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John Morris Arboricultural Consultancy

Trees, Planning & Development | Expert Witness | Arboricultural Clerk of Works | Government Support

Client: Land Development Agency
Site: Wilton ESB
Sarsfield Road
Cork
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ARBORICULTURAL IMPACT ASSESSMENT & METHOD STATEMENTS

John Morris Arboricultural Consultancy

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Purpose of Document

This report provides an assessment of trees on land at Wilton ESB, off Sarsfield Road in Cork in accordance with BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations*.

It provides an overview of the constraints posed by trees on or within influencing distance of the site and assesses the impacts of the proposal on trees.

It includes:

- A **Tree Schedule** that provides information for each tree;
- A **Tree Constraints Plan** that illustrates the location and constraints posed by trees;
- An **Arboricultural Impact Assessment** that considers the impacts of the proposal to those trees;
- An **Arboricultural Method Statement** that outlines how retained trees will be protected during works, and;
- A **Tree Impact & Protection Plan** that illustrates the impact of the proposal upon trees and protection measures that should be adopted during works.

The information contained within this report is intended to provide Cork City Council with sufficient information to assess tree related issues associated with the proposal.

Executive Summary

The Land Development Agency (LDA) intends to apply to Cork City Council for permission for a Large-scale Residential Development (LRD) with a total application on site area of c. 2.7 ha, on lands adjoining the ESB Networks DAC Office, at Sarsfield Road in Wilton, Cork City.

The site includes amenity tree planting on open green space around the main entrance and car parking, and areas of dense tree cover with overgrown vegetation.

The proposed development will require the removal of 107 no. trees and groups of trees from the site. The reason for these removals is to facilitate the main residential buildings and gardens, internal access roads, car parking and to create new areas of public open space. Five trees on ESB land south of site will also require removal to facilitate a new 2.6m high masonry wall with anti-climb measures.

The aim has been to incorporate healthy trees into the proposed developed where it is feasible to do so within the new built environment, including mature oak trees and established amenity planting by the main entrance and along the southern boundary with the ESB site.

To mitigate the removal of trees, it is proposed to plant a diverse variety of new trees and hedges across the site in areas of public open space, alongside roads, in parking areas, in the community courtyards and village green.

This new planting will help to increase species diversity and the quality of canopy cover in the local landscape.

The following measures are required to ensure the protection of trees and woodlands during works:

- Tree Protective Fencing
- Construction Exclusion Zones
- No-Dig Permanent Ground Protection
- Temporary Ground Protection
- Specialist Methods of Working

CONTENTS

ATTACHMENTS

DOCUMENT TITLE	DOCUMENT REFERENCE
TREE SCHEDULE	23-417-01
TREE CONSTRAINTS PLAN	23-417-02
TREE IMPACT & PROTECTION PLAN	23-417-03

1. INTRODUCTION

Instruction

1.1. Instruction was received from Land Development Agency (LDA) on 25th August 2023 to undertake a tree survey and prepare an arboricultural report to in connection with a planning application for a Large-scale Residential Development (LRD) and all associated site works on lands at Wilton ESB, Sarsfield Road, Cork.

Scope

1.2. The survey has been carried out in accordance with BS5837:2012 *Trees in relation to design, demolition and construction – Recommendations.*

1.3. The information collected during the survey has been used to prepare a report in connection with a planning application.

Site

1.4. The site includes area of c. 2.7 ha, on lands adjoining the ESB Networks DAC Office, at Sarsfield Road in Wilton, Cork (Figure 1).

Figure 1. Site location at Wilton ESB, Sarsfield Road, Cork.

2. TREE SURVEY

Site Visit

2.1. The tree survey was undertaken on 17th and 18th October 2023.

Details of the survey methodology and assessment criteria can be found in Appendix 1.

2.2. A copy of the survey data can be found on the Tree Schedule (Ref: 23-417-01) and Tree

Constraints Plan (Ref: 23-417-02) attached to this report.

2.3. On the Tree Constraints Plan, above ground constraints posed by canopy spread are plotted as a continuous line around the tree and shaded in the corresponding BS5837 retention category colour, whilst the below ground constraints posed by the Root Protection Area (RPA) have been plotted as a continuous magenta line with the text RPA inscribed.

