

Arboricultural Implications Assessment and Arboricultural Method Statement Combined

In accordance with
BS: 5837:2012

At
Fourteen Locks Visitor Centre
Revision 2

On the instructions of
Kew Planning

Dated 25th August 2025

Revision 2 - 17th September 2025

Written by

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Of

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Signed Steve Ambler	
Date	25 th August 2025
Revision 1	10 th September 2025
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INTRODUCTION, SCOPE AND BACKGROUND

This is a combined evaluation of an Arboricultural Implications Assessment (AIA) and an Arboricultural Method Statement (AMS) of the current development proposal of a new Canal Centre at Fourteen Locks, Newport. The scheme sees the demolition (to be conditioned) of the existing visitor centre and a new, tall, single storey one being built pretty much within the same footprint, with some additional landscaping and swales etc. It follows on to an earlier Tree Survey, Tree Categorisation, and Tree Constraints Plan¹ in which the trees were scored in line with the BS5837 and assessed for their suitability for retention within a proposed development. The trees' location is identified on the Tree Protection Plan, which is attached as an Appendix.

The AIA review is largely a desktop study of the development proposal although Vaughan Lewis (Lead Consultant Steve Ambler and Sons Tree Specialists Ltd) has attended a site visit. The purpose of this document is to identify, evaluate and mitigate the extent of direct and indirect impact on existing trees of reasonable and good quality.

The AMS considers the physical and structural requirements of the retained trees, to prevent any damage during construction activities, to maintain their good health and stability. It identifies any perceived conflict between the trees and development and proposes a tree friendly working method to reduce damage and injury.

The level of detail available is often a limiting factor when developing an AMS, so while a preliminary AMS may be prepared for planning, it is often post-planning when detailed design occurs. Unforeseen issues may arise and therefore, following the iterative approach, further design may be required.

The provision and acceptance of this Report are subject to the general Terms and Conditions of Steve Ambler & Sons Tree Specialists Ltd, a copy of which is at the rear of this document.

This assessment uses information provided by the client on the following drawings –

- FLVC-AHR-S1-XX-DR-A-08101-Block Plans – Planning
- FLVC-AHR-S1-XX-DR-A-08102-Proposed Site Plan Planning
- FLVC-AHR-S1-XX-DR-A-09100-Existing Topographical Survey
- FLVC-AHR-S1-XX-DR-A-09410-Soft Landscape Layout
- FLVC-AHR-S1-XX-DR-A-09420-Hard Landscape Layout
- 0050-P01-Proposed Drainage Layout- AHR Building Consultancy
- 13483-0050 Proposed Drainage Layout
- 13483sk0017 Rev A Drainage Remedial Works

¹ S. Ambler - Tree Survey, Tree Categorisation, and Tree Constraints Plan 24-075_14 Locks_BS5837 Tree Survey & TCP_APPROVED_11_DEC_2024_AMBLER-SJ

This assessment is undertaken by Stephen Ambler, the Company founder, a professional arboriculturalist and a Fellow of the Arboricultural Association having over 45 years' experience in the arboricultural industry, serving 19 of those years in local government as a principal arboricultural and woodlands officer. This consultancy practice was established in 1999 and later expanded in 2006 with the launch of a specialist 'Tree Contracting Unit' under the revised name - Steve Ambler & Sons Tree Specialists Ltd. Stephen holds the relevant qualifications: -

- a) Fellow Member of the Arboricultural Association.
- b) Professional Diploma in Arboriculture (Royal Forestry Society)
- c) Professional Technician in Arboriculture (Arboricultural Association)
- d) Certificate in Arboriculture (Royal Forestry Society)
- e) Lantra Award, "Bats and Arboriculture – A Guide for Practitioners" developed by The Bat Conservation Trust.
- f) Numerous City & Guilds Certificates in Tree Surgery related skills
- g) Numerous City & Guilds Certificates in Horticultural related skills

PLANNING CONDITIONS

- None as yet

SITE DESCRIPTION

The site is situated in the High Cross district to the north of Newport City, along the Crumlin arm of the Monmouthshire and Brecon Canal. The survey area is formed by a visitor centre and its immediate grounds, primarily comprising of a large car park laid to tarmac, a manmade pond and circular pathways.

The locks are designated as a scheduled ancient monument.

The ground is predominantly flat and somewhat open to the north with views over private farmland with the Ynysfro Reservoir in the distance. A strip of native broadleaved woodland is situated along the canal eastwards, and to the south and west lies housing with Cwm Lane forming the west boundary, off which lies the visitor centre entrance.

The tree cover consists of sections of hedgerow along Cwm Lane with early mature – mature standard broadleaved trees. Elsewhere tree cover is limited to individual specimens to the outskirts of the car park with two Ash (*Fraxinus excelsior*) trees on the northern boundary, just outside the fence line, but within potential influencing distance. There are several high pollarded White willow (*Salix alba*). The woodland to the east has not been included in the topographical survey and lies beyond the pond and banked circular path and so was unlikely to form a constraint to demolition and development of a new visitor centre.

Ordnance National Grid Reference: ST279886

Nearest Post Code: NP10 9GN

What3words: photocopy.braked.mistaken

Category A Trees

The following category A trees are recorded on the site, identified as – **there are no A category trees.**

(Due to their size and prominent locations in the landscape and general good health and condition with a life expectancy above 40 years)

Category B Trees

The following category B trees are recorded on the site, identified as – **hedge H1 a-c, hedge H2a, T3, T5, T6, T7, T8, T9, and T11, T12, T13, T14 and T15.**

(B category trees are normally trees which are large and prominent in the locality and in general good health and condition with some minor defects, or groups which cohesively provide screening of views into or out of the site (or between parts of it).

The remaining trees are not considered to be of any particular arboricultural or visual merit, are below the threshold of 75-mm diameter when measured at 1.5 metres above ground level or are in poor condition and have been allocated retention categories C or U.

NOTE - Category C trees are of little merit and need not necessarily be a significant constraint on the site' s potential as their loss may be mitigated through planting.

SPECIES RECORDED

Listed in alphabetical order –

- Ash (*Fraxinus excelsior*)
- Common alder (*Alnus glutinosa*)
- Common dogwood (*Cornus sanguinea*)
- Field maple (*Acer campestre*)
- Goat willow (*Salix caprea*)
- Grey alder (*Alnus incana*)
- Hawthorn (*Crataegus monogyna*)
- Hazel (*Corylus avellana*)
- Holly (*Ilex aquifolium*)
- Sycamore (*Acer pseudoplatanus*)
- White willow (*Salix alba*)

PLANNING POLICY WALES

PLANNING POLICY WALES 12 -includes the following key paragraphs in relation to trees: -

Green Infrastructure Assessments

6.2.5 Green Infrastructure Assessments provide key evidence to support the preparation of development plans. Such Green Infrastructure Assessments should use existing datasets, and the best available information, to develop an integrated map-based evidence resource for biodiversity, ecosystem resilience.

6.2.6 Green Infrastructure Assessments should also draw from the evidence base provided by NRW' s Area Statements and Nature Network Maps, Wellbeing Assessments and locally and regionally collected green infrastructure data and mapping.

6.2.8 The need for ecosystems, habitats, and species to adapt to climate change and other pressures should be considered as part of the Green Infrastructure Assessment. This must include identifying ways to avoid or reverse the fragmentation of habitats, and to improve habitat connectivity where appropriate, through the promotion of wildlife corridors, protection of riverine corridors and identifying opportunities for land rehabilitation, reducing pollution, landscape management and habitat restoration, creation, and nature recovery.

6.2.9 Planning authorities must encourage the appropriate management of features of the landscape which are of major importance for wild flora and fauna in order to complement and improve the ecological coherence of the National Site Network, formally known as the Natura 2000 network.

6.2.11 The quality of the built environment should be enhanced by integrating green infrastructure into development through appropriate site selection and use of creative design.

6.2.14 Development proposals should be informed by the priorities identified in green infrastructure assessments and locally based planning guidance. The Building with Nature standards represents good practice and are an effective prompt for developers to improve the quality of their schemes and demonstrate the sustainable management of natural resources.

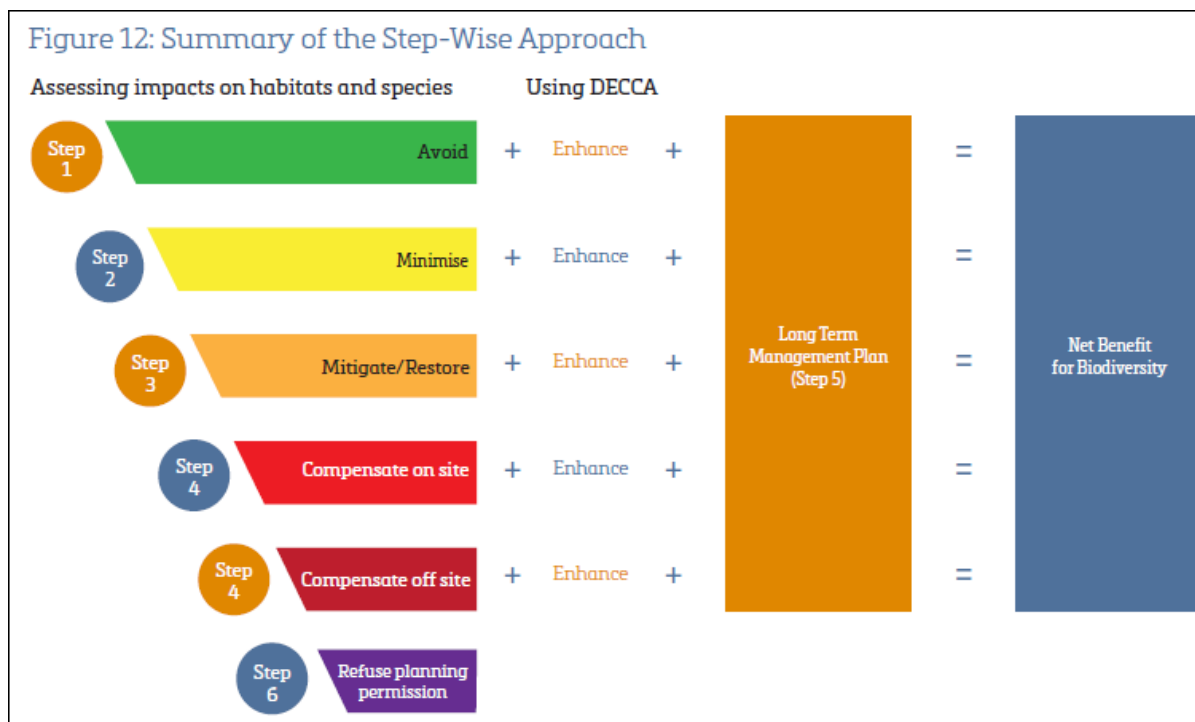
The Step-Wise Approach

The first priority for planning authorities is to avoid damage to biodiversity in its widest sense (i.e. the variety of species and habitats and their abundance) and ecosystem functioning.

6.4.16 The following factors will affect the implementation of the above stepwise approach: Preapplication surveys, research and data searches by developers will be necessary to establish the baseline state of biodiversity and ecosystem resilience on site taking into account the site' s contribution to resilient ecological networks through its diversity, extent, connectivity and condition and the provision of ecosystem services.

6.4.20 Statutorily designated sites must be protected from damage and deterioration, with their important features conserved and enhanced by appropriate management.

6.4.22 It should be recognised that all designated sites will have a unique and important role as part of ensuring resilient ecological networks and this contribution may be equally as important in a local context as its designation status. Distinctive & Natural Places
Planning Policy Wales | Edition 12.



6.4.23 Planning authorities should consider opportunities to restore networks of habitats to a healthy condition identified as a result of undertaking the Green Infrastructure Assessment and the identification of appropriate interventions to secure delivery against the attributes of resilience, namely, diversity, extent, connectivity, condition and adaptability.

6.4.24 SSSIs are of national importance. The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000, places a duty on all public bodies, including planning authorities, to take reasonable steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of the features by reason of which a SSSI is of special interest.

6.4.25 Development in a SSSI which is not necessary for the management of the site must be avoided. This is a matter of principle to ensure that these sites can continue to fulfil their role at the heart of resilient ecological networks.

6.4.31 Sites of Importance for Nature Conservation, Local Wildlife Sites, Local Nature Reserves, and Regionally Importance Geodiversity Sites make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given protection in development plans and the development management process.

6.4.35 The presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 is a material consideration.

6.4.36 Developments are always subject to the legislation covering European protected species regardless of whether or not they are within a designated site.

Trees, Hedgerows and Woodlands

6.4.37 Trees, hedgerows, groups of trees and areas of woodland are of great importance for biodiversity. They are important connecting habitats for resilient ecological networks and make an essential wider contribution to landscape character, culture,

heritage and sense of place, air quality, recreation, and local climate moderation. They also play a vital role in tackling the climate emergency by locking up carbon, and can provide shade, shelter and foraging opportunities, wider landscape benefits such as air and diffuse pollution interception, natural flood management, and building materials. The importance of trees, in particular urban trees, in creating distinctive and natural places which deliver health and wellbeing benefits to communities, now and in the future should be promoted as part of plan making and decision taking.

6.4.38 Welsh native tree and hedge species, characteristic of the local area, provide a strong ecosystem resilience function, and they provide resources for local wildlife, particularly other native plants, and species. Native tree and hedge species can also complement opportunities for natural regeneration. Alongside broader woodland habitat types, such as wood pasture, parkland and traditional orchards, native tree and hedge species help to define our cultural heritage and landscape, creating a strong sense of place and connection to the past.

6.4.39 Planning authorities must protect trees, hedgerows, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial green infrastructure function.

6.4.40 Where trees, woodland and hedgerows are present, their retention, protection and integration should be identified within planning applications. Where surveys identify trees, hedgerows, groups of trees and areas of woodland capable of making a significant contribution to the area, these trees should be retained and protected. The provision of services and utilities infrastructure to the application site should also avoid the loss of trees, woodlands or hedges and must be considered as part of the development proposal; where such trees are lost, they will be subject to the replacement planting ratios set out below.

6.4.41 Whilst most focus within the planning system is targeted at urban trees, planning authorities should recognise the importance of trees within the countryside, either as woodlands, within hedgerows and hedge banks, or freestanding trees in fields, or as wood pasture.

6.4.42 Permanent removal of trees, woodland and hedgerows will only be permitted where it would achieve significant and clearly defined public benefits. Where individual or groups of trees and hedgerows are removed as part of a proposed scheme, planning authorities must first follow the stepwise approach.

Replacement planting shall be at a ratio equivalent to the quality, environmental and ecological importance of the tree(s) lost and this must be preferably onsite, or immediately adjacent to the site, and at a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Where a woodland or a shelterbelt area is lost as part of a proposed scheme, the compensation planting must be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves, and 2500 trees per hectare for conifers.

6.4.15. Where loss is unavoidable developers will be required to provide compensatory planting (which is proportionate to the proposed loss as identified through an assessment of green infrastructure).

