Buxton and High Peak Trail

Proposals for linking Green Lane to Buxton Country Park and Ladmanlow



Picture of existing track in woods to be followed by proposed path

Appendix 4

Detailed tree report and maps of definitive route in relation to adjacent trees

peak•cycle•links

March 2012

cheshire woodlands
arboricultural consultancy

ARBORICULTURAL STATEMENT

of Michael Ellison

on the

PROPOSED BUXTON AND HIGH PEAK TRAIL
PROPOSAL FOR LINKING GREEN LANE
TO BUXTON COUNTRY PARK AND LADMANLOW

on behalf of

PEAK CYCLE LINKS

Reference: CW/6516-AS
Dated: 5 March 2012

Michael Ellison
Cheshire Woodlands
9 Lowe Street
Macclesfield
SK11 7NJ
United Kingdom

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1. TERMS OF REFERENCE

1.1 I am instructed by John Grimshaw on behalf of Peak Cycle Links to:

- carry out a broad assessment of trees adjacent to the route of the proposed path and cycle route
- assess the possible effects of the proposal on trees
- advise on possible modifications to the route to minimise any potential conflicts with trees
- prepare a schedule of trees
- assess the requirement for protection of trees during the development
- assess potential mitigation strategies where design conflicts are identified
- prepare a report on the above matters to be submitted with a planning application for the proposed development.

1.2 The tree survey is carried out in sufficient detail to gather data for and inform the design of the current project. Our appraisal of the mechanical integrity of trees on the site is of a preliminary nature and sufficient only to inform the current project. The assessment of trees is carried out from ground level without invasive investigation and therefore the disclosure of hidden defects cannot be expected. We do not carry out detailed safety assessments unless specifically instructed in writing to do so and have not carried out such an assessment of trees as part of the current project.

1.3 This report and associated plans remain the copyright of Cheshire Woodlands and any transfer of rights to any third party must be with our express written consent.

2. INTRODUCTION

2.1 My name is Michael Ellison, I am senior consultant with Cheshire Woodlands Arboricultural Consultancy based in Macclesfield, Cheshire. I carried out an assessment of the trees and the route of the application proposal accompanied by the applicants Engineer on 25 January 2012. I met on site with the Arboriculturists from Derbyshire County Council and High Peak Borough Council on 14 February 2012. These site visits and meetings along with my consideration of the application drawings form the basis of my assessment and report.

2.2 The construction of 0.7 kilometres of footpath and cycleway is proposed. The route of the proposal is plotted on the Tree Protection Plan appended at CW3. It is proposed that the path will generally be 2 metres wide, it will extend to 3 metres wide at some locations places and be restricted to 1.5 metres wide in others.

2.3 This assessment evaluates the effects of the application proposal upon trees. Ordinarily, such an assessment would involve recording the comparative values of trees broadly in line with the guidance of BS5837 (2005) and retention, protection and management of trees would be informed by this evaluation. It is my view that, in the case of the application proposal, valuing the trees in this way would serve no useful purpose.

3. THE SITE

3.1 The woodland site, which is on a north-facing hillside and comprises secondary broadleaf woodland on the site of a former limestone quarry and lime kiln workings. At its northern edge, the woodland is bounded in part by residential properties and the entrance point at Green Lane is in a spur of woodland of around 17 metres wide at the roadside boundary. The site is owned and managed by Buxton Civic Association, which operates the neighbouring Poole's Cavern, situated on the northern edge of the woodland and which attracts visitors to the wood.

4. STATUTORY CONTROLS

4.1 Grin Low Wood is protected by a tree preservation order administered by Derbyshire County Council. Subject to certain specified exemptions, the Town and Country Planning Act 1990 requires that an application must be made to the local planning authority to carry out works upon or to remove trees that are subject to a tree preservation order. Where directly affecting the implementation of a detailed planning approval (granted under the Town and Country Planning Act 1990), such works as are necessary to implement the development may be carried out to trees thus protected.

4.2 The Forestry Act (1967 as amended) requires that a licence must be obtained for the felling of growing trees, subject to certain exemptions. Up to five cubic metres of timber may be felled without a felling licence in any calendar quarter, providing no more than two cubic metres are sold. Where directly affecting the implementation of a detailed planning approval (granted under the Town and Country Planning Act 1990), such works as are necessary to implement the development may be carried out to trees without the permission of the Forestry Commission. It is my provisional view that insufficient marketable timber is to be felled to require a felling licence.

4.3 The Wildlife and Countryside Act 1981 (together with the amendments of 1985 & 1991, the subsequent variations to the schedule orders, and strengthening amendments made within the Countryside and Rights of Way Act 2000) forms the basis for legislation protecting Britain's flora and fauna. Nesting birds and all species of bat are afforded statutory protection. It is an offence to:

- disturb a nesting bird
- disturb a roosting bat or damage, destroy or block access to a bat roost
- intentionally kill, injure or take a bat
- sell, hire, barter or exchange a bat, dead or alive
- be in possession or control of a bat or anything derived from a bat

5. SURVEY METHODOLOGY

5.1 The client supplied a topographic land survey drawing with tree stem positions plotted and a layout proposal drawing. The topographic land survey drawing is the base for my Tree Protection Plan CW/6516-P-TP(Rev.F) appended at CW3.

5.2 The site was walked and trees were identified, measured and recorded as set out in the tabulated Tree Survey Schedule. Tree stem diameters were measured. The survey schedule should be read in conjunction with the Glossary of Terms appended at CW2. Trees have been recorded both individually and in groups. Individual trees are prefixed 'T' and groups of trees 'G'.