2.4. The purpose of the tree survey is to provide information to the design team on the constraints posed by trees, allowing informed decisions to made that will avoid or reduce impacts on trees.

2.5. The tree survey considered all trees with potential to be impacted by proposals including those outside the application area, but within influencing distance.

Description of Trees

2.6. The site comprises a large rectangular area of land that forms part of Wilton ESB Networks DAC Office. There eastern part of the site has dense tree cover on the open green space by the main entrance off Sarsfield Road, and around an area of overgrown area of fenced off land in the north east croner. There are also trees on open green space immediately north of the ESB car park and further dense tree cover along the western boundary with residential dwellings at Cardinal Court. A mature treeline extends across the central area of the site.

2.7. Trees in areas of open green space by the main entrance and car park form varied amenity planting consisting of Norway maple, London plane, birch cultivar, oak, lime, Rowan, horse chestnut, flowering cherry, hornbeam, silver maple and field maple. There is a diverse age range from young recent planting to established mature trees that provide visual amenity in the local landscape.

2.8. Dense tree cover in the north east corner comprises Leylandii that have have been planted around the permiter of fenced off land. These trees are now starting to show signs of natural decline, with many having been heavily pruned in the past or lost large limbs due to storm damage. There are younger trees and self-sown overgrown vegetation within the centre of this area of land, and another broafleaf treeline comprising silver maple, Norway maple and ash that extend along the western edge of the group.

2.9. Trees along the western boundary include Norway maple, field maple, sycamore and lime, which are surrouned by dense understorey vegetation. This vegetation continues around the north west corner and along the northern boundary, with a further treeline conistsing of ash growing on private land north of the site.

2.10. The majority of trees growing along the site boundaries have previously been heavily pruned losing a large portion of their crown. Although the majority of trees are showing signs of vigorus regrowth from pruning cuts, this heavy pruning causes physiological stress, reducing the life expectancy of trees.

Figure 2. Amenity tree planting by main entrance.

Figure 3. Amenity tree planting along main access road to car park.

Figure 4. Tree planting around car parking area.

Figure 5. Mature trees on open space in central area of site.

Figure 6. Mature oak trees north of main entrance.

Figure 7. Leylandii viewed from land north of site.

3. ARBORICULTURAL PRINCIPLES

Trees and Development

3.1. Trees provide a multitude of economic, environmental and social benefits to individuals and communities including (but not limited) to visual amenity and landscape value, ecosystem services and habitats for local wildlife. Trees can also hold historic and cultural importance by providing links to the past that create a sense of place and belonging.

3.2. They are living, self-optimising, mechanical organisms that grow in and react to the environment in which they are located and are capable of being wounded or infected by objects or other organisms that can cause a decline in health or result in death.

3.3. Development proposals that will impact trees should consider the value and contribution made by those trees, the impacts of development activity upon their health and an assessment of future conflicts that may arise between trees and the development proposal.

Below Ground Constraints

3.4. Soils contain organic and mineral material, air and water that provides a medium essential for root growth. The physical properties of soils including texture, porosity and bulk density can greatly impact the availability of water, nutrients and oxygen in the soil available to support the function and growth of tree roots. Protection of the soil environment in which trees grow is therefore essential to ensure tree vitality.

3.5. Tree roots provide support and anchorage and allow the uptake and transport of water, nutrients and oxygen for tree function and growth. Roots are commonly found in the upper 600-1000mm of soil, however depth can vary significantly depending on soil and local site conditions. Typically, tree root systems comprise a network of lateral roots that provide structural support and smaller fibrous roots that function in the uptake of water, nutrients and oxygen. Protection of the tree roots is therefore essential to ensure tree vitality.

Impacts of Construction & Development

3.6. The processes of construction including the movement of machinery and equipment near trees can cause soil compaction that can starve roots of oxygen and water, resulting in tree decline or death. Increasing ground levels near trees can cause similar impacts, whilst belowground soil excavations can damage root bark or lead to root severance and impair structural stability. Further impacts include (but are not limited to) contamination of soils by toxic substances such as cement or chemicals and root desiccation due to inadequate protection during exposure.

Root Protection Areas

3.7. In accordance with BS5837, the Root Protection Area (RPA) indicates the notional minimum area of ground around a tree deemed to contain sufficient roots and rooting volume to avoid adverse physiological or structural impairment and to support future tree function, growth and health.