6.4.43 Ancient woodland, seminatural woodlands, individual ancient, veteran and heritage trees and ancient hedgerows are irreplaceable natural resources, and have significant landscape, biodiversity, and cultural value. Such trees, woodlands and hedgerows are to be afforded protection from development which would result in their loss or deterioration unless very exceptionally there are significant and clearly defined public benefits; this protection must prevent potentially damaging operations and their unnecessary loss.

6.4.44 The protection and planting of trees and hedgerows should be delivered, where appropriate, through locally specific strategies and policies, through imposing conditions when granting planning permission, and/or by making Tree Preservation Orders (TPOs).

In addition, following legislation applies -

The Town & Country Planning Act 1990.

Section 197 of the Act places an express duty on the local planning authority, when granting planning permission, to ensure whenever appropriate that adequate conditions are imposed to secure the preservation or planting of trees, and that any necessary tree preservation orders are made under section 198 of the Act. When granting outline planning permission, the authority may consider it appropriate to impose a condition requiring the submission of particular details relating to trees to be retained on the site, such as their location in relation to the proposed development and their general state of health and stability. When granting detailed planning permission, conditions may be used to secure the protection of trees to be retained, for example by requiring the erection of fencing around trees during development or restricting works which are likely to adversely affect them. The long-term protection of trees, however, should be secured by Tree Preservation Orders (TPO) rather than by condition: such orders may also be expedient for the temporary protection of existing trees until details of the reserved matters are submitted and it becomes clear whether there is a need to retain the trees.

Well-being of Future Generations (Wales) Act 2015.

Long term: A greener city is a healthier city environmentally and encourages investment and employment opportunities. Natural green space supports social resilience and community wellbeing, making the environment healthier for both people and wildlife. Planning decisions aim to build sustainable and cohesive communities in both the built and green environment.

Prevention: Sound decisions help promote a greener environment, via TPOs for trees and woodlands and hedgerows, and reduces the loss of trees and woodlands and hedgerows on private land. Trees and woodlands and hedgerows are essential in the fight against climate change, as they sequester carbon, and assist with increased biodiversity.

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ARBORICULTURAL IMPLICATIONS ASSESSMENT

The following matters are considered under this Arboricultural Implications Assessment -

- A) Site Designation - Tree Preservation Order and Conservation Area protection
- B) The above and below ground constraints
- C) The proposed development footprint and tree losses
- D) Tree Losses, Felling and Trimming
- E) Tree Protective Barrier Fencing Barrier Fencing
- F) Demolition of Existing Buildings and Structures
- G) Installation of Temporary Ground Protection
- H) Infrastructure Requirements and Services
- I) Installation of New Hard Surfacing – Materials, Design Constraint
- J) Specialist Foundations and Installation Techniques.
- K) Retaining Structures to Facilitate Changes in Ground Level

- L) Boundary Treatments
- M) Proprietary Works for New Landscaping
- N) Whether Design can be Modified to allow Tree Retention
- O) Whether Tree Losses from the Development Proposal can be Mitigated
- P) A realistic Assessment of the Probable Impact of the Proposed development on the Trees and Vice Versa with Due Allowances for Their future Growth and Maintenance Requirements.
- Q) The Effects the Development Proposal may have on the Amenity Value of the Trees
- R) The relationship of windows to trees which may obstruct light considered

A) TREE PRESERVATION ORDER AND CONSERVATION AREA PROTECTION

At the time of writing, the Author is unaware of any statutory site designations. The Client is advised to check with the Local Planning Authority (LPA)

It must be recognised that during the construction phase, should injury or damage occur to any protected tree then an offence would have been committed which could result in prosecution. All parts of the tree are protected including the roots. If any person is found guilty upon prosecution of an offence, then fines of up to £20,000 can be implied and in some circumstances, sums in excess of this.

B) TREES - THE ABOVE AND BELOW GROUND CONSTRAINTS

The constraints posed by any retained tree is equal to its respective Root Protection Area (RPA) or crown spread, whichever is greater, and this distance for each tree or group is provided within the Tables in both the Tree Constraints Plan and Report ¹ and as reproduced below in Table 1. The Root Protection Area distance is a radial measurement provided in the column highlighted yellow. This radial distance must be measured from the centre of the tree's stem.

NOTE. When protecting retained trees, both the RPA and crown must be protected.

In the attached Tree Constraints Plan (Appendices), the RPAs are shown as solid orange lines whilst the canopy spreads of the trees are shown as solid green, blue or grey lines (subject to their category rating).

Table 1 - Key.

- Root Protection Area = Yellow Infill
- Trees & Groups Lost to Development = Red infill
- Groups Partially Lost to Development = Orange Infill.
- Areas of Caution = Purple Infill

(Where development operations are within, or close to a Root Protection Area, or where there is currently inadequate detail to make a full assessment of the potential impact. The Project Arborist must be consulted as the detailed designs emerge and considered within an updated version of this report).

Table 1

Tree Number	Tree Tag	Species	Height (M)	Effectual Diameter (mm)	Branch Spread				1st Significant Branch	Life stage	General Observations	Preliminary Management Recommendations	Remaining Contribution (years)	Retention Category	Root Protection Area (M2)	Root Protection Radius (M)	Photo Ref
9	1647	White willow	10	825	4	3	3	4	2	M	Relatively, recent pollarded specimen at 6m AGL. The extent of rooting is unclear here due to the relatively new path surfacing to the east, north and west. The Tree Constraints Plan (Appendices) shows unrestricted rooting except to the south where there is as low retaining structure and ground level change. PRIVATE STORM DRAIN CONFLICTS PIPE REPLACEMENT CONFLICTS	Re-pollard in 2026 and cyclically every 5-7 years thereafter. If this forms a significant constraint to development, then actual root morphology should be investigated.	20-40	B 2,3	308	9.90	4
10	1648	Common alder	10	375	3	4	4	4	2	EM	Tree of reasonable form located on bank between car park and path. PRIVATE STORM DRAIN CONFLICTS	None	40+	C 2,3	64	4.50	5
H 2a	NA	Hazel, hawthorn, field maple, ash	6	200	3	2	3	1	0	EM/M	Native hedge on west boundary with Cwm Lane which has been side pruned to the roadside only. CONFLICTS WITH - H2a - FENCING PROPOSED WITHIN RPA, BIN STORE AND RAISED PLANTER WITH ORNAMENTAL SHRUB PROPOSED SURFACE TREATMENT	Continue to side prune to roadside annually	40+	B 2,3	18	2.40	6
H 2b	NA	Hawthorn	1. 2	200	1	1	1	1	0	EM	Low, box cut, native hedge on southside of entrance. PRIVATE DRAIN FORMS A CONFLICT PROPOSED SURFACE TREATMENT	Box cut annually.	40+	C 2,3	18	2.40	/

Tree Number	Tree Tag	Species	Height (M)	Effectual Diameter (mm)	Branch Spread				1st Significant Branch	Life stage	General Observations	Preliminary Management Recommendations	Remaining Contribution (years)	Retention Category	Root Protection Area (M2)	Root Protection Radius (M)	Photo Ref
					N	S	E	W									
14	1650	Sycamore	16	500	1	4	5	7	5	EM/M	Standard tree of good form in H2a. Forms a pair of trees with T15, co-existing with shared rooting area and a reliance upon each other for protection from the elements. FENCING PROPOSED WITHIN RPA	None	40+	B 2	113	6.00	6
15	NA	Sycamore	16	525	5	2	5	7	4	EM/M	Standard tree of good form in H2a. Forms a pair of trees with T14, co-existing with shared rooting area and a reliance upon each other for protection from the elements. FENCING PROPOSED WITHIN RPA	None	40+	B 2	125	6.30	6

C) THE PROPOSED DEVELOPMENT FOOTPRINT AND TREE LOSSES

In reviewing Drawing number FLVC-AHR-S1-XX-DR-A-08102-Proposed Site Plan Planning.

- No trees are lost to the development: -

D) FELLING AND PRUNING

- Trees for felling: - NONE

- Trees requiring pruning or other surgery works ARE LISTED BELOW: -

1	1641	Goat willow	Forms part of small group on the main entrance. Triple stemmed specimen. Decayed central subordinate stem. Bird box attached	Remove decayed subordinate stem.
2	1642	Goat willow	Forms part of a small group of trees on the entrance. Failed from base and hung up in the neighbouring tree, towards the main entrance. Stem leaning on BT line.	Coppice ASAP to 30cm from ground level and finish with a clean cut at 20 degrees.
3	1639	Grey alder	Forms part of a small group of trees on the entrance. Twin stemmed specimen of reasonable form. Slightly compressive main fork. Bird box attached	Remove basal epicormics. Monitor compression fork.
4	1644	Goat willow	Forms part of small group on entrance. Triple stemmed. Bird box attached	Tip back north, east and south crown by 2m due to asymmetric form and changed exposure with T2' s failure.
H1a, b, c	NA	Hazel, holly, common dogwood, sycamore, hawthorn	Native hedge along Cwm Lane. H1 b & c are box cut at 1.5m AGL, with H1a side pruned only at 3m AGL.	Box cut all annually, so H1a will be clear of the streetlight and signage.
9	1647	White willow	Relatively, recent pollarded specimen at 6m AGL. The extent of rooting is unclear here due to the relatively new path surfacing to the east, north and west. The Tree Constraints Plan (Appendices) shows unrestricted rooting except to the south where there is as low retaining structure and ground level change.	Re-pollard in 2026 and cyclically every 5-7 years thereafter. If this forms a significant constraint to development, then actual root morphology should be investigated.
H2a	NA	Hazel, hawthorn, field maple, ash	Native hedge on west boundary with Cwm Lane which has been side pruned to the roadside only.	Continue to side prune to roadside annually
H2b	NA	Hawthorn	Low, box cut, native hedge on southside of entrance.	Box cut annually.
11	1649	Sycamore	Standard tree of good form in H2a.	Remove basal epicormics.

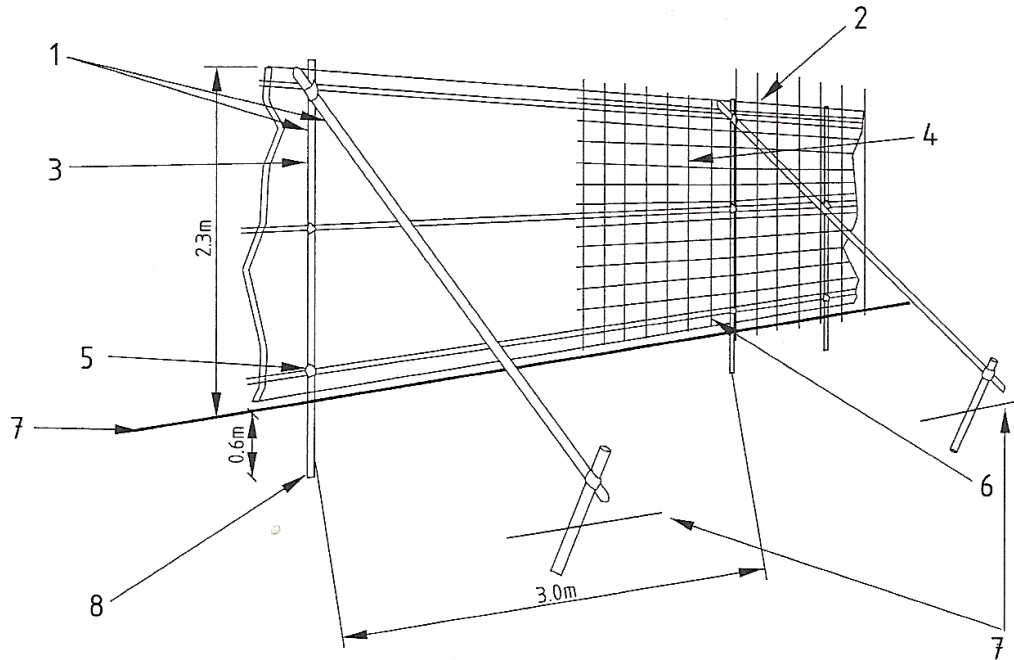
Method Statement for Tree Surgery and Felling

1. Engage a Project Arborist (PA) for the duration of works to monitor and advise as necessary under a Watching Brief Scheme.
2. Development footprint to be marked out clearly on site if required by the Project Arborist.
3. Any access facilitation pruning necessary to prevent injurious contact between plant and the tree(s) should be identified and scheduled by an Arborist and presented to the LPA for approval. In some cases, working space may be provided by temporarily tying back tree branches. Pruning or tying should be undertaken in accordance with a specification prepared by an arboriculturist.
4. PA to provide a toolbox talk to the approved tree contractors
5. PA to supervise tree felling and scrub clearance works and ensure they are in accordance with the approved plans.
6. Tree surgery and felling works must follow an approved Tree Works Schedule that is approved by the Local Planning Authority (LPA)
7. All approved tree works should only be undertaken by a competent arboricultural contractor who shall be made known to the LPA in writing 5 days prior to commencement for their approval.
8. All trees approved for felling (shown on the 'approved' Tree Removal, Retention & Protection Plan) should be clearly marked by the Project Arborist beforehand.
9. Tree felling and surgery should be undertaken with caution to prevent damage to retained trees and particularly their roots underground. Crush injuries will occur to roots of retained trees if felled within their RPA. In such instances, crash-mats should be used.
10. Legal issues relating to tree felling should be observed (Refer to section LEGAL CONSTRAINTS)
11. Under normal circumstances, the 'approved ' tree surgery and/or felling works should be completed prior to the erection of the Tree Protective Barrier Fencing although must come within the Watching Brief element under the supervision of the Project Arborist.
12. No vehicles are permitted within the RPA of any retained tree, without the use of load spreading material.
13. Contractors should be made aware of planning conditions relating to trees within and adjacent to the site and of any Tree Preservation Order or other site designation which may be relevant, through providing 'toolbox talks'.

E) TREE PROTECTIVE BARRIER FENCING

Before any materials or machinery are brought onto site, demolition, stripping of soil or development works of any kind commences, (apart from approved tree works) all trees to be retained must be protected using robust physical barriers (as shown in Figure 2, below) and where necessary, ground protection plates positioned.