5.3 The ecology of the woodland has been considered separately by Penny Anderson Associates and is not considered here.

6. DISCUSSION

6.1 The Tree Schedule and the Tree Protection Plan provide the basis for our consideration of the development proposal in relation to trees. The Tree Protection Plan provides an overview of the proposal and sets out the methodology for the protection of trees during the development process.

6.2 Grin Low Wood comprises a mixed age secondary woodland having developed following the closure of the lime kilns. Maturing beech (*Fagus sylvatica*) and sycamore (*Acer pseudoplatanus*) dominate with a lesser component of wych elm (*Ulmus glabra*), ash (*Fraxinus excelsior*), oak (*Quercus* sp.) and rowan (*Sorbus aucuparia*). There are a small number of older trees that appear to pre-date closure of the kilns and which are located adjacent to the northern boundary overlooking the southern edge of the town. Where openings have developed in the canopy through the failure and removal of trees there is young natural colonisation of predominantly ash, beech and sycamore. The understorey

of mainly rowan, hazel (*Corylus avellana*), elder (*Sambucus nigra*) and holly (*Ilex aquifolium*) is patchy and generally poor. The woodland contains many spoil heaps from the lime working, which are reported to support locally important calcareous grassland plant species (Hamilton 2011).

6.3 The application proposal requires the removal of a small number of trees along the 0.7 kilometre route. The proposed tree removals are relatively insignificant save for the removal of the post-mature beech tree T239 and cherry trees G5, which are located adjacent to the Green Lane entrance to the site. Having been heavily topped in recent years, T239 is a ill-suited to long-term retention and its removal and replacement will be beneficial in introducing age diversity and thereby an element of long-term continuity of tree cover to this boundary. The loss of cherry trees G5 is less desirable but can be reasonably mitigated by the provision of new deciduous and evergreen native trees.

6.4 The proposed zig-zag ramp and associated drystone retaining-wall at the Green Lane entrance extend into the root protection areas of several trees. The incursions into the root protection areas vary between 7.9% and 9% of the calculated areas and given that these incursions are limited to only one side of any tree, it is my opinion that the risk of a significant long-term impact on the health of the trees is low. In this area of the site, as elsewhere, the removal of stumps from felled trees must be by mechanical stump grinder and only to the extent necessary to enable construction of the ramp and walls. Grubbing out of stumps carries a high risk of damaging adjacent trees.

6.5 Extending in a southerly direction up to tree T219, the path requires some relatively minor excavation of up to 500mm depth and the placement of fill, also up to 500mm depth. The impact on adjacent trees will be relatively minor and if the works are implemented in accordance with the Arboricultural Method Statement detailed on the Tree Protection Plan, should not result in any significant long-term consequences. This pattern of excavation and minor fill continues along the entire length of the path and its impact has been minimised by calculating the root protection area for each tree as a circle measured from the centre of the tree, enabling the path to be located with minimum impact on tree roots.

6.6 Cut and fill operations have been separated into 2 categories. The method statement provides one specification for works that involve excavation of up to 100mm depth and or fill up to 400mm depth, and another where the cut and fill are to greater depths. Where greater changes in level are required, the preference has been to fill and avoid excavation. Where excavation has significant potential to affect the health of adjacent trees they are specified for removal and in this regard, we have modified the route of the path and beyond the initial entrance and zig-zag ramp from Green Lane, only 8 trees relatively insignificant trees and a number of saplings are to be removed to enable the proposal.

6.7 The Tree Protection Plan identifies all areas where the Project Engineer advises that either excavation of greater than 100mm depth or fill of greater than 400mm depth will be required. In these areas, the excavation has been minimised adjacent to retained trees and as previously stated, trees that would be significantly compromised by excavation are proposed for removal. Where the deeper areas of fill are proposed, a construction detail is proposed that will enable both cross-fall of drainage and gaseous diffusion beneath the fill, thereby minimising the effects of the fill upon the rooting environment. This methodology is set out in the Arboricultural Method Statement on the Tree Protection Plan.

6.8 The maximum extent of the work area is clearly identified on the Tree Protection Plan. It would be impractical to enclose this entire area of ground for the duration of the works. It would also be impractical to protect the entire woodland floor within the area defined as the work site. Conversely, the effects of uncontrolled access during construction would carry a high risk of damage to trees and ground flora and would not only be unacceptable to the landowner and the Council, but could result in offences under the Town and Country Planning (Trees) Regulations 1999. To minimise the impact on trees, it is proposed that the works will be phased and a plan of work developed to phase the construction in sections, working in from one or both ends of the path (access points A and B on the Tree Protection Plan) and completing, up to base course, a section of up to 60 metres length, but more likely 20 to 30 metres, before moving onto the next section, the access for which would be across the completed path base. Employing this approach will minimise the extent of Tree Protection Barriers required to enclose the worksite and with the operation of mobile plant being limited to the line of the proposed path, it is proposed that the barriers will be of light construction. The fencing specification is set out in the Arboricultural Method Statement on the Tree Protection Plan along with the wording for a 400 x 300mm warning sign. It is proposed that the areas of ground identified on the Tree Protection Plan as 'Ground Protection' may, if required as working space during construction operations, be covered with plywood sheets over a compressible layer of woodchip. It is most unlikely that the entire area would be covered with ground protection and in any event, the phasing of construction works would limit this area to the section under construction at any particular time. Any areas designated as Ground Protection and not protected with plywood sheets will be excluded from the work are by erection of tree protection barriers as set out in the Arboricultural Method statement.