3.8. The RPA is calculated in accordance with Section 4.6 of BS5837 and is summarised in Appendix 2.

3.9. The RPA is plotted as a continuous circle centred on the base of the stem, however where pre-existing site conditions such as the presence of built structures, changes in topography, soil type and structure or past management are likely to act as barriers, or alter normal distribution, BS5837 allows modifications to the shape of the RPA can be made based upon sound arboricultural assessment.

3.10. The default position should be that no development works occur inside RPAs, however in accordance with BS5837 when there is an overriding justification, it may be appropriate to implement specialist methods of construction or technical solutions that will reduce or eliminate the impact to roots and soil environments.

3.11. Additionally, where an area of RPA is lost, it should be demonstrated that the tree can remain viable with the area lost from encroachment compensated elsewhere contiguous with its RPA, based on the species, age, condition and past management of the tree, pre-existing site conditions and nature of operations proposed is undertaken.

Above Ground Constraints

3.12. Tree stems and crowns can restrict the availability of space on a development site that may result in conflicts between trees and the new built environment. The design and layout of a site should take into consideration the presence of tree canopies, as well as individual species characteristics and future growth requirements in order to create a harmonious relationship between trees and the new built environment.

4. PLANNING POLICY, STATUTORY CONSIDERATIONS & TREE LEGISLATION

Planning Policy

4.1. The National Planning Framework 'Project Ireland 2040' and National Development Plan (2021-2030) underpin planning policy across Ireland. These documents recognise the need to manage future growth in a planned, productive and sustainable way.

4.2. At the heart of Green Infrastructure Planning is to protect, preserve and enhance national capital by:

> *"protecting and valuing important and vulnerable habitats, landscapes, natural heritage and green spaces".*

4.3. The Site falls within the jurisdiction of Cork City Council, which has a statutory obligation to ensure that provision is made for the protection of trees, woodlands and hedgerows under the Planning and Development Act (2000), through implementation of a Development Plan. The current plan for Cork is the Cork City Development Plan (2022-2028).

Cork City Development Plan (2022-2028)

4.4. The Cork City Development Plan contains various policies in relation to trees and proposals for development including:

Chapter 6 I Green and Blue Infrastructure, Open Space and Biodiversity

Strategic Biodiversity Goals

To protect and enhance the city's trees and urban woodlands

Objective 6.5 - Trees & Urban Woodland

a. To protect and enhance the City's tree and urban woodlands in public and private ownership. Cork City Council will seek to survey, map and maintain existing important individual and groups of trees, using Tree Preservation Orders as appropriate;

b. To encourage the planting of new urban woodlands and trees where appropriate throughout the City and particularly where there are deficiencies in tree coverage as identified in the Cork City Green and Blue Infrastructure Study;

c. To support the preparation of a City Tree Strategy which provides a vision for longterm planting, protection and maintenance of trees, hedgerows and woodlands;

d. To support retaining existing trees and the planting of new trees as part of new developments subject to care on the species of tree and the siting and management of the trees to avoid conflict with transport safety and residential amenity in particular;

e. To promote the planting of pollinator friendly native deciduous trees and mixed forestry to benefit biodiversity.

Objective 6.9 Landscape

e. To discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.

Objective 10.98 Protection of Natural Landscape

d. Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.

4.5. The Cork City Development Plan (2022-2028) should influence future design proposals by ensuring that the existing trees are considered in the context of planning policy and retained where appropriate.

Tree Preservation Orders & Conservation Areas

4.6. Tree Preservation Orders (TPOs) may be made under Section 45 of the Local Government (Planning and Development) Act, 1963 and subsequent acts. Part XIII of the Planning and Development Act 2000 sets out the provisions for TPOs. A TPO can be made if it appears to the planning authority to be desirable and appropriate in the interest of amenity or the environment. A TPO can apply to a tree, trees, group of trees or woodland.

4.7. The principle effect of a TPO is to prohibit the cutting down, topping, lopping or wilful destruction of trees without the planning authority's consent. The order can also require the owner and occupier of the land subject to the order to enter into an agreement with the planning authority to ensure the proper management of the tree, trees or woodland.

4.8. A review of the Cork City Development Plan (2022-2028) indicates that at the time of the development plan, there were no TPO's in place upon the Site (Table 6.15).