The correct location for the Tree Protection Barriers is shown in the Tree Protection Plan, in the Appendices



- | | |
|--|--|
| 1 Standard scaffold poles | 5 Standard clamps |
| 2 Uprights to be driven into the ground | 6 Wire twisted and secured on inside face of fencing to avoid easy dismantling |
| 3 Panels secured to uprights with wire ties and where necessary standard scaffold clamps | 7 Ground level |
| 4 Weldmesh wired to the uprights and horizontals | 8 Approx. 0.6 m driven into the ground |

Figure 2 — Protective barrier



Tree Protective Barrier Fencing Method Statement

1. Engage a Project Arborist for the duration of works to monitor and advise as necessary under a Watching Brief Scheme.
2. The developer must ensure all Tree Protective Barrier Fencing is installed prior to any occupation of the site and prior to plant, machinery, equipment, site offices or materials etc being located, except for tree works where approved.
3. Where required, pre-development approved tree work may be undertaken prior to the installation of tree protection measures which must be under the guidance of the PA and with the agreement of the Local Planning Authority. However, no vehicles will be permitted within any unprotected RPA of retained trees and works must be carried out with due consideration and without causing injury to any retained tree. Trees permitted for felling will only be those approved on the Tree, Removal, Retention, & Protection Plan which must be identified on site clearly by the PA.
4. The PA must identify by marking out the RPA or crown spread, whichever the greater, for each tree or group on site, using road pins or fluorescent marker paint.
5. It should be confirmed by the PA that the barriers and any necessary ground protection are installed correctly prior to the commencement of any other operation and the LPA informed, who may wish to attend site and view it first-hand. A method statement is provided later in this report for installing ground protection measures which must be followed.
6. Once the Protective Barrier Fencing is in place, it must be signed off by the PA prior to any demolition, movement of plant and equipment or any site occupancy.
7. The PA will assess if any pruning or tying back of branches is required to prevent contact injury from plant. The PA will seek approval from the LPA of any Works Schedule created, identifying all necessary works.
8. Barriers should be monitored and maintained throughout any demolition, ground preparation and construction phase to ensure they remain rigid, complete, and fit for purpose.
9. Any works occurring within any RPA **must** be covered by an 'Approved' Arboricultural Method Statement and may only proceed under the supervision of the Project Arborist.
10. This protective barrier may only be repositioned or moved where covered by an Approved Method Statement and under the supervision of the PA.
11. Prior to any construction activity and where due to site constraints construction activity cannot be fully or permanently excluded from all or part of a tree's RPA, appropriate ground, tree stem, and low crown protection must be installed (see section 6.2.3 – BS 5837), under the guidance of the PA.

NOTES

1. It might be feasible on some sites to use temporary site office buildings as components of the tree protection barriers, provided these can be installed and removed without damaging the retained trees or their rooting environment.
2. All-weather notices should be attached to the barrier with words such as: "CONSTRUCTION EXCLUSION ZONE - NO ACCESS". Refer to example below).

F) DEMOLITION OF EXISTING STRUCTURES AND HARD SURFACES

- The scheme sees the demolition (to be conditioned) of the existing visitor centre. Tree Protective Barrier Fencing must be in position and signed off by the Project Arborist (PA) prior to demolition occurring and under the guidance of the below method statement.

Method Statement - Demolition

1. Engage a Project Arborist for the duration of works to monitor and advise as necessary under a Watching Brief Scheme.
2. Any approved tree felling should be undertaken if desired to assist in providing additional room for the demolition process. Trees permitted for felling will only be those with safety issues as mentioned above – Item 4.
3. Approved tree surgery and felling works must be undertaken under the supervision and guidance of the PA.
4. The erection of the Tree Protective Barrier Fencing must be correctly positioned, fit for purpose and approved by the PA prior to any site occupation, the commencement of any construction activities, deliveries, enabling works, including the movement of plant and equipment and commencement of any demolition works.
5. Great care should be taken not to damage the trunk or branch framework of any retained tree. The PA will assess if any stem protection, trimming or tying back of branches is required to prevent contact injury from plant and seek approval from the LPA of a works schedule, identifying all necessary works.
6. All plant and demolition equipment **must** operate outside of the RPA' s. If this is not possible, barrier fencing may only be offset to expose some of the RPA providing -
 - it is covered by an approved ³ Arboricultural Method Statement
 - suitable ground protection is installed
 - stems are protected where necessary
 - low branches are tied back or pruned back if part of an approved schedule of works, prior to commencement of operations, all to the satisfaction of the PA/LPA.
7. Some trees stand immediately adjacent to the structure to be removed. In this case, and subject to a risk assessment by the contractor, the demolition should be undertaken inwards within the footprint of the existing building (often referred to as "top down and pull back") to prevent damage to the tree. Barrier Fencing must be in place prior to commencement.
8. The advice of an Arboriculturist should be sought where underground structures are present (none known at this time) within the RPA are, or will become, redundant. In general, it is preferable to leave such structures in situ, as their removal could damage adjacent tree roots.
9. When removing existing hard surfaces above an RPA, the tree protective barrier fencing may be offset temporarily where it is agreed with the PA. All works must be done under the strict supervision of the PA.
10. Plant and equipment should not encounter any part of the tree or unprotected ground surface and where the existing hard surface being removed is not strong enough or of sufficient width to offer support, then load spreading ground plates will be necessary.
11. Demolition and removal of hard surfaces must be undertaken in a way that does not cause soil compaction within an RPA (or an area highlighted for planting) or physically encounter and injure roots or above ground parts of any retained tree.
12. All plant and demolition equipment **must** operate outside of the RPA' s. If this is not possible, barrier fencing may only be offset to expose some of the RPA providing -
 - it is covered by an approved ³ Arboricultural Method Statement
 - suitable ground protection is installed
 - stems are protected where necessary

- low branches are tied back or pruned back if part of an approved schedule of works, prior to commencement of operations, all to the satisfaction of the PA/LPA.

13. Subject to a risk assessment by the contractor, where possible, the demolition should be undertaken inwards within the footprint of the existing building (often referred to as "top down and pull back") to prevent damage to the trees.
14. Hand-held tools or appropriate machinery should be used (under arboricultural supervision) to remove the existing hard surface, in a reverse working fashion that is not damaging to any part of the tree, working backwards over the area, so that any plant or machinery is not moving over exposed ground.
15. Where any tree stands adjacent to a structure scheduled for demolition, levels of dust are likely to build up on the trees. This can have a damaging effect on the health of a tree where it becomes particularly heavy during the summer months when trees are in full leaf and actively growing. Where this occurs, it should be monitored and removed through hosing down when deemed necessary by the PA.
16. Upon completion of the works, the Tree Protective Barrier Fencing must be reinstated immediately to the satisfaction of the PA and signed off with the LPA.

G) INSTALLATION OF TEMPORARY GROUND PROTECTION

- The figure below shows the development footprint and its closeness to the root protection areas of trees H2b, H2a, T15 and T10 (shown as orange dotted lines). It is highly likely ground protection will be required here.

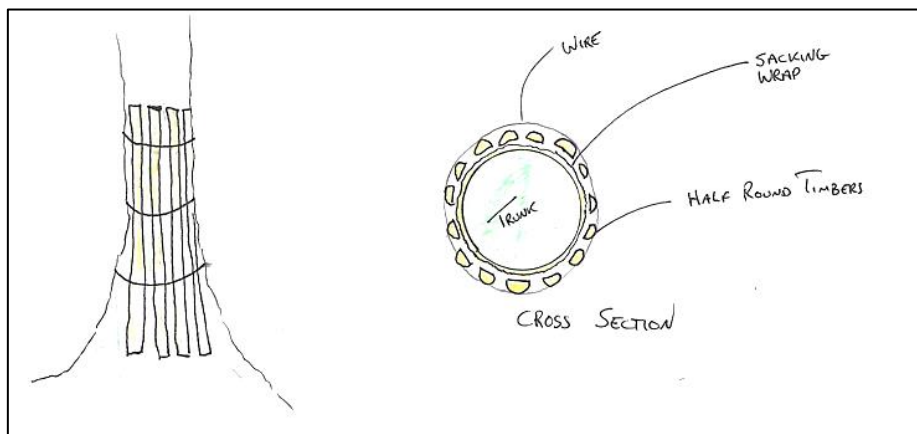


Where construction works or temporary access is justified within the RPA, this should be facilitated by a set-back in the alignment of the barrier fencing and temporary ground protection installed within the exposed RPA to act as a load spreader and avoid soil compaction and compressive root injury. The ground protection materials must be adequate to support the plant and equipment used and for the weights intended. Such a setback in the alignment of fencing must only occur immediately prior to the works commencing and which must be reinstated immediately following completion of the works, under the guidance and to the satisfaction of the Project Arborist.

In all cases, the objective should be to avoid compaction of the soil and injuries to the roots which can arise from even a single passage of a vehicle especially in wet conditions. Ground protection must be positioned correctly before any materials or machinery is brought onto site.

Tree stem protection may also be deemed necessary, and this will be assessed by the PA and instructed accordingly. If it is necessary, it must be installed to the standard shown below in Figure 1.

Figure 1 - Stem Protection Detail



Method Statement - Ground and Stem Protection

1. A site meeting should be arranged between the Site Manager and the PA to discuss the requirement.
2. Temporary ground protection is to act as a load spreader to avoid soil compaction and compressive root injury.
3. The load spreaders intended for use must be adequate for the loads intended and agreed with the PA in writing prior to commencement of works.
4. Where construction works or temporary access is justified within the RPA, and is highlighted within an approved AMS, this should be facilitated by a set-back in the alignment of the barrier fencing.
5. The Tree Protective Barrier Fencing may be set back the minimum amount required for the duration of the works and to the satisfaction of the PA.
6. Temporary ground protection must be installed over the exposed Root Protection Area (RPA), to act as a load spreader to avoid soil compaction and compressive root injury.
7. Laying the ground protection material over the exposed RPA should be carried out immediately after the set back in the barrier fencing is completed and prior to the onset of any works and preferably during dry weather.
8. Take care not to damage any part of the tree stem or branches. Select plant or equipment that is of a suitable height to prevent the necessity for pruning. Where conflict still exists, tie back branches in preference to pruning where possible or prune in accordance with an approved ³ tree surgery schedule.
9. Install stem protection where necessary in accordance with Figure 1. PA to assess and advise.
10. In all cases, the objective should be to avoid compaction of the soil and crushing injuries to the roots which can arise from even a single passage of a vehicle, plant or equipment, especially in wet conditions.
11. A product such as Trackmats or a similar product should be used which must be agreed with the Project Arborist. The ground protection might comprise one of the following: -
 - ✓ For pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, to form a suspended walkway, or on top of a compression-resistant layer (e.g., 100 mm depth of woodchip), laid onto a geotextile membrane.

- ✓ For pedestrian-operated plant up to a gross weight of 2-ton gross weight, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g., 150 mm depth of woodchip), laid onto a geotextile membrane.
- ✓ For wheeled or tracked construction traffic exceeding 2-ton gross weight, an alternative system (e.g., proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with an engineer and Arboriculturist, to accommodate the likely loading to which it will be subjected.
- 12. Laying the ground protection layers should be done in a forward working fashion to avoid compaction so any vehicle involved in the process will always be situated on top of the ground protection.
- 13. Removal of the ground protection at the end of the construction phase should also be done in a reverse working fashion.
- 14. Stem protection should be removed carefully avoiding damage to the bark.
- 15. Such a set-back in the alignment of fencing must be reinstalled immediately following completion of the works in accordance with the Tree Protection Plan and under the guidance of the PA.
- 16. PA to sign off the activity with the LPA.

H) INFRASTRUCTURE REQUIREMENTS AND SERVICE SUPPLIES

Services General Details

Tree roots can be damaged where services are installed within the RPA. Also, disruption to underground services can occur if they are placed within the root-plate zone as tree roots can cause damage to them. The RPA therefore should be taken as a minimum constraint to the development with regards the installation of underground services and greater distances should be allowed where possible.

Mechanical trenching for the installation of underground apparatus and drainage severs any tree roots present which may adversely affect the health and/or stability of the affected tree/s. It can also change the local soil hydrology. Care should be taken in the routeing and methods of installation of all underground apparatus. Wherever possible, apparatus should be routed outside of Root Protection Areas.

Where apparatus is to pass within an RPA, detailed plans showing the proposed routeing should be drawn up in conjunction with the PA. In such cases, trenchless insertion methods should be used (refer to Table 3 below), with entry and retrieval pits being sited outside the RPA, if roots can be retained and protected. Hand excavation might be acceptable for shallow service runs.

The crown of a tree is also a constraint to a development and should be considered when seeking to install services or when operating plant and equipment. Often, the crown of a tree exceeds the RPA. Both matters will be considered in detail within the Arboricultural Method Statement.

New development can influence the existing drainage pattern and ground water levels of a site, due to level changes, increased areas of hard surface and new drainage installations. The root systems of mature trees do not generally adapt as well as younger specimens to alterations to groundwater. Expert advice on both drainage and trees should be taken where groundwater conditions are liable to change.

Toilets and Site Accommodation

- No information is provided

Contractors carparking

- No information is provided

Secure Site Storage

- No information is provided

Storage for Site Materials

- No information is provided

Main Gas

- No information is provided

Signage and CCTV

- CCTV and signage are unlikely to be required and are not currently proposed as part of this scheme.

Mains Water

- No conflicts

Vision Splays

- No trees are to be removed to achieve necessary vision splays under the current scheme.

Level Changes

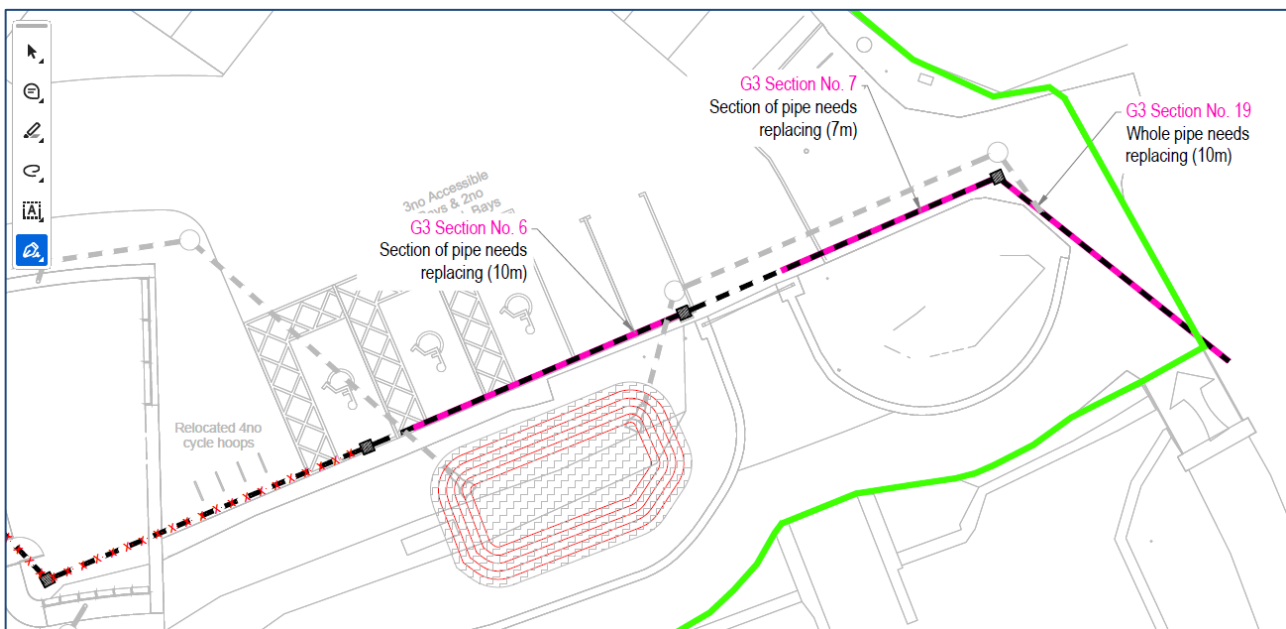
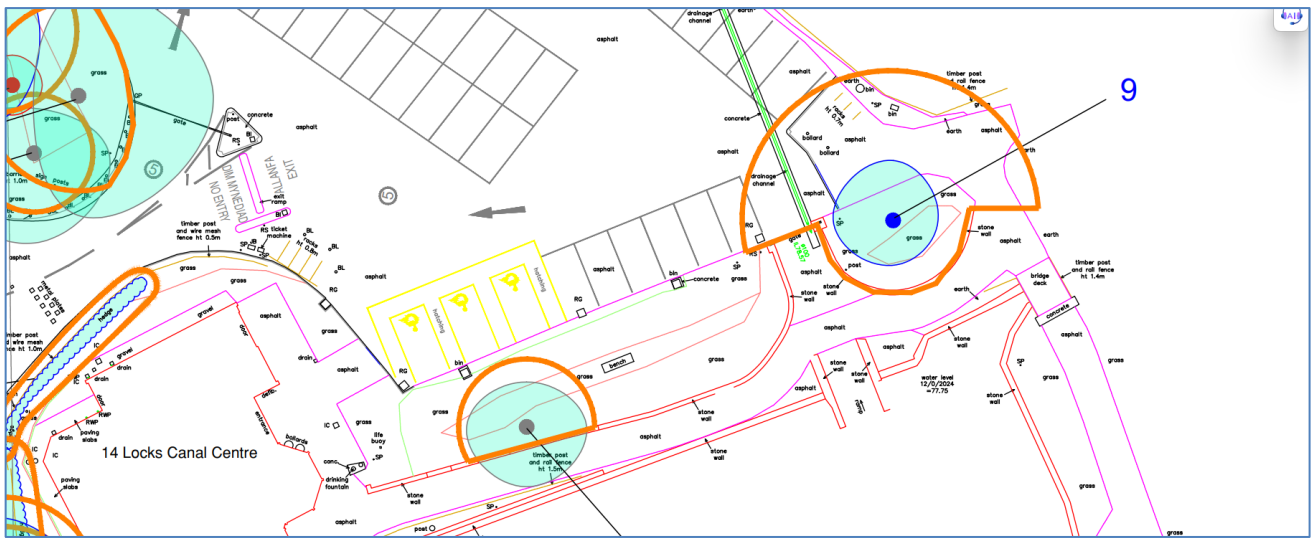
- No information was provided on existing and proposed levels.