6.9 Between trees T123 and T124, it is proposed that a wooden bridging structure will be installed to enable adequate path width without impacting the adjacent trees. This structure will be designed by the Project Engineer within the constraints set out in the Arboricultural Method Statement.

6.10 It is proposed that the works will be monitored by the Project Arboriculturist, who, as set out in the Arboricultural Method Statement, will visit site at monthly intervals for the

duration of the works and following each visit, will issue a report to the Project Engineer, the landowner and the Council. The Project Arboriculturist will be contracted to advise on construction operations in relation to trees for the duration of the works.

6.11 The establishment of new trees is proposed in the area of the Green Lane entrance and access ramps. The proposed native tree species are listed in the Planting Schedule on the Tree Protection Plan and have been selected to provide both high, middle and low-canopy species to provide continuity in the sylvan character of Green Lane with intermittent low level screening of views into the site. Internally to the woodland, openings created by the limited tree removals will provide opportunities for natural colonisation of tree species, thereby contributing to the slowly increasing patchwork of age diversity.

6.12 In area G1 of the survey, removal of natural colonisation is proposed to open up views to the north-west and prevent damage to the adjacent drystone wall. This work is not required to enable the application proposal. In areas G2, G3 and G4, removal of small areas of young ash natural colonisation is proposed to enable the proposal. These clearings are considered by the landowner to be beneficial in opening up the associated spoil heaps and releasing the calcareous grassland plants.

6.13 The proposed path will result in increased access to Grin Low Wood and this increase will, in turn, inevitable increase the risk from tree failure hazards. Given that the risks from trees in the affected section of Grin Low Wood is currently very low, the increased use of the site during fine weather when trees are least likely to fail is most unlikely to elevate risks to a significant level. The presence of dead branches over the path has only a low associated risk in relation to falling onto pedestrians and cyclists but will necessitate ongoing clearance of debris following high wind events.

7. CONCLUSIONS

7.1 There are no significant losses proposed to enable the application proposal, save for removal of the already compromised mature beech tree T239. The proposed tree removals are few in number and of a relatively minor nature. The loss of trees is mitigated by the potential for increased age diversity alone. There are additional benefits associated with clearing the lime spoil tips.

7.2 While there are some impacts on retained trees, these have been minimised by routing the path where excavation and fill will have least effect on tree roots and in this regard the effects of the proposal should be acceptable providing that works are phased in short sections and tree protection measures are implemented as set out in the Arboricultural Method Statement.

7.3 Increased public access will have a negligible effect on the risks from falling trees and branches, although obstructions on the path will need to be managed.

8. RECOMMENDATIONS

8.1 No tree pruning or removal works should commence on site until necessary consents have been obtained from the local planning authority, either in respect of tree preservation orders or as part of a detailed planning approval.

8.2 Trees should be carefully inspected for birds' nests prior to pruning or removal and any work likely to destroy or disturb active nests should be avoided until the young have fledged.

8.3 All personnel working with or in the trees should be vigilant and mindful of the possible presence of roosting bats. A competent ecologist should investigate and advise on any indications that trees on the site are used as bat roosts.

8.4 All tree removal and pruning works should be implemented in accordance with Tree Schedule CW/6516-SS1, prior to commencement of any construction activity. All such works should be carried out by a qualified arboricultural contractor, carrying appropriate insurance cover and should be implemented to the minimum current CE and UK industry standards and in accordance with current industry codes of practice. Certificated personnel should apply all pesticides in accordance with The Control of Pesticides Regulations.

8.5 A plan of operations should be drawn up to phase the construction work in sections of up to 60 metres length as described in the Arboricultural Method Statement.

8.6 Construction Exclusion Zones around retained trees should be achieved by the erection of Tree Protection Barriers as detailed on the Tree Protection Plan and in the Arboricultural Method Statement. The integrity of the barriers should be maintained for the duration of the works on each section of the path construction.

8.7 All arboricultural, construction, and landscape works should be carried out in accordance with the Arboricultural Method Statement.

9. REFERENCES.

BS5837 2005. Trees in Relation to Construction - Recommendations. British Standards Institute, London.

BS3998 2010. Recommendations for Tree Work. British Standards Institute, London.

Hamilton. H,. 2011. Buxton and High Peak Trail Link: Buxton to Country Park and Ladmanlow. Penny Anderson Associates Ltd, Buxton. 41pp.