Table 6.15. Tree Preservation Orders in Cork City.

Irish Distilleries, North Mall
Westboro, Middle Glanmire Road
Lakeview, Castle Road
Belgrave Square, Wellington Road
Ringmahon Road
Roseville, Old Youghal Road
Springmount
Rockmahon, Castle Road
Brookfield House (Village), College Road
Deerpark, Greenmount
Ardnalee, Middle Glanmire Road
Castletreasure, Douglas

Table 6.15: Tree Preservation Orders in Cork City.

Special Amenity Area Orders

4.9. A National Special Amenity Area is a designation for a landscape of national importance for its aesthetic and/or recreational value.

4.10. Planning authorities are empowered (under section 202 of the Planning and Development Act 2000), to make a Special Amenity Area Order (SAAO) for reasons of outstanding natural beauty or its special recreational value and having regard to any benefits for nature conservation. The purpose is to preserve and enhance landscape character and to prevent and limit development.

4.11. A review of the Cork City Development Plan (2022-2028) indicates that the Site is not within a SAAO (Figure 8).

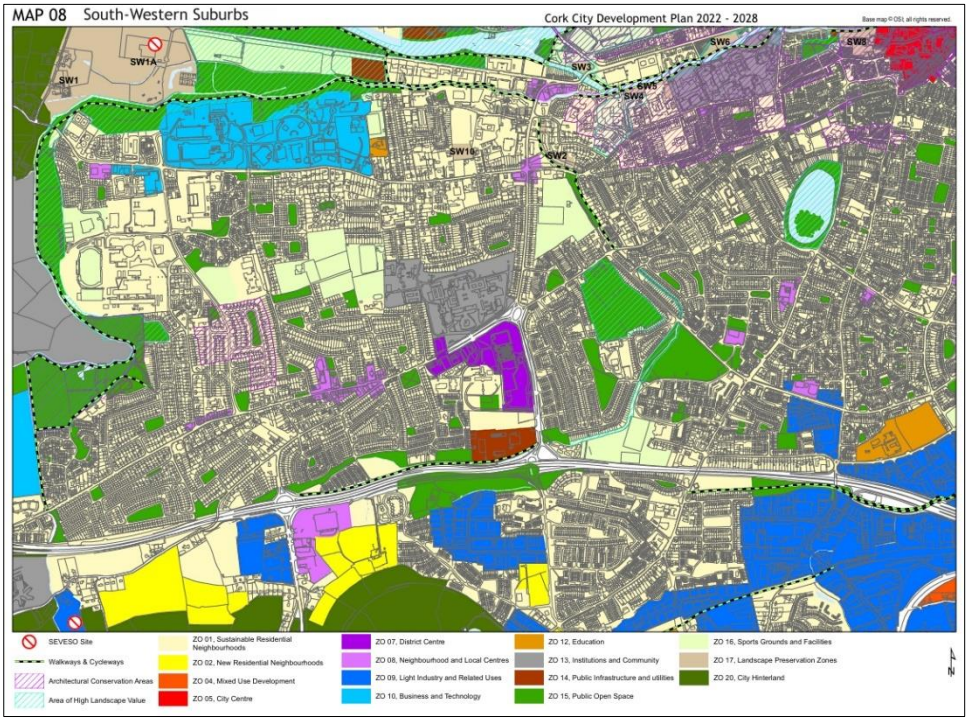


Figure 8. Map 08 South-Western Suburbs (Source: Cork Citty Development Plan 2022-2028).

Felling Licenses

4.12. It is an offence for any person to uproot or cut down any tree unless the owner has obtained permission in the form of a felling licence from the Forest Service, with the exception of the following scenarios (under section 19 of the Forestry Act 2014):

