems - A growth characteristic, where two or more stems of similar size grow from the same point. Can create an inherent weakness.

Compaction - The compressing & hardening of soil around tree root systems, due to vehicular/pedestrian use etc. Loss of pore space between soil granules limits water movement and gaseous exchange, and inhibits root growth.

Competent person – Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached

Note 1 A competent person understands the hazards and the methods to be implemented to eliminate or reduce the risks that can arise. For example, when on site, a competent person is able to recognise at all times whether it is safe to proceed.

Note 2 A competent person is able to advise on the best means by which the recommendations of this British Standard may be implemented.

Condition – Assessment based on a visual and professional view giving consideration to many factors such as tree health, structural integrity and suitability of its position.

Construction Exclusion Zone – Area based on the RPA (in m²), identified by an arboriculturist, to be protected by development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

Coppice - The method of managing trees by cutting the stems at between 1.0 inch and 1.0 foot from the ground level on a regular cycle, the cut stumps of the trees or shrubs are allowed to re-grow many new stems.

Crown spread - Gives distances between extreme limits of the crown and the stem, usually along the four compass points. Helps to show crown symmetry.

Crown Reduction – The removal of branch ends to reduce the extreme limits of a trees branch spread and height.

Crown Thin – The removal of selected branches within the crown to thin the internal branch structure.

D.B.H. - 'Diameter at Breast Height', an industry standard to gauge tree stem size and development. Within arboriculture, breast height is taken to be 1.5m above ground level.

Dieback - The reduction in crown vigour and extension growth progressing to death of distal parts; often associated with decline.

Epicormic/adventitious growth - New growth from dormant buds that can often form tenuous attachments. Although some species readily form such shoots, it can be an indication of stress.

Feathered Whip – Size of tree for planting, usually ranging from 1.25m to 2.5m in height.

Form - A general assessment of the shape and position of the tree within its' environment.

Frass – Debris such as bore dust left by wood boring insects.

Hanger – Term used to describe a branch that has become detached and is being supported by other branches. Can be a hazard to persons and property below.

Hazard Beam – After the loss of a distal part, a limb concentrates growth upwards creating adverse end weights that can render the limb susceptible to failure.

Heavy Standard – Size of tree for planting, usually above 3.5m in height.

Included bark – Growth characteristic usually caused when two or more stems/branches growing in close proximity 'fuse' together entrapping the bark from when the parts were separate in the middle, creating a structural weakness.

Meristem - The undifferentiated plant tissue from which new cells are formed, such as that at the tip of a stem or root.

Meristematic Disorder – A growth disorder caused by a disruption of the meristem (see above) from any of a number of biotic factors (see above). Manifests as growths such as 'Witches Brooms' & 'Galls'.

Necrosis/Necrotic – Death of tissues usually characterised by a blackening in colour.

Occlusion/Occluded – Normally used to describe the overgrowth of a wound. Also, immovable foreign objects in contact with a tree part can become encased or 'occluded' by the tree as it grows incrementally.

Pathogen - An agent that causes disease, especially a living microorganism such as a bacterium or fungus.

Plasticity index - The table used to calibrate the shrinkability of a clay soil.

Pollard – The removal and subsequent regular re-removal of the crown of a tree above animal browsing height. Can be an effective method of controlling the size of trees in urban areas. This is ideally begun in the trees early stages and maintained throughout its life.

Reaction wood - Essentially additional wood laid down by the tree to compensate for structural defects such as cavities.

Ring barking/Girdling – the removal of bark around the entire circumference of a stem or branch, causing the death of all distal parts.

Root Protection Area (RPA) – Layout design tool indicating the area surrounding a tree that contains sufficient rooting volume to ensure the survival of the tree, shown in plan form in m².

Saprophyte – An organism which exists on dead plant material.

Scaffold branches - The main structural branches within the crown.

Services – Any above ground and piped and/or ducted underground infrastructure including water main, electricity supply, gas supply, fibre optic utilities, telecommunications cabling, storm and foul water drainage, including temporary storage for run-off, pumping stations, interceptors and other allied buried structures.

Shrinkable clay – Clay soil which alters in volume depending on moisture content. Property sited on shrinkable clay can suffer subsidence damage due to soil desiccation; this can be due to the water uptake of nearby vegetation, including trees.

Special engineering – design of a structure with the physiological requirements of trees as the priority.

Standard – Size of tree for planting, usually ranging from 2m to 3.5m in height.

Structure – Man-made object, such as a building, carriageway, path, wall, services, and built and excavated earthworks.

Transplant – (1) size of tree for planting, usually ranges from 0.2m to 0.9m in height (2) the relocation of a tree or shrub including a given portion of the root system.

Tree Constraints Plan (TCP) – Plan prepared by an arboriculturist for the purposes of layout design showing the RPA and representing the effect that the mature height and spread of retained trees will have on layouts through shade, dominance, etc.

Tree protection plan – scale drawing prepared by an arboriculturist showing the finalised layout proposals, tree retention and tree and landscape protection measures detailed within the arboricultural method statement (AMS), which can be shown graphically.

U.L.E – ‘Useful Life Expectancy’ is an estimate based on currently known factors of the possible remaining life of the tree as an asset.

Veteran tree – Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.

Vigour - A general classification, as to the present and future potential growth and development of a tree. A comment regarding the health status of the tree specific to its species