APPENDIX CW 1

TREE SCHEDULE

PROJECT: GRIN LOW WOODS, BUXTON
CLIENT: BUXTON CIVIC ASSOCIATION LTD
REF: CW/6516-SS1
DATE: 2 FEBRUARY 2012

SURVEYED BY: M ELLISON
CHESHIRE WOODLANDS
PAGE: 1

No.	Tag No.	Species	Stem Dia. (mm)	Comments	Management	BS5837 RPA Radius (m)
T106	759	Beech	550			6.6
T107	760	Beech	550			6.6
T108	761	Sycamore	350			4.2
T109	762	Ash	700			8.4
T110	763	Larch	350		• Retain or reduce to a 4 – 5m high stump	4.2
T111	764	Sycamore	650			7.8
T112	765	Sycamore	530			6.4
T113	766	Ash	600			7.2
T114	767	Sycamore	500			6.0
T115	768	Ash	420			5.0
T116	769	Sycamore	550			6.6
T117	770	Sycamore	480		• Fell and grind stump	5.8
T118	771	Sycamore	300			3.6
T119	772	Sycamore	550		• Fell and grind stump	6.6
T120	773	Beech	500			6.0
T121						
T122		Sycamore	300			3.6
T123	774	Beech	700			8.4
T124		Beech	580			7.0
T125		Beech	400			4.8
T126		Elm	350			4.2
T127	775	Elm	400			4.8
T128		Sycamore	500			6.0
T129		Beech	650			7.8
T130	776	Sycamore	580			7.0
T131		Beech	900			10.8
T132		Elm	350			4.2
T133		Sycamore	600			7.2
T134		Sycamore	500			6.0
T135		Sycamore	450			5.4
T136	777	Sycamore	680			8.2
T137		Sycamore	300			3.6
T138		Ash	900			10.8
T139		Sycamore	350			4.2
T140		Ash	400	• Extensive cankering, decay and epicormic shoots to the stem.		4.8
T141		Beech	1100	• Extensive dieback	• Reduce to a 4 – 5m high stump	13.2
T142		Sycamore	700	• Leaning to the north		8.4
T143		Sycamore	400			4.8
T144		Beech	1300			15.0
T145		Sycamore	550			6.6
T146		Sycamore	480			5.8
T147		Sycamore	350			4.2
T148		Sycamore		• Moribund		
T149	778	Elm	450			5.4
T150		Beech	950			11.4
T151		Beech	700			8.4
T152		Sycamore	450			5.4
T153		Sycamore	650			7.8
T154		Beech	900			10.8
T155		Beech	1100			13.2
T156		Sycamore	850			10.2

Trees were not assessed for safety in relation to the proposed change of land use

TREE SCHEDULE

PROJECT: GRIN LOW WOODS, BUXTON
CLIENT: BUXTON CIVIC ASSOCIATION LTD
REF: CW/6516-SS1
DATE: 2 FEBRUARY 2012

SURVEYED BY: M ELLISON
CHESHIRE WOODLANDS
PAGE: 2

No.	Tag No.	Species	Stem Dia. (mm)	Comments	Management	BS5837 RPA Radius (m)
T157		Sycamore	500			6.0
T158		Ash	550			6.6
T159		Elm	380			4.6
T160		Beech	580			7.0
T161		Sycamore	650			7.8
T162		Sycamore	600			7.2
T163		Elm	650			7.8
T164		Ash	300			3.6
T165		Ash	300			3.6
T166	779	Ash	850	• Particular caution required in installation of fill due to large diameter (150mm) surface root on west side	• Surround a single large diameter root with finely crushed aggregate or lime kiln waste having a maximum diameter of 3mm enclosed between two sheets of geotextile membrane	10.2
T167		Sycamore	520			6.2
T168		Sycamore	500			6.0
T169		Sycamore	700			8.4
T170	780		900 780			10.8
T171		Sycamore	850			10.2
T172		Elm	300			3.6
T173		Elm	350			4.2
T174	781	Beech	700			8.4
T175		Beech	700			8.4
T176		Sycamore	450			5.4
T177		Beech	550			6.6
T178		Sycamore	750	• Cavities and hollowing to the stem • Valuable habitat		9.0
T179		Sycamore	500			6.0
T180		Beech	580	• Dead (no RPA required)		
T181		Beech	1100			13.2
T182		Beech	680		• Fell	8.2
T183	46 orange paint	Beech	550			6.6
T184		Beech	700			8.4
T185	43 orange paint	Beech	450			5.4
T186		Beech	750			9.0
T187		Ash	700			8.4
T188	40 orange paint	Sycamore	450		• Fell	5.4
T189		Ash	300		• Fell	3.6
T190		Ash	250			3.0
T191		Sycamore	600	• Leaning at 40° to south east with no roots on east side		7.2
T192	37 orange paint	Beech	680			8.2
T193	36 orange paint	Beech	650	• Lesions associated with *Phytophthora* sp. on stem		7.8
T194		Sycamore	420		• Fell	5.0

TREE SCHEDULE

PROJECT: GRIN LOW WOODS, BUXTON
CLIENT: BUXTON CIVIC ASSOCIATION LTD
REF: CW/6516-SS1
DATE: 2 FEBRUARY 2012

SURVEYED BY: M ELLISON
CHESHIRE WOODLANDS
PAGE: 3

No.	Tag No.	Species	Stem Dia. (mm)	Comments	Management	BS5837 RPA Radius (m)
T195		Beech	600			7.2
T196		Ash	500			6.0
T197		Elm	250			3.0
T198		Beech	600			7.2
T199		Sycamore	500			6.0
T200		Beech	600			7.2
T201		Elm	700			8.4
T202		Sycamore	400			4.8
T203		Sycamore	700			8.4
T204		Sycamore	300			3.6
T205		Sycamore	400			4.8
T206	782	Sycamore	600			7.2
T207		Beech	550			6.6
T208		Beech	900			10.8
T209		Sycamore	500	• Dead	• Reduce to a 4 - 5 metre high stump	6.0
T210		Sycamore	750			9.0
T211		Beech	500		• Fell and grind stump	6.0
T212		Sycamore	300	• Close to path		3.6
T213	786	Sycamore	500	• Close to path • Excavations proposed to south side to remove mound upon which 214 is located. It is anticipated that this will have only a limited impact on 213		6.0
T214		Sycamore	300		• Fell and grub out or grind stump	3.6
T215		Beech	550	• Minor risk of root damage during excavation of adjacent tree 214, although this will be supervised by the consulting arborist		6.6
T216		Sycamore	350			4.2
T217		Sycamore	700			8.4
T218		Sycamore	650			7.8
T219		Sycamore	550			6.6
T220		Beech	700			8.4
T221		Sycamore	550			6.6
T222		Beech	550	• Lesions associated with *Phytophthora* sp. on stem		6.6
T223		Sycamore	550			6.6
T224		Beech	500			6.0
T225		Sycamore	450			5.4
T226		Sycamore	500			6.0
T227		Sycamore	600			7.2
T228		Beech	1000			12.0
T229		Elm	500		• Remove basal shoots on west side	6.0
T230		Elm	350		• Remove basal shoots on west side	4.2
T231		Elm	600		• Remove basal shoots on west side	7.2
T232		Sycamore	680		• Remove basal shoots on west side	8.2
T233		Sycamore	800			9.6
T234		Sycamore	1100 940			13.2