- A tree in an urban area. (An urban area is an area that is comprised of a city, town or
- borough specified in Part 2 of Schedule 5and in Schedule 6 of the Local Government Act 2001, before the enactment of the Local Government Reform Act 2014 (this act dissolved Town Councils, however, the old boundaries of these areas are still considered as urban for the purpose of the Forestry Act 2014).
- A tree within 30 metres of a building (other than a wall or temporary structure) but excluding any building built after the trees were planted.
- A tree less than 5 years of age that came about through natural regeneration and removed from a field as part of the normal maintenance of agricultural land (but not where the tree is standing in a hedgerow).
- A tree uprooted in a nursery for the purpose of transplantation.
- A tree of the willow or poplar species planted and maintained solely for fuel under a short rotation coppice.
- A tree outside a forest within 10 metres of a public road and which, in the opinion of the owner (being an opinion formed on reasonable grounds), is dangerous to persons using the public road on account of its age or condition.
- A tree outside a forest, the removal of which is specified in a grant of planning permission, providing it was indicated on the lodged plans as being planned for removal as part of the application.
- A tree outside a forest of the hawthorn or blackthorn species growing in a hedge.
- A tree outside a forest in a hedgerow and felled for the purposes of its trimming the hedge providing that the tree does not exceed 20 centimetres diameter at 1.3 metres above ground level.
- Agricultural holdings can fell a limited small number of trees not exceeding 3 cubic metres.
- The maximum number of trees permitted to be felled under that exemption per year is 4 trees (12 cubic metres)
- Outside a forest, apple, pear, plum, or damson species are exempt from the need for a felling license.

Wildlife

4.13. The cutting or felling of trees and hedgerows is prohibited during the period 1st April to 31st August every year with limited exceptions under the Wildlife Acts 1976-2008.

5. ARBORICULTURAL IMPACT ASSESSMENT

Development Proposal

5.1. The Land Development Agency (LDA) intends to apply to Cork City Council for permission for a Large Residential Development with a total application site area of c. 2.61ha, on lands adjoining the ESB Networks DAC Office, at Farrandahadore More, Sarsfield Road, Wilton, Cork City. The development will provide 348 no. residential units and a 138 sqm childcare facility, revised access arrangements to Sarsfield Road and all associated development above and below ground

Design Principles

5.2. The proposal has been influenced by the tree cover on site, and by relevant planning policy relating to trees in the Cork City Development Plan (2022-2028).

5.3. The default position has been to avoid works within the canopy or RPA of any tree, however where this has not been possible (e.g. due to other site constraints or unavoidable impacts) a hierarchy of mitigation has been applied (Figure 9).

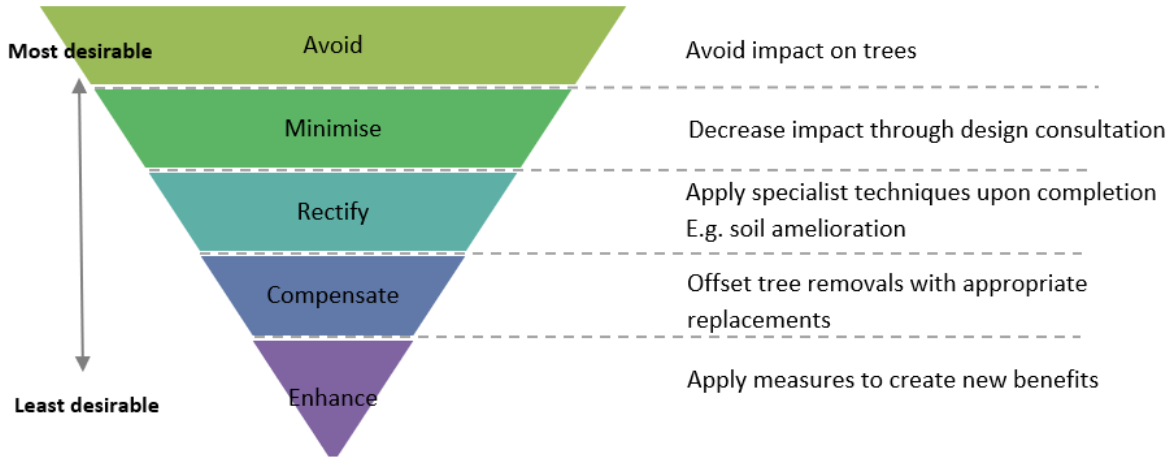


Figure 9. Trees & Development Mitigation Hierarchy (John Morris Arboricultural Consultancy, 2019).

The Impact

5.4. The proposed development will require the removal 107 no. trees or groups of trees.

5.5. Table 2 contains the tree numbers to be removed by BS837 retention category.

5.6. The trees to be removed are also illustrated on the Tree Impact & Protection (Ref: 23-417-04) attached to this report.