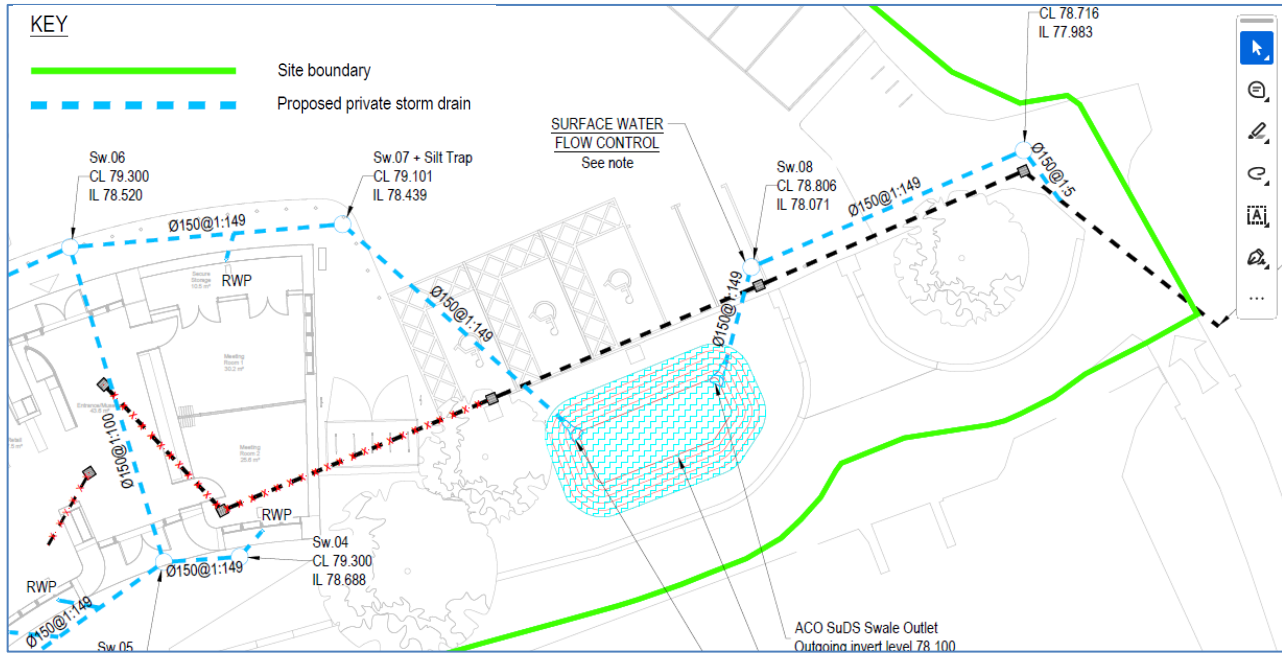
Building Footprint

Whilst the development plans when viewed suggest there is a conflict, the bin store and planter do not require any new platforms or excavation for their construction and will merely be secured in place on existing hardstanding. Standard wood panel fencing will surround the bin store and that marginally encroaches the Root Protection Area only. Therefore, the conflict is negligible.

Drainage, SUDS & Swales.

- Drawing number 0050-P01-Proposed Drainage Layout- AHR Building Consultancy shows a conflict with the proposed private storm drain and Tree 9 and 10 (See Key below). The RPA for both trees is shown on the first figure below which is an extract from the Tree Constraint Plan (Ambler). I have overlaid the RPA approximately onto drawing number 0050-P01-Proposed Drainage Layout- AHR Building Consultancy in the second figure below.
- Proposed pipe replacement will conflict also with tree 9 and 10. See third figure below.



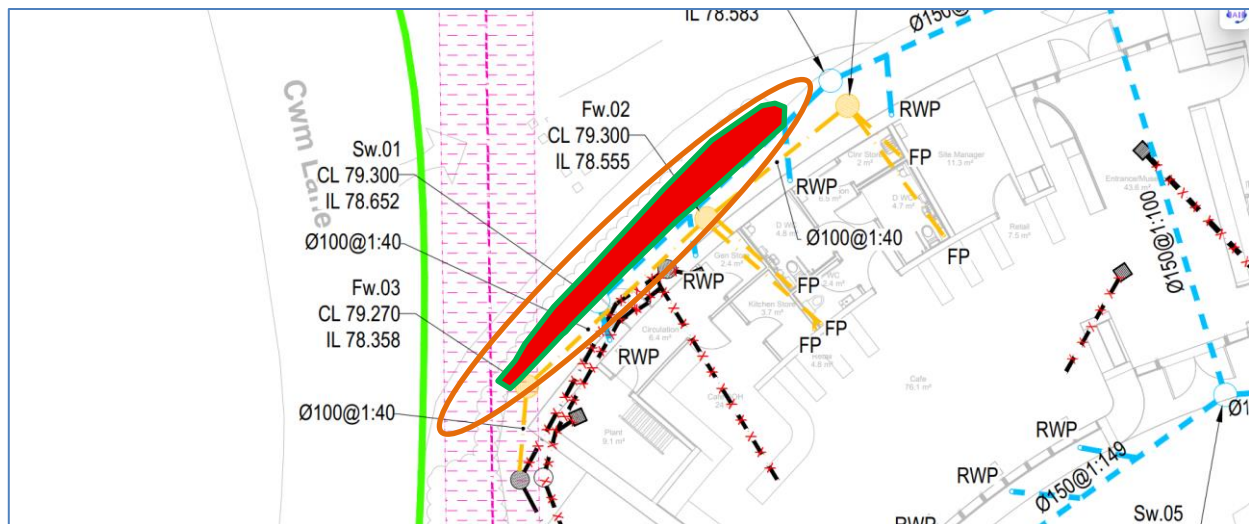


Recommendation –

1. Drain replacement should be done using no dig techniques and Vacuum Excavation in relation to Tree 9 and 10.
2. Employ tree friendly construction techniques such as Thrust Boring, Vacuum Excavation or Impact Miling to instal the private storm drain in relation to trees 9 and 10 following the method statement and Table 3 below -

Foul Sewer

- Proposed private drain interferes with Hedge 2b. See screenshot below. Hedge is coloured red, RPA coloured orange, and proposed drain blue dash.



Recommendation –

3. Private Drain should be installed using no dig techniques and Vacuum Excavation in relation to Tree 9 and 10. Or. employ tree friendly construction techniques such as Thrust Boring, Vacuum Excavation or Impact Miling to instal the private storm drain in relation to trees 9 and 10 following the method statement and Table 3 below -

Image showing thrust boring techniques



Table 3 Trenchless solutions for differing utility apparatus installation requirements					
Method	Accuracy	Bore dia. ^{A)}	Max. sub. ^{B)} length	Applications	Not suitable for
	mm	mm	m		
Microtunnelling	<20	100 to 300	40	Gravity-fall pipes, deep apparatus, watercourse/ roadway undercrossings	Low-cost projects due to relative expense
Surface-launched directional drilling	≈100	25 to 1 200	150	Pressure pipes, cables including fibre optic	Gravity-fall pipes, e.g. drains and sewers ^{C)}
Pipe ramming	≈150	150 to 2 000	70	Any large-bore pipes and ducts	Rocky and other heavily obstructed soils
Impact moling ^{D)}	≈50 ^{E)}	30 to 180 ^{F)}	40	Gas, water and cable connections, e.g. from street to property	Any application that requires accuracy over distances in excess of 5 m

^{A)} Dependent on strata encountered.

^{B)} Maximum subterranean length.

^{C)} Pit-launched directional drilling can be used for gravity fall pipes up to 20 m subterranean length.

^{D)} Impact moling (also known as thrust-bore) generally requires soft, cohesive soils.

^{E)} Substantial inverse relationship between accuracy and distance.

^{F)} Figures given relate to single pass: up to 300 mm bore achievable with multiple passes.

NOTE - The National Joint Utilities Guidance 4 (NJUG), which is a guide for utility companies when installing services, is not relevant under Planning Conditions and the more stringent protection measures under Section 7.7. of BS5837 Trees in relation to design, demolition and construction – Recommendations (2012), apply. Utility companies must be instructed accordingly and follow the above-mentioned British Standard.

Arboricultural Method Statement - Services.

Excavating trenches using hand digging methods close to trees is an accepted alternative for small distances providing roots above 100-mm are not severed or damaged in the process which can allow services to be installed beneath the web of tree roots, although digging is painstakingly slow and laborious. The use of air spades may also be viable. This approach demands the onsite presence

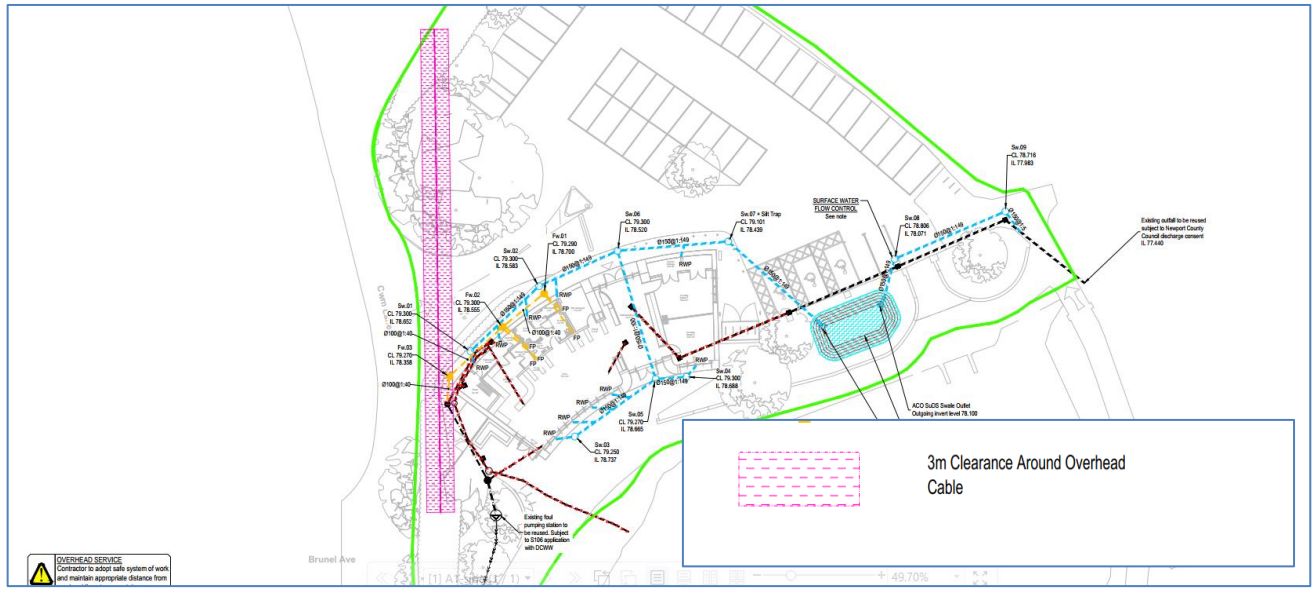
of an Arborist to oversee the day to day digging which often becomes a condition of planning. This method only proves a viable alternative with a short length of the intended route and cost implications associated with labour and a supervising arborist.

1. The Client is to mark out the proposed route of the service runs clearly, using flu marker paint or other agreed system, for inspection by the PA prior to any works commencing.
2. Service route to be located outside the RPA where possible.
3. PA to supervise the entire operation.
4. PA to provide toolbox talk to the engaged Contractors undertaking the works immediately prior to commencement of works.
5. Tree Protective Barrier Fencing to be offset just sufficiently for the works to be undertaken and immediately prior to the works.
6. The tree crowns should be protected from possible collision damage and included within the area protected by the tree protective barrier fencing.
7. Ground plates to be installed were needed, approved and signed off by the PA.
8. Install stem protection where necessary in accordance with Figure 1. PA to assess and advise.
9. Any proposed tree surgery works must be scheduled by the PA and presented to the LPA for approval prior to commencement.
10. Contractor must carry a spill kit and deal with any oil or fuel leaks promptly and report them to the PA and Site Manager.
11. Trench is to be excavated by hand, using hand tools only or by vacuum excavation or air spade.
12. Roots above 50-mm diameter must be retained undamaged.
13. Exposed roots must be covered with damp hessian once exposed, to prevent drying.
14. Smaller broken roots should be pruned with a clean-cut, using secateurs.
15. Following insertion of the services beneath the retained roots, the trench should be backfilled with clean, friable, sandy loam soil. Compacting by foot in layers of 100-mm.
16. Tree Protective Barrier Fencing to be repositioned in its correct location immediately upon completion of the works and to the satisfaction of the PA.
17. All the works must be to the full satisfaction of the PA.

Mains Electricity

- An existing overhead electricity cable requires a standard 3-metre clearance around this overhead service wire. This overhead service is existing and will be subject to resilience cutting by the power provider. See screen shot below.

Recommendation - PA to undertake a tree canopy survey and discuss implications and draw up tree surgery schedule if appropriate for approval by the LPA.