TREE SCHEDULE

PROJECT: GRIN LOW WOODS, BUXTON
CLIENT: BUXTON CIVIC ASSOCIATION LTD
REF: CW/6516-SS1
DATE: 2 FEBRUARY 2012

SURVEYED BY: M ELLISON
CHESHIRE WOODLANDS
PAGE: 4

APPENDIX CW 2

No.	Tag No.	Species	Stem Dia. (mm)	Comments	Management	BS5837 RPA Radius (m)
T235		Sycamore	650	• Incursion into circular root protection area (RPA) by footpath and drystone retaining wall that is equal to 8.6% of RPA		7.8
T236		Beech	1000	• Incursion into circular root protection area (RPA) by footpath and drystone retaining wall that is equivalent to 9% of RPA		12.0
T237		Beech	700			8.4
T238		Beech	700	• Incursion into circular root protection area (RPA) by footpath and drystone retaining wall that is equal to 7.9% of RPA		8.4
T239		Beech	1100	• Crown substantially reduced due to cavities and past branch failures • Displacing front highway boundary wall • Low value	• Fell and grind stump to avoid damage to or undermining of roots to adjacent beech T238	13.2
T241		Cherry	450	• On neighbouring land		5.4
T242		Yew	300			3.6
T243		Cherry	450			5.4
T244		Cherry	280			3.4
T245		Cherry	450			5.4
G1		Ash Beech	≤200	• Natural colonisation obscuring views and having high potential to displace adjacent wall	• Remove all ash and beech natural colonisation of a diameter less than 150mm retaining only ash tree G1/1	2.4
G2		Ash			• Remove seven trees of up to 220mm to make way for cut on north side of path	
G3		Ash	≤180		• Remove as required to install path (trees under 80mm diameter to be retained irrespective of distance of path)	2.2
G4		Ash Elm	≤100	• Ash and elm regeneration with small number of planted cherry • Small number of elm trees at the eastern end of up to 180mm diameter	• Remove smaller trees as required for the proposal (up to 20 trees of a diameter less than 80mm)	3.6
G5/1		Cherry	300		• Fell and grub out or grind stump	3.6
G5/2		Cherry	300		• Fell and grub out or grind stump	3.6
G5/3		Cherry	220		• Fell and grub out or grind stump	2.6
G5/4		Cherry	280		• Fell and grub out or grind stump	3.4
G5/5		Cherry	380		• Fell and grub out or grind stump	4.6
G5/6		Cherry	250		• Fell and grub out or grind stump	3.0

GLOSSARY OF ARBORICULTURAL TERMS

Abscission. The shedding of a leaf or other short-lived part of a woody plant, involving the formation of a corky layer across its base; in some tree species twigs can be shed in this way

Abiotic. Pertaining to non-living agents; e.g. environmental factors

Absorptive roots. Non-woody, short-lived roots, generally having a diameter of less than one millimetre, the primary function of which is uptake of water and nutrients

Adaptive growth. In tree biomechanics, the process whereby the rate of wood formation in the cambial zone, as well as wood quality, responds to gravity and other forces acting on the cambium. This helps to maintain a uniform distribution of mechanical stress

Adaptive roots. The adaptive growth of existing roots; or the production of new roots in response to damage, decay or altered mechanical loading

Adventitious shoots. Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Anchorage. The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

Architecture. In a tree, a term describing the pattern of branching of the crown or root system

Axil. The place where a bud is borne between a leaf and its parent shoot

Bacteria. Microscopic single-celled organisms, many species of which break down dead organic matter, and some of which cause diseases in other organisms

Bark. A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

Basidiomycotina (Basidiomycetes). One of the major taxonomic groups of fungi; their spores are borne on microscopic peg-like structures (basidia), which in many types are in turn borne on or within conspicuous fruit bodies, such as brackets or toadstools. Most of the principal decay fungi in standing trees are basidiomycetes

Bolling. A term sometimes used to describe pollard heads

Bottle-butt. A broadening of the stem base and buttresses of a tree, in excess of normal and sometimes denoting a growth response to weakening in that region, especially due to decay involving selective delignification

Bracing. The use of rods or cables to restrain the movement between parts of a tree

Branch:

- **Primary.** A first order branch arising from a stem
- **Lateral.** A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral.** A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

Branch bark ridge. The raised arc of bark tissues that forms within the acute angle between a branch and its parent stem

Branch collar. A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

Brown-rot. A type of wood decay in which cellulose is degraded, while lignin is only modified

Buckling. An irreversible deformation of a structure subjected to a bending load

Buttress zone. The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions

Cambium. Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

Canker. A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

Canopy species. Tree species that mature to form a closed woodland canopy

Cleaning out. The removal of dead, crossing, weak, and damaged branches, where this will not damage or spoil the overall appearance of the tree

Compartmentalization. The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

Compression fork. An acute angled fork that is mechanically optimised for the growth pressure that two or more adjacent stems exert on each other.