5.7. Five trees on ESB land south of site will also require removal to facilitate a new 2.6m high masonry wall with anti-climb measures.

Table 2. Tree removals by BS5837 category.

	Category A	Category B	Category C	Category U
Tree or Group No.		26, 29, 31, 32, 33, 34, 35, 36, 37, 38, 52, 53, 55, 56, 67, 68, 72, 73 & 76	1, 6, 7, 8, 9, 10, 11, 12, 13, 18, 22, 23, 24, 45, 46, 47, 48, 49, 50, 51, 54, 57, G58, G59, 61, G62, 63, 64, 65, 66, 69, 70, 71, 74, 75, 77, 79, 80, 81, 83, G92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, G133 & G134	20, 21, 78, 82, 84 & 104 * ** (These trees are recommended for removal irrespective of proposal).*
Total	**0**	**19**	**82**	**6**

5.8. Figure 10 illustrates the number of trees for removal by age class.

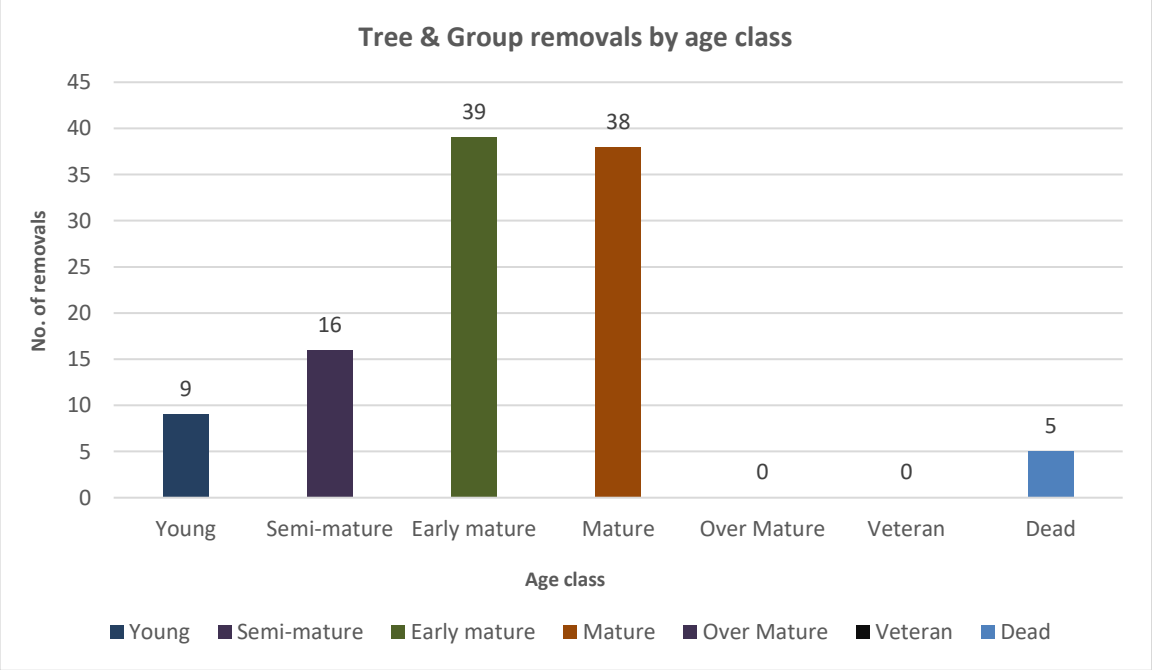


Figure 10. Tree removals by age class.

5.9. The aim has been to include those arboricultural features that can provide future contribution in terms of their amenity, landscape and ecological value, where it is feasible within the new built environment.

Boundary Treatments

5.10. All works for new boundary treatments within the RPA of retained trees should be undertaken in accordance with the Arboricultural Method Statements in Chapter 6 of this report, to minimise impacts upon roots and soils.

Ground Levels

5.11. There should be no changes in ground levels within the RPA of any tree to be retained.

'No-Dig' Permanent Ground Protection

5.12. There may be a requirement for 'No-Dig' permanent ground protection in locations where new hard surfaces (roads, footpaths, car parking bays) are required within RPAs, and where the existing proposed ground levels allow for sufficient build-up of a system capable of supporting load bearing requirements.