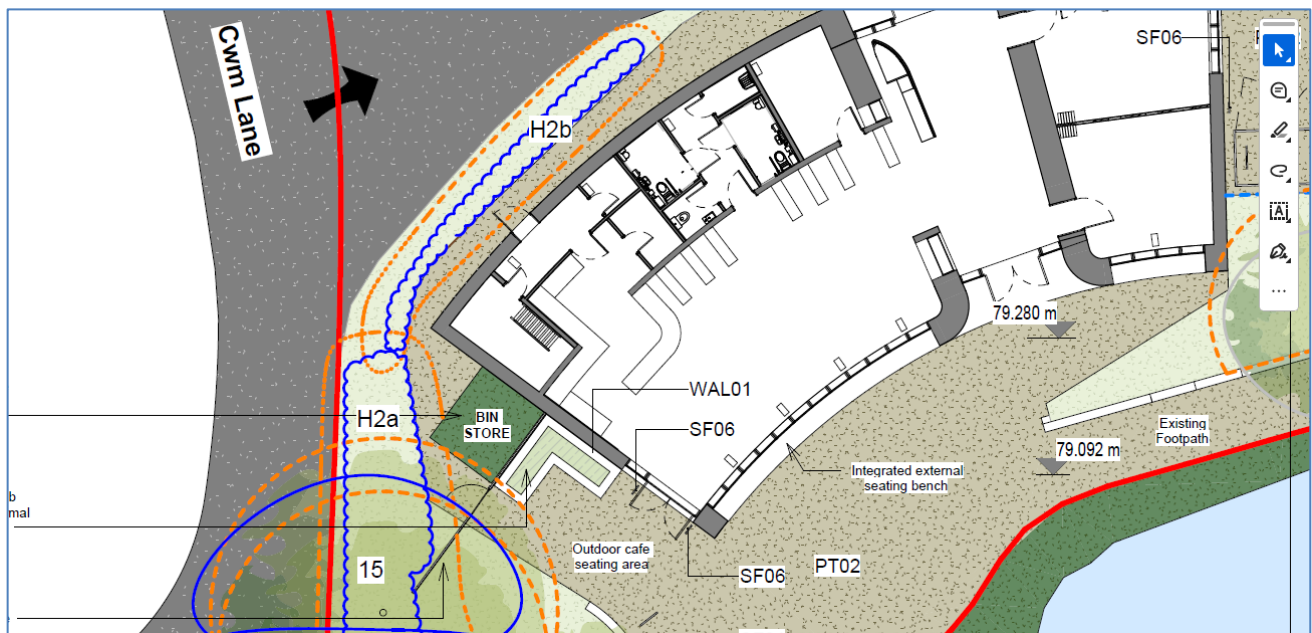


I) INSTALLATION OF NEW HARD SURFACING - MATERIALS, DESIGN CONSTRAINTS

- It is uncertain if the resin bond surfacing is existing or proposed in some areas of the RPAs as it is not distinguished within the Hard Landscape Plan as shown in the key extract below (PT02).

NOTE – Resurfacing and laying of footpaths and access roadways across or through RPAs is particularly damaging to trees.

 **PT02** Existing & proposed buff coloured resin bound gravel surface



Tree friendly construction techniques are acceptable where the existing ground levels are not lowered and the following design principals and working method are engaged.

Design Recommendations

1. The design recommendations are taken from ² Arboricultural Practice Note 12 & ³Arboricultural Association Guidance Note 12 and should not require excavation or soil stripping into the ground, within the RPA – in other words, NO DIGGING. Scraping is not permitted unless using hand tools to remove turf or vegetation layers.
2. The structure of the hard surface should be designed to avoid localised compaction by evenly distributing the loading over the track width or wheelbase of any vehicle expected to use the access.
3. If the new surface is expected to be subject to de-icing salt application, an impermeable barrier should be incorporated to prevent contamination of the rooting area. Run-off should be directed away from the RPA.
4. Where a permeable surface is to be used by vehicular traffic, a geotextile should be used at the base of construction to help prevent pollution contamination of the rooting area below.
5. Permeable hard surfacing can result in soil volume moisture content remaining at or near field capacity for long periods. Where there is a risk of waterlogging, the design should incorporate appropriate land drainage.
6. Land drainage within the RPA should be designed to avoid damage to the tree and the soil structure, e.g., sand slitting formed by compressed air soil displacement with the slits set radially to the tree.
7. The hard surface should be resistant to or tolerant of deformation by tree roots and should be set back from the stem of the tree and its above-ground root buttressing by a minimum of 500-mm to allow for growth and movement. Resulting gaps may be filled using appropriate inert granular material.

NOTES.

Appropriate sub-base options for new hard surfacing include three-dimensional cellular confinement systems. Alternatively, piles, pads or elevated beams can be used to support surfaces to bridge over the RPA or, following exploratory investigations to determine location, to provide support within the RPA while allowing the retention of roots greater than 25 mm diameter.

The use of two-dimensional load suspension systems is not recommended for surfaces intended for use by vehicles.

8. When designing the hard surface, account should be taken of finished levels in relation to adjacent structures, including damp-proof courses, garage slabs and links to existing vehicular crossovers.
9. If a permeable surface is to be used by construction traffic, this should be protected with a temporary sacrificial surface laid over a geotextile separator to ensure that its permeability is retained (i.e., interstices should not become blocked during construction).
10. The excavation needed for the placement of kerbs, edgings, and their associated foundations and haunchings can damage tree roots. Within the RPA, this should be avoided either using alternative methods of edge support or by not using supports at all.

NOTE. For example, where kerbing is required for light structures such as footpaths, above-ground peg and board edging might be acceptable. Where areas of hard surface require edge support, the use of sleepers (pinned in place where required), gabions or other non-invasive ground-contact structures, including the use of proprietary products, can provide appropriate solutions.

² Arboricultural Practice Note 12. Arboricultural Advisory Information Service. Through the Trees to Development. Derek Patch and Ben Holding

³ Arboricultural Association, Guidance Note 12. The Use of Cellular Confinement Systems Near Trees: A Guide to Good Practice. Ben Rose

11. The soil structure including the area beneath the proposed new hard surface should be protected from compaction during installation. This may be achieved by a) the use of temporary ground protection to safeguard the working area: b) constructing the new surface with machinery working forward from the surface as it is constructed (known as "rolling out").
12. Where herbicide is used to control vegetation prior to construction of hard surfacing, the manufacturer's guidance should be strictly followed, and care should be taken to avoid any damaging effects on trees or other vegetation to be retained.

NOTE. The use of appropriate geotextiles can provide a barrier that inhibits weed growth but allows water and gases to pass freely.

13. The ground should not be skimmed to establish the new hard surface at the former ground level. Loose organic matter and/or turf should be removed carefully using hand tools. The new surface should then be established above the soil.
14. Raising levels should be achieved by use of a granular material which remains gas and water permeable throughout its design life.
15. Due to the highly alkaline leachate produced during the curing of wet concrete, concrete should not be poured within the RPA unless an impermeable liner has been installed.
16. New permanent hard surfacing should not exceed 20% of existing unsurfaced ground within the RPA.
17. Construction should incorporate two main components:
18. A synthetic load spreading material.
19. A no-fines aggregate sub-base.

NOTE. A **geotextile**, which is usually used to prevent layers of different materials mixing while allowing water to pass through is not designed to be load bearing. 'Load Spreading' materials are synthetic grids or webs designed to support roads on soft ground by distributing the load of a wheel over a larger area than would normally occur. Such load spreading materials may be two or three dimensional.

20. When placed on a **two-dimensional grid**, appropriate, no-fines granular sub-base material penetrates the mesh, but is unable to pass through it, forming a positive interlock. This interlock between aggregate and grid provides a reinforced platform and efficient load spread into the ground over a wider area than the footprint of the wheel on the surface. A suitable geogrid/aggregate combination constructed with the grid under tension should prevent rutting of the ground beneath construction.

NOTE. Two dimensional grids are not to be used where vehicles access is required.

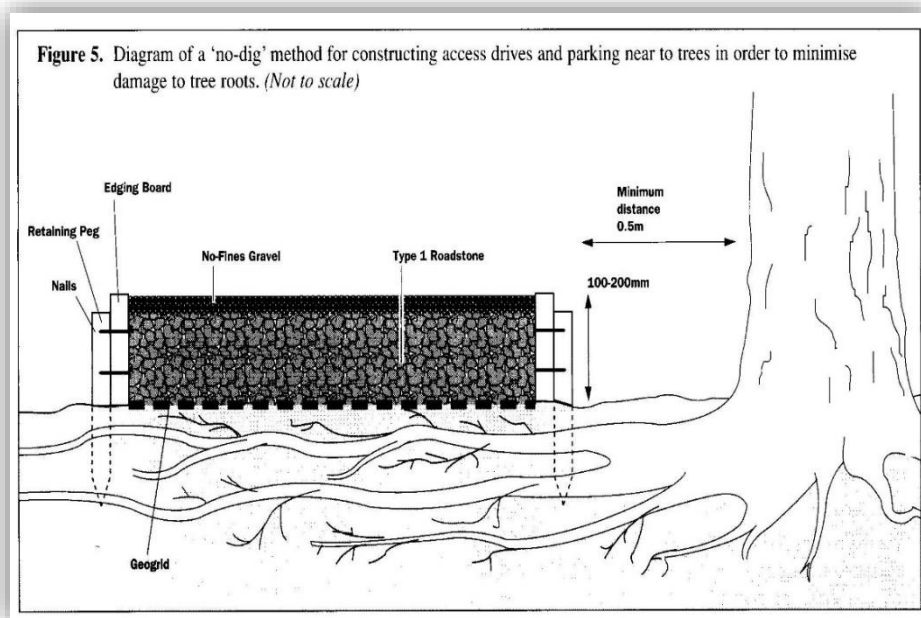
21. The **three-dimensional load spreading products** (Cellular Confinement System) create cells into which the subbase material is placed (refer to image, below). Such a construction does support the sub-base material: it confines the material in discrete cells. Manufacturers recommended a geotextile (see note above) is placed between the ground and load spreader to prevent the cell-contained mineral material being pressed down on the underlying soil.
22. A no-dig construction above ground level will need to be contained to prevent outward creep under the weight of vehicles. This may be achieved with an edging support provided its construction does not involve excavation. A suitable material may be long-life timbers pinned through the load-spreader into the underlying soil (refer to image, below). This could add strength to the structure because the pressure of vehicles forcing the sub-base downwards and outwards will tend to increase the tension on the grid and tendency to rutting.
23. The granular sub-base material **MUST** have a 'no-fines' content which means that even when it is compacted it should be freely draining and will allow oxygen to diffuse into, and damaging gases (e.g., carbon dioxide and methane) out of the soil.

NOTE. For site-specific prescriptions and material specifications, advice should be sought from a qualified geotechnical or civil engineer who should work in consultation with an arboriculturalist.

Image. Three-Dimensional Load-Spreader



Figure 5



Method Statement - Constructing Access within RPA

1. The Client is to mark out the proposed route clearly, using flu marker paint or other system, for inspection by the PA prior to any works commencing.
 2. PA to supervise the entire operation.
 3. PA to provide toolbox talk to the engaged Contractors undertaking the works immediately prior to commencement of works.
 4. Tree Protective Barrier Fencing to be offset just sufficiently for the works to be undertaken and immediately prior to the works.
 5. The trees crowns should be protected from possible collision damage and included within the area protected by the tree protective barrier fencing.
 6. Ground plates to be installed where needed, approved and signed off by the PA.
 7. Install stem protection where necessary in accordance with Figure 1. PA to assess and advise.
 8. Any proposed tree surgery works must be scheduled by the PA and presented to the LPA for approval prior to commencement.
 9. Contractor must carry a spill kit and deal with any oil or fuel leaks promptly and report them to the PA and Site Manager.
 10. Construction should ideally be undertaken between May and October when the ground is driest and least prone to compaction.
 11. Take care when constructing not to compact the soil or cause root damage. There **must not** be any movement within the root protection area before the ground is protected by the load spreader and the subbase. Then movement must only be along the construction.
 12. Kill ground vegetation using a translocated herbicide such as glyphosate⁴. After some time, gather up the dead organic material: this will prevent the build-up of anaerobic conditions beneath the construction, which might otherwise occur as vegetation begins to decompose.
 13. Remove major protrusions such as rocks and tree or shrub stumps (stumps should be ground out rather than excavated to minimise soil disturbance).
 14. Fill major hollows with sharp sand. DO NOT GRADE-OFF HIGH SPOTS
 15. If necessary, for example when using three-dimensional cellular confinement products as a 'load spreader' , a geotextile should be spread over the area of the driveway or car park.
 16. Lay a geotextile membrane over the whole of the driveway/parking area prior to the application of the three-dimensional load spreader.
 17. Lay the 'synthetic load spreader' directly onto the level ground or the geotextile as appropriate.
 18. Secure the synthetic load spreader under tension using long pins driven into the ground through the grid.
- NOTE.** Before driving pegs or pins into the ground, check for underground services that could be damaged.
19. Construct an edging which is secured through the load spreader so that pressure on the running surface will force the edging outwards and so increase the tension on the load spreader. With boards attached to pegs driven into the ground through the geogrid. Pegs should be long enough to give sufficient support for the construction.
- NOTE.** Before driving pegs or pins into the ground, check for underground services that could be damaged.
20. Cover the load spreader with a minimum of 100 mm of no-fines aggregate. This should not be tipped straight onto the synthetic material but should be placed at one end and then pushed onto the grid so that machinery moves on the spread sub-base, not directly on the geogrid and not on the ground either side of it. Begin construction at the entrance to the site and 'roll-out the sub-base in front of the machinery which always remains over the sub-base.
 21. Compact the sub-base to ensure binding with the geogrid and to minimise future rutting.
 22. A further geotextile may be placed over the sub-base to prevent dry bedding materials or surfacing merging with the sub-base.

⁴ Pesticides can be dangerous...refer to manufactures instructions and follow the advice on the label carefully. Pesticides should only be used by competent personnel.

23. Place the final surface which is likely to consist of gravel or tarmacadam, although paving slabs and brick pavements may be acceptable, provided they are dry bedded on the sub-base and the joints are not sealed with grout, to allow for infiltration of water and gaseous diffusion.
24. Tree Protective Barrier Fencing to be repositioned in its correct location immediately upon completion of the works and to the satisfaction of the PA.
25. All the works must be to the full satisfaction of the PA.

J) SPECIALIST FOUNDATIONS - INSTALLATION TECHNIQUES

- No special engineering is required for foundations within the RPA

K) RETAINING STRUCTURES TO FACILITATE CHANGES IN GROUND LEVELS

- Non required within any RPA as part of this scheme.

L) BOUNDARY TREATMENTS

- The hit and miss style 1.8-metre-high fencing conflicts with the RPA of tree T15 and Hedge H2a (highlighted within yellow box in the figure below). Where these conflicts occur, the following approach within the method statement below should be taken to minimise any potential damage to tree roots.