Compression strength. The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees with special drilling devices

Compressive loading. Mechanical loading which exerts a positive pressure; the opposite to tensile loading

Condition. An indication of the physiological vitality of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree

Construction exclusion zone. Area based on the Root Protection Area (in square metres) to be protected during development, by the use of barriers and/or ground protection

Crown/Canopy. The main foliage bearing section of the tree

Crown lifting. The removal of limbs and small branches to a specified height above ground level

Crown thinning. The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

Crown reduction/shaping. A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

Crown reduction/thinning. Reduction of the canopy volume by thinning to remove dominant branches whilst preserving, as far as possible the natural tree shape

Deadwood. Dead branch wood

Decurrent. In trees, a system of branching in which the crown is borne on a number of major widely-spreading limbs of similar size (cf. excurrent). In fungi with toadstools as fruit bodies, the description of gills which run some distance down the stem, rather than terminating abruptly

Defect. In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment

Delamination. The separation of wood layers along their length, visible as longitudinal splitting

Dieback. The death of parts of a woody plant, starting at shoot-tips or root-tips

Disease. A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms

Distal. In the direction away from the main body of a tree or subject organism (cf. proximal)

Dominance. In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also the tendency of a tree to maintain a taller crown than its neighbours

Dormant bud. An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

Dysfunction. In woody tissues, the loss of physiological function, especially water conduction, in sapwood

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DBH (Diameter at Breast Height). Stem diameter measured at a height of 1.5 metres (UK) or the nearest measurable point. Where measurement at a height of 1.5 metres is not possible, another height may be specified

Deadwood. Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard

Endophytes. Micro-organisms which live inside plant tissues without causing overt disease, but in some cases capable of causing disease if the tissues become physiologically stressed, for example by lack of moisture

Epicormic shoot. A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot

Excrescence. Any abnormal outgrowth on the surface of tree or other organism

Excurrent. In trees, a system of branching in which there is a well defined central main stem, bearing branches which are limited in their length, diameter and secondary branching (cf. decurrent)

Felling licence. In the UK, a permit to fell trees in excess of a stipulated number of stems or volume of timber

Flush-cut. A pruning cut which removes part of the branch bark ridge and or branch-collar

Girdling root. A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

Guying. A form of artificial support with cables for trees with a temporarily inadequate anchorage

Habit. The overall growth characteristics, shape of the tree and branch structure

Hazard beam. An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting

Heartwood/false-heartwood/ripewood. Sapwood that has become dysfunctional as part of the natural aging processes

Heave. A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

High canopy tree species. Tree species having potential to contribute to the closed canopy of a mature woodland or forest

Incipient failure. In wood tissues, a mechanical failure which results only in deformation or cracking, and not in the fall or detachment of the affected part

Included bark (ingrown bark). Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact

Increment borer. A hollow auger, which can be used for the extraction of wood cores for counting or measuring wood increments or for inspecting the condition of the wood

Infection. The establishment of a parasitic micro-organism in the tissues of a tree or other organism

Internode. The part of a stem between two nodes; not to be confused with a length of stem which bear nodes but no branches

Lever arm. A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

Lignin. The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

Lions tailing. A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end-loading

Loading. A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

Longitudinal. Along the length (of a stem, root or branch)

Lopping. A term often used to describe the removal of large branches from a tree, but also used to describe other forms of cutting

Mature Heights (approximate)**:**

- **Low maturing –** less than 8 metres high
- **Moderately high maturing –** 8 – 12 metres high
- **High maturing –** greater than 12 metres high

Microdrill. An electronic rotating steel probe, which when inserted into woody tissue provides a measure of tissue density

Minor deadwood. Deadwood of a diameter less than 25mm and or unlikely to cause significant harm or damage upon impact with a target beneath the tree

Mulch. Material laid down over the rooting area of a tree or other plant to help conserve moisture; a mulch may consist of organic matter or a sheet of plastic or other artificial material

Mycelium. The body of a fungus, consisting of branched filaments (hyphae)

Occluding tissues. A general term for the roll of wood, cambium and bark that forms around a wound on a woody plant (cf. woundwood)

Occlusion. The process whereby a wound is progressively closed by the formation of new wood and bark around it

Pathogen. A micro-organism which causes disease in another organism

Photosynthesis. The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products

Phytotoxic. Toxic to plants

Pollarding. The removal of the tree canopy, back to the stem or primary branches, usually to a point just outside that of the previous cutting. Pollarding may involve the removal of the entire canopy in one operation, or may be phased over several years. The period of safe retention of trees having been pollarded varies with species and individuals. It is usually necessary to re-pollard on a regular basis, annually in the case of some species

Primary branch. A major branch, generally having a basal diameter greater than 0.25 x stem diameter

Primary root zone. The soil volume most likely to contain roots that are critical to the health and stability of the tree and normally defined by reference BS5837 (2005) Guide for Trees in Relation to Construction.

Priority. Works may be prioritised, 1. = high, 5. = low

Probability. A statistical measure of the likelihood that a particular event might occur

Proximal. In the direction towards from the main body of a tree or other living organism (cf. distal)

Pruning. The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs

Radial. In the plane or direction of the radius of a circular object such as a tree stem

Rams-horn. In connection with wounds on trees, a roll of occluding tissues which has a spiral structure as seen in cross-section

Rays. Strips of radially elongated parenchyma cells within wood and bark. The functions of rays include food storage, radial translocation and contributing to the strength of wood

Reactive Growth/Reaction Wood. Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

Removal of dead wood. Unless otherwise specified, this refers to the removal of all accessible dead, dying and diseased branchwood and broken snags

Removal of major dead wood. The removal of, dead, dying and diseased branchwood above a specified size

Respacing. Selective removal of trees from a group or woodland to provide space and resources for the development of retained trees.

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

Residual wall. The wall of non-decayed wood remaining following decay of internal stem, branch or root tissues

Ring-barking (girdling)**.** The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage.

Root-collar. The transitional area between the stem/s and roots

Root-collar examination. Excavation of surfacing and soils around the root-collar to assess the structural integrity of roots and/or stem

Root protection area. An area of ground surrounding a tree that contains sufficient rooting volume to ensure the tree's survival. Calculated with reference to Table 2 of BS5837 (2005) and shown in plan form in square metres

Root zone. Area of soils containing absorptive roots of the tree/s described. The **Primary** root zone is that which we consider of primary importance to the physiological well-being of the tree

Sapwood. Living xylem tissues

Secondary branch. A branch, generally having a basal diameter of less than 0.25 x stem diameter

Selective delignification. A kind of wood decay (white-rot) in which lignin is degraded faster than cellulose

Shedding. In woody plants, the normal abscission, rotting off or sloughing of leaves, floral parts, twigs, fine roots and bark scales

Silvicultural thinning. Removal of selected trees to favour the development of retained specimens to achieve a management objective

Simultaneous white-rot. A kind of wood decay in which lignin and cellulose are degraded at about the same rate

Snag. In woody plants, a portion of a cut or broken stem, branch or root which extends beyond any growing-point or dormant bud; a snag usually tends to die back to the nearest growing point

Soft-rot. A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

Spores. Propagules of fungi and many other life-forms; most spores are microscopic and dispersed in air or water

Shrub species. Woody perennial species forming the lowest level of woody plants in a woodland and not normally considered to be trees

Sporophore. The spore bearing structure of fungi

Sprouts. Adventitious shoot growth erupting from beneath the bark

Stem/s. The main supporting structure/s, from ground level up to the first major division into branches

Stress. In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature

Stress. In mechanics, the application of a force to an object

Stringy white-rot. The kind of wood decay produced by selective delignification

Storm. A layer of tissue which supports the fruit bodies of some types of fungi, mainly ascomycetes

Structural roots. Roots, generally having a diameter greater than ten millimetres, and contributing significantly to the structural support and stability of the tree

Subsidence. In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

Subsidence. In relation to branches of trees, a term that can be used to describe a progressive downward bending due to increasing weight

Taper. In stems and branches, the degree of change in girth along a given length

Target canker. A kind of perennial canker, containing concentric rings of dead occluding tissues

Targets. In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

Topping. In arboriculture, the removal of the crown of a tree, or of a major proportion of it

Torsional stress. Mechanical stress applied by a twisting force

Translocation. In plant physiology, the movement of water and dissolved materials through the body of the plant

Transpiration. The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

Understorey. A layer of vegetation beneath the main canopy of woodland or forest or plants forming this

Understorey tree species. Tree species not having potential to attain a size at which they can contribute to the closed high canopy of a woodland

Vascular wilt. A type of plant disease in which water-conducting cells become dysfunctional

Vessels. Water-conducting cells in plants, usually wide and long for hydraulic efficiency; generally not present in coniferous trees

Veteran tree. A loosely defined term for an old specimen that is of interest biologically, culturally or aesthetically because of its age, size or condition and which has usually lived longer than the typical upper age range for the species concerned

Vigour. The expression of carbohydrate expenditure to growth (in trees).

Vitality. A measure of physiological condition expressed through the health and growth of foliage, shoots and adaptive woody tissues.

White-rot. A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

Wind exposure. The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

Wind pressure. The force exerted by a wind on a particular object

Windthrow. The blowing over of a tree at its roots

Wound dressing. A general term for sealants and other materials used to cover wounds in the hope of protecting them against desiccation and infection; only of proven value against fresh wound parasites

Woundwood. Wood with atypical anatomical features, formed in the vicinity of a wound

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX CW 3

TREE PROTECTION PLAN - SHEET 1 OF 2

TREE PROTECTION PLAN

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CLIENT	PEAK CYCLE LINKS
PROJECT	GRIN LOW WOOD GREEN LANE BUXTON
JOB REF	CW/6516-P-TP(Rev F)
DATE	6 March 2012
SCALE	

- LIMIT OF THE PROJECT WORK SITE
- T1 — INDIVIDUALLY RECORDED TREE TO BE RETAINED
- TREE TO BE REMOVED FROM A GROUP
- G1 — RECORDED GROUP OF TREES
- PROPOSED TREE (SEE PLANT SPECIFICATION FOR SPECIES AND STOCK SIZES
- PROPOSED TREE OR SHRUB PLANTING (SEE PLANT SPECIFICATION FOR SPECIES AND STOCK SIZES)
- ROUTE OF PROPOSED PATH
- PROPOSED DRYSTONE RETAINING-WALL
- PROPOSED EXCAVATION EXTENDING TO A DEPTH GREATER THAN 100MM BELOW THE EXISTING SURFACE AT THE LOWEST POINT
- PROPOSED FILL MATERIAL EXTENDING TO A HEIGHT GREATER THAN 400MM ABOVE EXISTING GROUND LEVEL AT THE HIGHEST POINT AND GRADING DOWN TO EXISTING GROUND LEVELS
- TIMBER BOARDWALK TO BRIDGE ROOT BUTTRESSES OF ADJACENT TREES (TO BE SPECIFIED BY THE PROJECT ENGINEER PRIOR TO COMMENCEMENT OF WORK ON SITE)
- GROUND PROTECTION (SEE ARBORICULTURAL METHOD STATEMENT FOR SPECIFICATION)