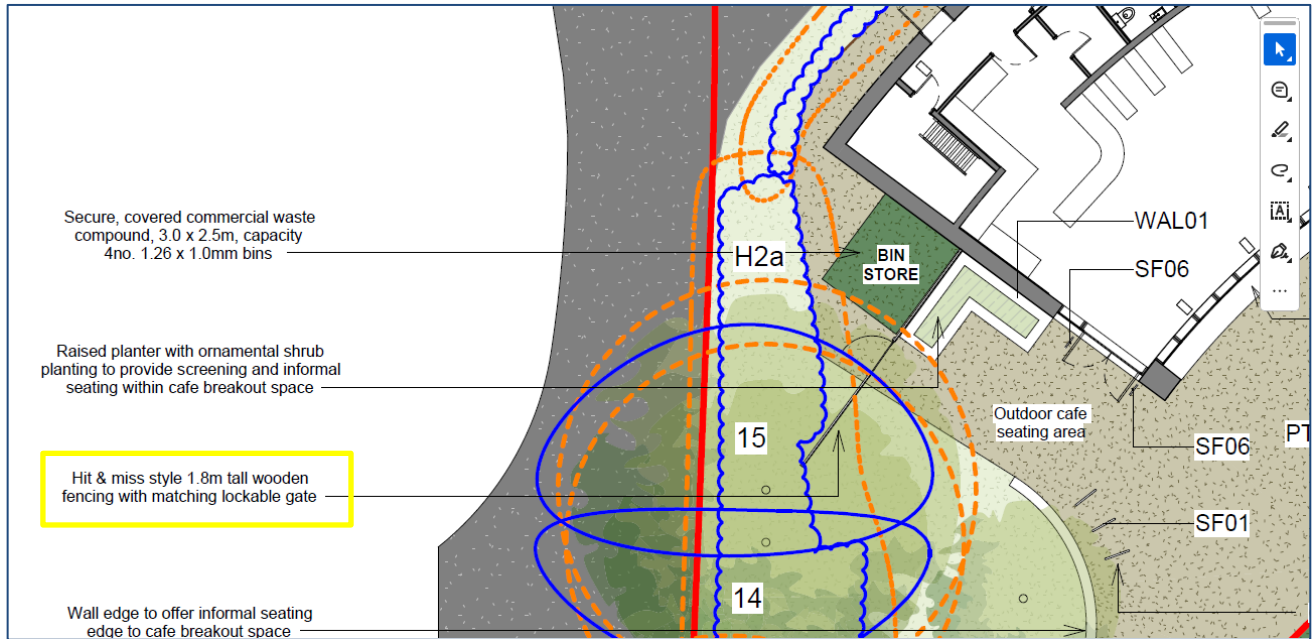
The erection of boundary fencing within RPA has the potential to damage tree roots, their stability, and long-term survivability. Damage may be caused in several ways although the most common is during excavations for the support posts, which can sever structural roots, the larger, woody roots that occur within several metres of the tree. To sever these can cause immediate stability and physiological issues and certainly provide entry points for decay organisms which later may become an issue affecting their stability.

Where possible, excavations should not occur within the Mechanical Effective Root-plate Radius (MERR). The MERR is a radial measurement established during work undertaken by Claus Mattheck⁵ and refers to the critical distances required to maintain the structural roots and stability of a tree. Structural roots differ from the finer feeding roots protected by the somewhat larger RPA. The MERR of any tree directly correlates to its trunk diameter when measured just above the root buttress flare.

Excavations for post holes should not exceed 200-mm in diameter, be cut cleanly with a posthole borer and be carefully positioned. They should not be spaced any closer than 1 metre apart when working within the RPA.

If working in the MERR is unavoidable, it may only proceed using hand tools and under the supervision of the PA and the agreement of the LPA and where the positioning of the fencepost is adjusted to avoid any large roots. These are often visible just along the surface close to the trunk and they should not be damaged during exploratory works.

⁵ Mattheck. C. & Breloer. H. The Body Language of Trees. A Handbook for Failure Analysis



Method Statement - Boundary Fencing

1. A posthole auger will be necessary to cut the postholes, and care should be taken when using any mechanical driven rig within the RPA.
2. Auguring must avoid the Mechanically Effective Root-plate Radius (MERR) of any retained tree, and these distances must be provided by the Arborist whilst on site and clearly marked out.
3. If working in the MERR is unavoidable, it may only proceed using hand tools and under the supervision of the PA and where the positioning of the fencepost is adjusted to avoid any large roots
4. The auger operation should limit the diameter of the holes to 200-mm or below, with a minimum distance between the edge of each pile of 1000-mm.
5. The barrier fencing should be altered to accommodate the works immediately prior to the operation and under the supervision of the PA. Once work is completed, the barrier fencing must be reinstated immediately to each protected tree.
6. Where using a rig, the auger operation should be carried out whilst on top of 'load spreaders' sufficient to support the weight of the plant to protect the RPA from compaction and the underlying roots from compressive injury, this protection should include tracking inwards and outwards from the RPA.
7. Consider the height of the Rig to prevent damage to overhanging branches.
8. Protect the tree stem as shown in Figure 1 where there is a potential conflict.
9. The augured excavated material shall be collected carefully and removed from the RPA.
10. Take precautions to prevent soil contamination, use a non-permeable sheet below the rig during its operation to prevent leaking fuel and hydraulic oil onto the soil.
11. Spill kits should be carried and in the event of any contamination, it shall be collected immediately and disposed of in a proper manner and the Arboriculturalist and Site Manager informed.
12. Where concrete is required, a non-permeable sleeve must be used to each augured hole to prevent leachates entering the soil and great care shall be taken not to spill and contaminate the soil.
13. The Project Arborist shall be informed of the dates of this operation and will attend site and provide a toolbox talk and supervise the work.
14. Works must be carried out to the satisfaction of the PA.

15. Photographic evidence will be taken to update the LPAs Tree Officer as part of the watching brief condition.
16. Upon completion of the works, the Tree Protective Barrier Fencing must be immediately reinstalled in compliance with the Tree Protection Plan.
17. PA to sign off the reinstatement of the Tree Protective Barrier Fencing.

M) PREPARATORY WORKS FOR NEW LANDSCAPING

- Amendments to design have now removed all potential conflicts with the proposed landscaping and retained trees.

General Advice

The surface around newly planted and existing trees should allow for adequate infiltration of water and free gas exchange, reduction of water evaporation and the retention of an open soil structure to encourage root growth. Care should be taken therefore to ensure grass or weed growth does not compete with young root growth by intercepting available water and nutrient supply. Care should also be taken to avoid the risk of damage to the stems of young trees from future strimming or mowing operations. An area with a radius of at least 500-mm from the stem of newly planted trees should therefore be kept free from competing vegetation by chemical weed control or by the more environmentally friendly option of mulching.

As a general rule the following loamy soil volumes should be provided for newly planted trees. Multiple factors need consideration including climate, size, species, proposed management and soil type.

- Small sized tree (Mature size with a stem diameter of <150 mm) = >10m³
- Medium sized tree (Mature size with stem diameter <300 mm) = >20m³
- Large sized tree (Mature size with stem diameter >450 mm) = >30m³



Top soiling over and above the root-plate of tree's is detrimental to their health even as little as 75-mm or above and where turf is added.

Often following completion of construction works, soil management and grass seeding, or turfing is carried out, and this can also be damaging to trees and therefore we have provided some general advice relating to landscaping near retained trees...

NOTE. Soft landscape finishes, including mulch and cultivated beds, will generally provide more favourable conditions for young tree establishment than most hard surfaces or grass. The use of ground-cover shrubs with an appropriate organic mulch is particularly beneficial: this treatment suppresses weeds, reduces maintenance, discourages intrusion and maintains a permeable open soil structure.

Soil Compaction and Remediation Measures

Soil that has been compacted will not provide suitable conditions for the survival and growth of vegetation, whether existing or new, and is a common cause of post-construction tree loss on development sites. Compacted soil will adversely affect drainage, gas exchange, nutrient uptake and organic content, and will seriously impede or restrict root growth. The risk of soil compaction is greatest in soils with significant clay content and in wet conditions. It can result from temporary or short-term loadings, such as the passage of a single vehicle, or from longer-term construction activities, including materials storage.

Soil compaction should be avoided in RPAs and areas where new planting or seeding is proposed which contain suitable ground conditions (fertile soil). Where soil compaction has occurred in RPAs or proposed planting areas, arboricultural advice should be taken before carrying out any remedial works. Remedial works may include sub-soil aeration using compressed air, and the addition of other materials, preferably of a bulky, organic nature (but excluding peat), to improve structure.

Use of Mulch

Open soil and shrub planting areas around newly planted trees should be mulched to inhibit weed growth, reduce groundwater evaporation, resist, and mitigate soil compaction and reduce maintenance requirements, whilst allowing gas exchange and water penetration to roots. The mulch material should be weed-free, easy to apply, containable within the area of application and readily available. The choice of material will be informed by local availability of materials, site characteristics and aesthetic requirements. The mulch should be periodically replenished as it decomposes so that it does not become depleted, and ideally when the soil is warm and moist.

The materials that may be used for mulching include coarsely divided plant matter, such as well-composted wood chip, pulverized bark, leaf mould or green waste conforming to PAS 100, and these may be combined with well-rotted animal manure. If the sole intention is to conserve moisture, a layer of gravel or well-secured sheets of material such as permeable geotextile fabric may be used and may be covered for cosmetic purposes. Any such sheets should be maintained to avoid damage to the tree (e.g., by clogging, weed growth, restriction of air movement or constriction of the stem).

The mulched area should extend over as much of the root system as can be allowed by other site-usage requirements. The depth of organic mulch should not be so much as to inhibit aeration of the root system (normally no more than 100 mm). The area around the tree should be well-watered prior to the application of mulching material and the mulch should be periodically replenished as it decomposes, so that it does not become depleted.

Mulches should be kept away from direct contact with the bark of the stem, or of major roots since this might encourage infection by pathogens by maintaining wet conditions.

NOTES

1. Mulches that retain water encourage the development of roots near the soil surface and within the mulch itself. This can become a disadvantage owing to desiccation if the mulch is removed or not replenished.
2. Although, by improving the soil texture and acting as a buffer for rainfall, mulches generally help to prevent extremes of soil wetness and dryness, they can prolong waterlogging on sites where drainage is seriously impeded. This in turn can harm tree roots and make them more susceptible to certain pathogens such as *Phytophthora* spp.
3. Further guidance on mulching is given in BS3998 Tree Works – Recommendations (2010).

N) WHETHER DESIGN CAN BE MODIFIED TO ACCOMMODATE TREE RETENTION

- The design team have worked with the Author to reduce as many conflicts as possible with this development and this revision 2 is the final version. The remaining conflicts identified can be addressed using tree friendly techniques and methods for tree friendly construction are provided.

O) WHETHER TREE LOSSES FROM THE DEVELOPMENT PROPOSAL CAN BE MITIGATED

- No tree losses occur as part of this proposal

P) A REALISTIC ASSESSMENT OF THE PROBABLE IMPACT OF THE PROPOSED DEVELOPMENT ON THE TREES & VICE VERSA

- Many of the trees are early mature, so future growth is expected. Some conflict may occur with branches touching the building structure in the future. This could be managed through light target pruning techniques.
- Any potential damage to the proposed building as a consequence of the trees would consider (a) indirect damage through subsidence or heave (a matter related to geology), (b) Direct damage, physical damage caused by incremental growth, (c) The disruption to underground services, (d) Displacement, lifting or distortion, (e) The impact on branches on the super structure or (f) Structural failure of a tree.
 - a) **Indirect damage.** The likelihood of damage occurring to the structure as a result of ground movement occurring through soil swelling and shrinking is dependent on local geological conditions and the presence of shrinkable clay soils beneath the foundations. This report has not considered the soil type in any detail or undertaken a laboratory soil analysis as part of this brief. The potential for direct damage should be taken into consideration throughout the design and construction process. For guidance on avoiding indirect damage by trees to structures, refer to NHBC Chapter 4.2.
 - b) **Direct damage.** This can sometimes occur through the annual incremental growth of the trunk or root buttresses through a process called 'secondary thickening'. The greatest risk of direct damage occurs when trees are close to building structures and occur with the expanding growth of the main trunk and roots although any likelihood of such damage diminishes rapidly with distance. Table A.1 of BS:5837 is produced below and provides advice on minimum distances to avoid damage.
 - c) **Displacement, lifting or distortion.** This can occur where lightweight structures are within influencing distance of trees and annual incremental growth of roots and buttresses have the ability to disturb paving, walls, porches, and garages.

Erecting buildings and structures near trees can result in conflicts and minimum distances are advised below in Table A1. Advice in Table A1 should be followed (see below) when planting new trees or controlling seedling growth.

BRITISH STANDARD

BS 5837:2012

Allowance needs to be made for the swaying of stem and branches during storm conditions. Branches which are liable to strike the structure need to be removed or pruned back to a suitable branching point as appropriate (see BS 3998:2010).

Table A.1 Minimum distance between young trees or new planting and structure to avoid direct damage to a structure from future tree growth

Type of structure	Minimum distance between young trees or new planting and structure, in metres (m)		
	Stem dia. <300 mm ^{A)}	Stem dia. 300 mm to 600 mm ^{A)}	Stem dia. >600 mm ^{A)}
Buildings and heavily loaded structures	—	0.5	1.2
Lightly loaded structures such as garages, porches etc.	—	0.7	1.5
Services			
<1 m deep	0.5	1.5	3.0
>1 m deep	—	1.0	2.0
Masonry boundary walls	—	1.0	2.0
In-situ concrete paths and drives	0.5	1.0	2.5
Paths and drives with flexible surfaces or paving slabs	0.7	1.5	3.0

^{A)} Diameter of stem at 1.5 m above ground level at maturity

A.1.3 Allowance for future growth

Where the installation of paths or light structures such as walls is unavoidable near to trees, the design and construction specification needs to take account of future growth.

If it is necessary to build a wall or similar structure over a root greater than 50 mm diameter, provision for future diameter growth needs to be made by surrounding the root with uncompacted sharp sand, void-formers, or other flexible fill materials, and by laying an adequately reinforced lintel or raft over the surface.

- d) **The impact of branches on structures.** Where development occurs close to trees and branches interfere or could interfere later due to their growth, can cause the LPA problems with repeated requests for trees to be pruned.
- e) **Wind Dynamics.** As far as wind dynamics are concerned, the following matters are noted. Air deflected over or around such solid structures will be locally accelerated to create turbulence. The proposed development is within influencing distance of the trees as buildings or solid structures can have an effect on leeward wind patterns for a distance in excess of 30 times their height⁶, although the effects of the more damaging wind turbulence in respect of trees is much shorter than this with the more dramatic influence being at least twice the height of the structure. It is usually a problem where retained trees have thin stems without adequate stem taper, and which have usually resulted where they have developed at close spacing' s and under mass shelter and particularly where a number of those trees have been removed.
- f) **Large trees can sometimes cause apprehension to occupiers of nearby buildings especially during windy weather.** Whilst this is true in some instances, structural failure amongst trees is most common where a specimen is diseased or structurally defective or undermanaged. Well managed trees offer little risk to residences where under routine arboricultural inspections, providing any remedial works recommended during such an inspection are carried out by a competent tree surgeon and in the time period recommended. The recommendations given within the Tree Survey¹

⁶ Patch.D. Trees, Shelter and Energy Conservation. Arboricultural Research and Information Note 145/ARB/98

should be fully implemented. The level of risk exposure (target occupancy) for these trees will increase and impose a duty upon landowners to manage the trees. However, this is a reasonable expectation of any perspective landowner and should not be seen as detrimental to the health or long- term future of the trees or to the outcome of the application. Appropriate tree management under the guidance of an Arboriculturalist should be beneficial: it may however suggest that management is required from time to time which up until now has been somewhat neglected.

- g) **Leaves and fruits of some species may cause problems**, and the accumulation of honeydew may be damaging to surfaces and vehicles. Here, the species of Sycamore (*Acer pseudoplatanus*) and Field maple (*Acer campestre*) is noted which is associated with aphid activity and the production of honeydew excretions. Falling leaves are likely to impact on this development and Gutter Guards should be built into the scheme to prevent gutters from becoming blocked. There are no species found on this site that produce large fruits.

Q) THE EFFECTS THAT DEVELOPMENT PROPOSALS MAY HAVE ON THE AMENITY VALUE OF THE TREES

- The proposed Visitor Centre at the Fourteen Locks will have negligible impact on the visual amenity of the area in terms of existing tree cover. No trees are lost to the development. Proposed landscape will enhance the area further.

GENERAL MATTERS

To prevent damage to the trees, including their roots, within the fenced area (RPA) there must be no...

- φ Alteration of ground levels, including soil stripping.
- φ Installation of drainage or services using conventional open trenching methods which would not be in accordance with BS:5837. (Any works should be in accordance with the National Joint Utilities NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees Volume 4)
- φ Excavation of any kind.
- φ Storage of any materials or equipment, even on a temporary basis.
- φ Storage of oil, bitumen, cement or other harmful materials, mixed or discharged within 12-m of the trunk of any retained tree and making further allowances for any slope of the ground so prevent running contamination. Phytotoxic materials would include any mineral oil, fuels, cement mortar washings concrete washings, mortar.
- φ Fires must not be lit beneath or within 12-m of any tree canopies.
- φ Site operations such as deliveries, site machines, crane jibs etc should be organised to avoid damaging the trunk or crown of trees. Where this conflict is unavoidable then facilitation pruning should be carried out in advance, rather than after damage has occurred. This may also be required to allow demolition operations.
- φ Mechanical cultivation of the soil as part of landscaping operations.

Planning of site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs), in order that they can operate without encountering the RPA, trunks stems or branches of any retained trees. Such contact can result in serious damage to the trees and might make their safe retention impossible. Consequently, any movement of plant or machinery in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is maintained at all times. Access facilitation pruning should be undertaken where necessary to maintain this clearance if in accordance with good arboricultural practice (refer to notes below).

AUDITABLE SYSTEM OF ARBORICULTURAL SITE MONITORING

Includes a schedule of specific site events requiring input or supervision.

Successfully retaining trees on any development site depends on several controls being in place. A determination and willingness by all parties is required but primarily the Site Manager will have overall responsibility to ensure that control measures are observed. Communication early in the procedure between the client, site manager, Arborist and Local Authority Tree Officer or other appointed staff, which is fundamental in maintaining a level of care.

The engagement of a Project Arborist is probably the single most essential component towards ensuring success. This should involve regular 'drop-in' visits by an appointed Arborist who will be responsible for monitoring tree protection measures and offer advice when needed.

A line of communications must be in place between Project Arboriculturalist, Site Manager, and Local Planning Authority Tree Officer as a minimum requirement. Details are provided below. Should any queries arise in relation to the protection of trees on this development site then please contact the Arborist on call, during normal office hours.

Such visits must be recorded to form an auditable trail and regular Reports submitted to the Local Planning Authority. The number of visits will be dependent on the type and density of the development and the matters requiring arboricultural input. The number of visits required may also be stated or altered by the LPA at any time during the permitted development.

The Site Manager (SM) must make themselves available for a meeting with the PA during the first Watching Brief (WB) visit. The SM must have read the document prior to the meeting and prepare any questions. During this initial meeting, the PA will point out the Arboricultural Watching Brief system and the site-specific Arb related works section that require specific supervision by the PA, along with the Tree Protection Plan. The SM will be required to sign and date a hard copy of the Arboricultural Method Statement with a dual signature page stating they have fully read, understood, and will implement the recommendations of the document. A copy will be appended to the first Arboricultural Watching Brief report and stay there for future reports, the SM will retain a signed copy on site.

SPECIFIC ARBORICULTURAL EVENTS

1. Tree Surgery and Pruning
2. Erection of Tree Protective Barrier Fencing
3. Laying of Ground Protection
4. Demolition
5. Laying of Services
6. Construction of Bin Store and Planters
7. Replacing services
8. Construction very close to RPAs
9. Working within an RPA
10. Fencing
11. Removal of Tree Protective Barrier Fencing, stem protection and ground protection plates or load spreaders.

SCHEDULE OF WATCHING BRIEF VISITS

1. At the very start of the site set up, and prior to the commencement of any construction or movement on site, the Project Arborist (PA) will attend site and provide the Site Manager with a toolbox talk on the Arboricultural Method Statement (AMS), will outline the role of the PA, identify all the key moments and specific arboricultural events within the AMS, and explain the mandatory reporting process to the Local Planning Authority (LPA). Should the Site Manager be replaced or temporarily substituted, then the process must be repeated, and it is the duty of the client to inform the PA when this occurs.
2. The PA should attend site and mark out the Tree Protective Barrier Fencing.
3. The PA should attend site and assess the Tree Protective Barrier Fencing is fit for purpose and sign-off with the LPA.
4. The Project Arborist should attend site and perform a watching brief visit on a weekly basis for the first two months and then fortnightly thereafter, unless specified differently by the LPA.
5. The PA at each visit will assess the retained trees and their protection for compliance with the Tree Protection Plan.
6. The PA must supervise all works that occur within or close to any RPA.
7. The suitability of the root protection fencing will be assessed at each visit.
8. Additional visits will occur at scheduled specific events as listed above and the PA MUST receive 7 days' notice in writing of these events so they can be calendared in.
9. Watching Brief Reports will be submitted to the LPA at the end of each month detailing the date of the visit, list concerns, recommended remedial action, sign off remedial action where complete and will include photographic evidence.
10. The Watching Brief Report will relay, communicate and update the LPA of the standard and success of arboricultural care on site.

COMMUNICATIONS LIST

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Environment & Economy Department

Civic Centre

Newport

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Mr. Scott Ambler (Project Arborist)

Steve Ambler & Sons Tree Specialists Ltd

Mobile – 0777 2998 9374

Email – Scott@steveamblertrees.com

Site Manager - To be confirmed.

RECOMMENDATIONS

1. The Arboricultural Method Statement (AMS) element of this Report and the Tree Protection Plan must be followed rigorously during construction. It is strongly recommended that a 'Project Arborist' is engaged for the duration of the construction period to oversee tree protection matters, be on hand to provide any arboricultural advice and maintain a level of communications between the client and Local Planning Authority's Tree Officer through submission of monthly progress reports.
2. Appoint a Project Arborist for the duration of the development to monitor and advise on tree protection and liaise with the Local Planning Authority where required.
3. Arborist to be present and supervise the works identified under Specific Arboricultural Events above.
4. Tree Protective Barrier Fencing must be in position as per the Tree Loss, Retention, Protection Plan and signed off by the Project Arborist (PA) prior to demolition and all works occurring.
5. Existing overhead service wire and tree canopies possibly subject to previous resilience cutting. Arborist to undertake a tree canopy survey and discuss implications and draw up tree surgery schedule or management plan if appropriate, for approval by the LPA.
6. Drain replacement should be installed using no dig techniques such as Vacuum Excavation in relation to Tree 9 and 10.
7. Employ tree friendly construction techniques such as thrust boring, Vacuum Excavation or impact moling to instal the private storm drain in relation to trees 9 and 10.
8. No level changes are permitted within the RPA of any tree.

Enter trees into annual routine tree inspections once the scheme is complete or when target occupancy increases.

Tree clearance works or works other than those to deal with serious defects posing considerable risk shall not commence until such time written approval or full planning approval is received from the Local Planning Authority. Any authorised tree works should be completed prior to the onset of any demolition or construction works, taking account of all legal constraints.

All the retained trees should be re-examined by an arboricultural specialist, once the development is complete.

Where the installation of paths or lightweight structures such as walls are unavoidable near to trees, the design and construction specification needs to take account of future growth. Refer to Table A of the Standard.

Shading of buildings by trees can be a problem, particularly where there are rooms which require natural light. Buildings will need to be positioned further away than just the outer edge of tree canopies to reduce the likelihood of pressure from future occupiers for tree removal or trimming. This applies particularly where windows of habitable rooms will face onto tree canopies. Future dimensions of immature trees and shadow patterns should also be considered. A minimum of 2-m should be allowed between buildings and the outer edge of fully-grown canopies to allow for building maintenance and the erection of scaffolding etc.

Proposed buildings should be designed to take account of existing trees that are to be retained, their ultimate size and density of foliage, and the effect that these will have on the availability of light. Where sufficient distances (including allowances for future growth) cannot be achieved, the removal of C category trees should be considered. Larger trees are unlikely to increase greatly in height or spread. Older trees are particularly sensitive to root disturbance and are best retained within open space where they can be managed for optimum health, amenity value, and safety, rather than within private spaces.

All trees being retained must be protected by barriers and/or ground protection before -

- Any site activity, except for tree clearance.
- Materials or machinery are brought onto site.
- Demolition of any kind.
- Removal of surfaces.
- Stripping of soil.
- Stripping of vegetation.
- Digging or trenching.
- Changes in existing ground levels.

Where all activity can be excluded from the RPA, vertical barriers should be erected to create a construction exclusion zone. Where construction activity cannot be fully or permanently excluded in this manner from all or part of a tree's RPA, appropriate ground, stem and crown protection should be installed (see 6.2.2 and Figure 2 of the standard) working under the guidance of an approved AMS and the supervision of the Project Arborist.

The default specification should consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated in Figure 2 in the Appendices. The vertical tubes should be spaced at a maximum interval of 3 metres and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. Care should be exercised when locating the vertical poles to avoid underground services and, in the case of the bracing poles, to avoid contact with structural roots. If the presence of underground services precludes the use of driven poles, an alternative specification should be prepared in conjunction with the project arboriculturist that provides an equal level of protection. Such alternatives could include the attachment of the panels to a free-standing scaffold support framework.

In order to prevent damage to the trees, including their roots, within the fenced area (RPA) there should be no...

- Alteration of ground levels, including soil stripping and digging.
- Installation of drainage or services using conventional open trenching methods which would not be in accordance with BS: 5837. (The National Joint Utilities NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees Volume 4 is not considered appropriate and the guidance within BS5837 must be followed)
- Excavation (there are exceptions when covered by an approved⁷ Arboricultural Method Statement)
- Storage of any materials or equipment, even on a temporary basis.
- Storage of oil, bitumen, cement or other harmful materials, mixed or discharged within 12-m of the trunk of any retained tree and making further allowances for any slope of the ground to prevent running contamination. Phytotoxic materials would include any mineral oil, fuels, cement mortar washings concrete washings, mortar.
- Fires must not be lit beneath or within 12-m of any tree canopies.

⁷ Approved by the Local Planning Authority

- Site operations such as - deliveries, site machines, crane jibs etc (should be organised to avoid damaging the trunk or crown of trees). Where this conflict is unavoidable, then facilitation pruning should be carried out in advance or tying back of the trees crown, rather than after damage has occurred. This may also be required to allow demolition operations. Facilitation pruning will require the consent of the LPA and should be under the guidance of the PA.
- Mechanical cultivation of the soil or digging for planting as part of landscaping operations.

Tree felling and surgery may be required to allow access for construction or future site traffic, or in the interests of the future health and safety. Detailed recommendations for such works can be provided once a final site layout is agreed and it is determined which trees (if any) are to be retained. All surgery should comply with the British Standards 3998:2010 Tree Work Recommendations and have the approval of the LPA. The legal position regarding site designations should be considered.

NOTE. It is reasonable to predict that no long-lasting disruption to tree physiology on this site will occur due to this proposed development if, the needs of the trees are catered for and that care is taken during construction to protect their roots, crowns and stems; the recommendations of the above documents are fully implemented; and a suitably qualified Project Arborist is appointed.

LEGAL CONSTRAINTS

Tree Preservation Orders and Conservation Area Status in Wales

In Wales, the law on TPOs is in Part V111 of the Town and Country Planning Act 1990 Town and Country Planning (Trees) Regulations 1999. When any tree/s are protected by a TPO or are situated within a Conservation Area, it is an offence (1) cut down (2) uproot (3) top (4) lop (5) wilfully damage or (6) wilfully destruct a tree without the express written permission from the Local Planning Authority (LPA), there are exceptions. An LPA may grant permission, if considered reasonable following the submission of an application for consent to undertake the works, or where in accordance with an Approved Planning Application or under the exemptions within the Town and Country Planning Act 1990 of dead, dying, or dangerous. It is advisable to consult the LPA and an Arborist prior to conducting any tree works under these exemptions.

Felling Licence

A Felling Licence may be required in certain felling operations, and these are administered by the Forestry Commission where more than five cubic metres of wood are felled in one calendar quarter and when selling more than two cubic metres. There are exceptions, and these are in the Forestry Act 1967 and Regulations made under this Act. Contravention of the felling licence controls can incur substantial penalties. Tree felling forming part of a Local Authority Planning Approval is exempt.

Tree work operations have the potential to impact on protected species, most notably birds and bats. **The Wildlife and Countryside Act 1981** is the primary legislation which protect birds in the UK, and it is an offence, with certain exceptions, to intentionally kill, injure, or take any wild bird, or intentionally take, damage or destroy the nest of any wild bird while it is in use or being built or take or destroy an egg of any wild bird. Certain species of bird are afforded additional protection, whereby it is an offence to intentionally or recklessly disturb any wild bird included on Schedule 1 of the Act, while it is nest building or at a nest containing eggs or young or disturb the dependent young of such a bird.

It is not an offence to fell trees during the bird nesting period (which is generally considered to be between mid-February and September inclusive) providing it is done so without breaching the legislation detailed above.

Caution must be aired if tree works are programmed during the nesting season as there is the potential for delay if nesting birds are found to be on site. Should nesting birds be present then all but essential works must be postponed. If in undertaking essential works a nest or nests are found to be present, then further advice must be sought from the statutory nature conservation authority, which in Wales is Natural Resources Wales and in England is Natural England, or from an appropriately qualified ecologist. The penalty for disturbing or destroying one bird or nest can be an unlimited fine and up to six months in prison, or both.