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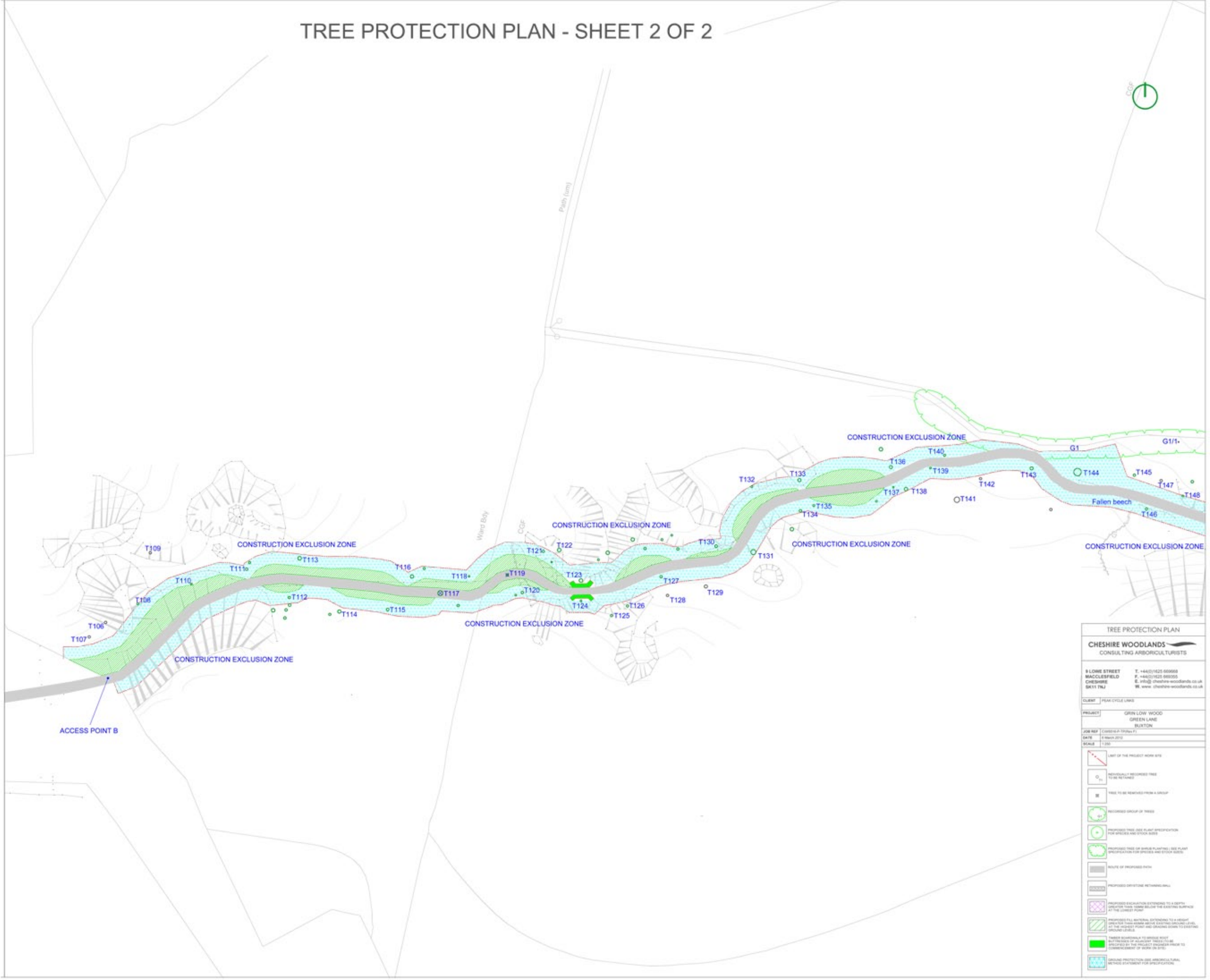
TREE PROTECTION PLAN - SHEET 2 OF 2



TREE PROTECTION PLAN

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CLIENT: PEAK CYCLE LINKS

PROJECT: GRIN LOW WOOD
GREEN LANE
BUXTON

JOB REF: CW6516-P-TPWeb P1
DATE: 6 March 2012
SCALE: 1:250

LIMIT OF THE PROJECT WORK SITE

INDIVIDUALLY RECORDED TREE TO BE RETAINED

TREE TO BE REMOVED FROM A GROUP

RECORDED GROUP OF TREES

PROPOSED TREE (SEE PLANT SPECIFICATION FOR SPECIES AND STOCK SIZES)

PROPOSED TREE OR SHRUB PLANTING (SEE PLANT SPECIFICATION FOR SPECIES AND STOCK SIZES)

ROUTE OF PROPOSED PATH

PROPOSED DRYSTONE RETAINING WALL

PROPOSED EXCAVATION EXTENDING TO A DEPTH GREATER THAN 100MM BELOW THE EXISTING SURFACE AT THE LOWEST POINT

PROPOSED FILL MATERIAL EXTENDING TO A HEIGHT GREATER THAN 450MM ABOVE EXISTING GROUND LEVEL AT THE HIGHEST POINT AND GRADING DOWN TO EXISTING GROUND LEVELS

TIMBER BOARDWALK TO BRIDGE ROOT BUTTRESSES OF ADJACENT TREES (TO BE SPECIFIED BY THE PROJECT ENGINEER PRIOR TO COMMENCEMENT OF WORK ON SITE)

GROUND PROTECTION (SEE ARBORICULTURAL METHOD STATEMENT FOR SPECIFICATION)

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