Bats...Summary of Current Relevant Legislation

Bats are also generally associated with trees and can be impacted by tree work operations. There are some 17 species of bat which are known to breed in the British Isles, all are insectivorous and depend to some extent on habitat in which trees are a significant element. Bats are a protected species and are in decline both globally and nationally. Therefore, they are to be fully considered before any tree work commences and particularly if the trees are mature. All species of bats are afforded **full** protection under the **Conservation of Habitats and Species Regulations 2017 (as amended)** and **partial** protection under the **Wildlife and Countryside Act 1981 (as amended)**. It is an offence (with limited exceptions) to deliberately take, injure, or kill a bat, intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats, deliberately damage or destroy a place used by bats for breeding or resting (roosts) (even if bats are not occupying the roost at the time) or intentionally or recklessly obstruct access to a bat roost.

Therefore, bats are to be fully considered before any tree work commences and particularly if trees contain veteran features (which can occur in young trees as well as older trees). This can include all work on trees whether it is surgery, felling, the covering, or filling of cavities or the installation of rod braces and flexible cable braces. If a bat roost is known to be in any tree that is to be removed or

worked on, or if any work is to take place adjacent to a known bat roost that may result in disturbance to that bat/s, then a license must be obtained from Natural Resources Wales or Natural England before work can take place.

Where there is the risk of a bat roosts being present, it is incumbent upon the owner or manager to commission a specialist bat survey to identify bat roosts before instructing tree surgery to commence. Failure to do so and in the event of breaching the legislation detailed above is an offence.

Maximum penalties for committing offences relating to bats or their roosts can amount to imprisonment for a term not exceeding six months or to fines of up to Level 5 on the standard scale under the Criminal Justice Act 1982/ 1991 (i.e., £5000 in April 2001) per roost or bat disturbed or killed, or to both.

NOTE - This is a simplified summary of the legal position relating to bats and birds and is intended for guidance purposes only. If further assistance is required, the primary legislation should be referred to. It may also be necessary to see legal advice or the advice of an appropriately qualified ecologist.

In the event of disturbing a roost site or injuring any bats is an offence. Maximum penalties for committing offences relating to bats or their roosts can amount to imprisonment for a term not exceeding six months or to fines of up to Level 5 on the standard scale under the Criminal Justice Act 1982/ 1991 (i.e., £5000 in April 2001) per roost or bat disturbed or killed, or to both.

Statute and Common Law – for Tree Inspections.

A landowner or land manager should be aware that both statute and common law dictates regular inspections of trees on land in their control are necessary where such trees could cause injury or damage in the event they should fall or shed any parts. A person suitably qualified in arboriculture should undertake such routine inspections and any remedial tree works recommended should be carried out within the time constraints specified, to prevent injury or damage occurring. A landowner should retain records of all inspections, and any remedial tree works that have resulted from such inspections. Arboricultural Association, the Malthouse, Stroud Green, Standish, Stonehouse, Gloucestershire, GL10 3DL. Telephone 01242 522152. www.trees.org.uk can provide advice on suitably qualified persons or indeed suitable qualifications a person should hold to undertake qualified inspections.

LIMITATIONS OF THIS REPORT

It must be stressed that this report is a desktop, pre-development assessment and not a risk assessment or a detailed report on the health and condition of the trees. Tree/s should be subject to regular tree condition inspections, and a full tree condition inspection and appropriate management appraisal is strongly recommended and particularly on completion of any development.

The effect this new development may have on localised wind turbulence has not been assessed during this inspection. As trees grow, they respond and mechanically adapt to their surroundings and exposure limits. With the erection of dwellings near existing trees, new turbulence is created. The author accepts no liabilities to any failure subsequent upon such new imposed, artificial conditions.

Unless stated in writing, the inspection shall not include any underground parts of the tree. It does not consider **indirect** damage resulting from the extraction of moisture from shrinkable clay soils by tree roots causing **subsidence** or by **heave** occurring through soil rewetting following removal of trees on this site. Such problems are almost entirely restricted to areas of shrinkable clay soils and as I have **not** considered a soil analysis as part of my present brief, this aspect is **not** addressed at this time.

Unless otherwise stated in writing and in the absence of altered circumstances, a report on the health and safety of a tree or trees cannot be relied on after a period of 12 months. Following such a period, a further inspection is required.

Further and more general report limitations are set out in the author's Terms and Conditions and copies are available upon request.

GLOSSARY OF TERMS

Adventitious: Latent or dormant bud on stem or root often invisible until stimulated into growth which occurs from an unusual place i.e. not a twig, leaf or bud.

Anchorage: in trees, the holding of the root system within the soil, involving the flow of forces from the stem through the branches of the root system to the cohesive root/soil interface.

Arboricultural Implication Assessment (AIA) study, undertaken by an arboriculturalist, to identify, evaluate and possibly mitigate the extent of direct and indirect impact on existing trees that may arise because of the implementation of the site layout.

Arboricultural Method Statement: methodology for the implementation of any aspects of development that has the potential to result in loss of or damage to a tree.

Arboriculturalist: person who has, through relevant education, training, and experience, gained recognised qualifications and expertise in the management of trees generally and in relation to construction.

Arboriculture: the culture and management of trees as groups and individuals, primarily for amenity and other non-forestry purposes.

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

Assessment: in relation to tree hazards, the process of estimating the risk which a tree or group of trees poses to persons or property (THIS INVOLVES A VISUAL INSPECTION FOR DEFECTS AND CONTRIBUTORY SITE FACTORS, AND SOMETIMES ALSO A DETAILED INVESTIGATION OF SUSPECTED DEFECTS)

Assym: This abbreviation means...asymmetric...and refers to the tree having an asymmetric or unbalanced crown. This is usually preceded by a measurement in metres which provides the extent of crown asymmetry and is measured from the centre of the trunk. It may also have a correlation to the lever arm.

Bole: (trunk) the main stem of a tree below its first major branch

Branch: a limb extending from the main stem or parent branch of a tree

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 sides of the junctions.

Canopy: the topmost layer of twigs and foliage in a woodland, tree, or group of trees

Construction Exclusion Zone: area based on the RPA (meters as a radial measurement and sometimes a m²), identified by an Arboriculturalist, to be protected during development, including demolition and construction work, by use of barriers and/or ground protection fit for the purpose to ensure the successful long-term retention of a tree.

Crown: in arboriculture the main foliage-bearing portion of a tree containing the leaves and branches

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

Diameter (DBH) The diameter for each tree is in millimetres based on the diameter or circumference of the trunk measured at a height of approximately 1.5 metres above ground level, unless otherwise stated. All measurements are approximate.

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

Energy: the capacity to do work (THROUGH PHOTOSYNTHESIS, GREEN PLANTS ABSORB ENERGY FROM SUNLIGHT AND STORE IT IN THE FORM OF CHEMICAL COMPOUNDS WHICH ARE USED IN ENERGY-DEPENDANT PROCESSES SUCH AS GROWTH)

Failure: in connection with tree hazards, a partial or total fracture within woody tissues or loss of cohesion between roots and soil. (IN TOTAL FAILURE THE AFFECTED PART SNAPS OR TEARS AWAY COMPLETELY. IN PARTIAL FAILURE, THERE IS A CRACK OR DEFORMATION WHICH RESULTS IN AN ALTERED DISTRIBUTION OF MECHANICAL STRESS)

Group: the term 'group' is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g., trees that provide companion shelter), visually (e.g., avenues or screens) or culturally including for biodiversity (e.g., parkland or wood pasture).

Heave: in relation to a shrinkable clay soil, expansion due to re-wetting, sometimes after the felling or root severance of a tree which was previously extracting moisture from the deeper layers: also, in relation to root growth, the lifting of pavements and other structures by radial expansion: also, in relation to tree stability, the lifting of one side of a wind-rocked root plate.

Leader: in a tree, a topmost shoot that has apical dominance.

Preventive action: in a tree hazard management, action that helps to prevent injury to persons or damage to property.

Pruning: the removal or cutting back of twigs, branches or roots: in some contexts, applying only to twigs or small branches only, but more often used to describe all kinds of work involving cutting.

Pruning: the removal or cutting back of twigs, branches or roots: in some contexts, applying only to twigs or small branches only, but more often used to describe all kinds of work involving cutting.

Retained Tree: a tree that has been considered suitable by an Arborist for retention and which during the design stage is selected for retention and incorporated within the development.

Risk: the likelihood of the potential harm from a particular hazard becoming actual harm.

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 This is a protection area established around the base of each tree to prevent physical, chemical or compaction damage occurring. Protection to the RPA is achieved through the erection of fencing or another suitable barrier.

Soil heave: see heave.

Special Precaution Area: this is an area, usually within the root protection area, where construction or other activity may be permitted but only under the direction of a 'Arboricultural Method Statement' and the supervision of an Arborist.

Species The species is the given name of the tree which is usually provided in both the common and scientific names.

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

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

Targets: in a tree hazard assessment (and with somewhat incorrect terminology), persons or property or other things of value, which might be harmed by mechanical failure of the tree or by objects falling from it.

Tree Constraint Plan (TCP): plan prepared by an Arboriculturalist for the purpose 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 Preservation Order: in Great Britain, an order made by a local authority, whereby the authority's consent is generally required for the cutting down, topping, or lopping of specified trees.

Tree Protection Plan: scale drawing prepared by an arboriculturalist showing the final layout proposals, tree retention and tree and landscape protection measures detailed within the arboricultural method statement (AMS), which can be shown graphically.

Tree: a woody plant, which typically has a single main stem and, in maturity, attains a height of at least four metres and a stem diameter at breast height of at least 75-mm.

Trunk: the single main stem of a tree.

Vigour: in tree assessment, an overall measure of the rate of shoot production, shoot extension or diameter growth (cf. vitality)

Visual Tree Assessment (VTA): in addition to the literal meaning, a system expounded by Mattheck & Breloer (1995) to aid the diagnosis of potential defects through visual signs and the application of mechanical criteria.

Wind exposure: the degree to which a tree or other object is exposed to wind, with regard both to duration and velocity.

Wind pressure: the force exerted by wind on a tree or other object.

Wind snap: the breaking of a tree stem by wind.

Windthrow: the blowing over of a tree at its roots.

REFERENCES

British Standards Institute Publication 'Trees in Relation to Design, Demolition and Construction – Recommendations' 2012

British Standard Recommendations for Tree Work BS 3998: 2010

REPORT LIMITATIONS

It must be stressed that this arboricultural impact assessment is not a risk assessment or a detailed report on the health and condition of the trees. It has been produced as a desktop review.

Every attempt has been made to provide a realistic and accurate assessment of the impact of the development on the trees. No liability can be accepted for any tree related issue or tree and building interactions in the absence of information or where information is unclear or misleading.

This Report is based on the tree circumstances and condition at the time of the original tree survey. It must be recognised that the circumstances may be altered radically over the course of time and any development process and that such changes cannot be accurately predicted. The report does not provide any specific long-term tree management recommendations.

The effect this new development may have on localised wind turbulence has not been assessed during this inspection. As trees grow, they respond and mechanically adapt to their surroundings and exposure limits. With the erection of dwellings near existing trees, new turbulence is created. The author accepts no liabilities to any failure subsequent upon such new imposed, artificial conditions.

This Report does not consider **indirect** damage resulting from the extraction of moisture from shrinkable clay soils by tree roots causing **subsidence** or by **heave** occurring through soil rewetting following removal of trees on this site. Such problems are almost entirely restricted to areas of shrinkable clay soils and as I have **not** considered a soil analysis as part of my present brief, this aspect is **not** addressed at this time.

REFERENCES

1. BS 5837: 2012 Trees in Relation to Design, Demolition and Construction - Recommendations
2. Ambler SJ – Tree Survey, Categorisation & Constraints Report Fourteen Locks Dated December 2024

APPENDICES

FLOW DIAGRAM – PLANNING FOR TREES IN DEVELOPMENT.

BS 5837:2012

BRITISH STANDARD

Annex B (informative)

Trees and the planning system

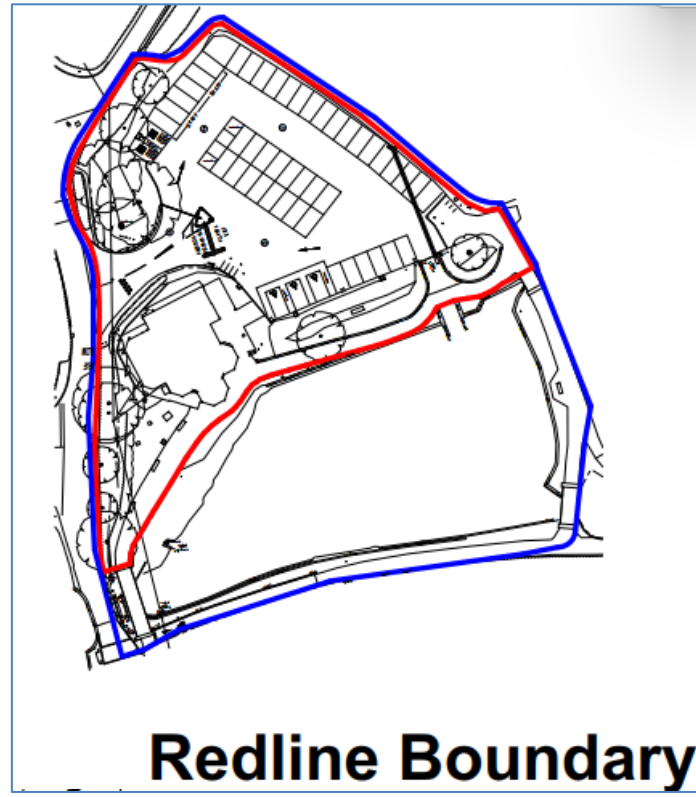
Under the UK planning system, local authorities have a statutory duty to consider the protection and planting of trees when granting planning permission for proposed development. The potential effect of development on trees, whether statutorily protected (e.g. by a tree preservation order or by their inclusion within a conservation area) or not, is a material consideration that is taken into account in dealing with planning applications. Where trees are statutorily protected, it is important to contact the local planning authority and follow the appropriate procedures before undertaking any works that might affect the protected trees.

The nature and level of detail of information required to enable a local planning authority to properly consider the implications and effects of development proposals varies between stages and in relation to what is proposed. Table B.1 provides advice to both developers and local authorities on an appropriate amount of information. The term “minimum detail” is intended to reflect information that local authorities are expected to seek, whilst the term “additional information” identifies further details that might reasonably be sought, especially where any construction is proposed within the RPA.

Table B.1 Delivery of tree-related information into the planning system

Stage of process	Minimum detail	Additional information
Pre-application	Tree survey	Tree retention/removal plan (draft)
Planning application	Tree survey (in the absence of pre-application discussions) Tree retention/removal plan (finalized) Retained trees and RPAs shown on proposed layout Strategic hard and soft landscape design, including species and location of new tree planting Arboricultural impact assessment	Existing and proposed finished levels Tree protection plan Arboricultural method statement – heads of terms Details for all special engineering within the RPA and other relevant construction details
Reserved matters/ planning conditions	Alignment of utility apparatus (including drainage), where outside the RPA or where installed using a trenchless method Dimensioned tree protection plan Arboricultural method statement – detailed Schedule of works to retained trees, e.g. access facilitation pruning Detailed hard and soft landscape design	Arboricultural site monitoring schedule Tree and landscape management plan Post-construction remedial works Landscape maintenance schedule

SITE BOUNDARY



TREE LOSS, RETENTION, PROTECTION PLAN