5.13. A general method statement for this type of system is provided in Chapter 6, however confirmation of the specific product, depth and locations is to be confirmed with input from the project Landscape Architect and Structural Engineer.

Services

5.14. Tree constraints have been provided to all members of the design team and there should be no underground services sited in the RPA of any tree to be retained.

Tree Works

5.15. Details of those trees proposed for removal are provided on the Tree Schedule and illustrated on the Tree Impact & Protection Plan attached to this report.

Magnitude of Impact

5.16. The magnitude of impact as result of the proposal has been assessed by considering the BS5837 retention category and subcategory of trees to be removed (Table 3). The aim is to assess the direct impacts on the existing tree population from an arboricultural perspective, but also the impact in terms of visual amenity, landscape value and contribution to the wider surrounding area.

5.17. The assessment does not look at impacts from an ecological perspective but may allow for high level observations to be made in terms of the relationship between trees and their contribution to green connectivity, which can offer ecological and biodiversity benefits including nesting, foraging and transport corridors for local wildlife.

Table 3. Magnitude of arboricultural impact (John Morris Arboricultural Consultancy 2020).

Magnitude Category	Description of Impact
High	The proposal will require the removal of category A trees of high quality and able to offer a significant future contribution for at least 40 years. These trees are irreplaceable and may include specimen trees that are an excellent example of their species, notable, veteran or ancient trees or ancient woodland.
Moderate	The proposal will require the removal of category B trees of moderate quality able to offer a substantial future contribution for at least 20 years. These trees may include those that provide amenity value and contribute to the character of the site and local area. These trees would be difficult to replace and new planting is likely to take a minimum of 15-25 years to provide satisfactory mitigation.
Low	The proposal will require the removal of category C trees of low quality able to provide a contribution for at least 10 years. These trees may include younger trees or those in poor health with a limited useful life expectancy. These trees should not be regarded as a significant constraint and could normally be easily with new better quality planting with benefits realised in under 5 years.
Negligible	The proposal will require the removal of category U trees of poor quality. These trees include those than cannot be retained in the context of current land use for longer than 10 years or pose a risk to persons or property due to decline.
None	The proposal will not require the removal of any trees.

5.18. The proposal will require the removal of low and moderate quality trees.

5.19. This has been identified as a **moderate** magnitude of impact.

5.20. To mitigate the magnitude of impact, realistic and feasible mitigation measures should be implemented that will reduce the magnitude of impact within a reasonable timeframe and/or create a post-development situation that improves on the pre-development baseline.

Mitigation and Improvements

5.21. To mitigate the removal of trees, it is proposed to plant a diverse variety of new trees and hedges across the site in areas of public open space, alongside roads, in parking areas, in the community courtyards and village green.

5.22. The species, size and location of new and replacement trees is illustrated on the Landscape Plan and Tree Planting Schedule submitted as part of the application.

6. DRAFT PRE-PLANNING STAGE ARBORICULTURAL METHOD STATEMENTS

Purpose

6.1. The purpose of this statement is to provide a system of working to ensure retained trees are protected at all times during construction. It should be read in conjunction with the Tree Impact & Protection Plan, attached to this report.

6.2. A copy of this report must be made permanently available for the duration of the development. It can be:

- Included in tender documents to identify and quantify tree protection and management requirements;
- Used to plan timing of site operations to minimise the impact upon trees, and;
- Referenced on site for practical guidance on how to protect trees.

6.3. The compliance of arboricultural method statements is a recommended as a condition of planning and is necessary to ensure the protection and vitality of retained trees.

Key Responsibilities

6.4. It is the responsibility of the main contractor to ensure that all site personnel fully understand the protection measures on the site, that tree protection measures are adhered to at all times, and that the project arboriculturist is contacted if there are any issues related to trees.

Tree Protective Fencing

6.5. A protective fence will be erected around retained trees, prior to the commencement of materials or machinery being brought onto site, removal of soil or any form of construction. The area within this fencing will form the construction exclusion zone (CEZ) and it will be afforded protection at all times. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopies.

6.6. The fence is to be sited in accordance with the Tree Impact & Protection Plan attached to this report.

6.7. Details of the minimum distance for fencing from trees can be found in the Tree Schedule attached to this report.

6.8. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, a number of fencing/protection solutions will be required including the Heras 151 system of fencing, timber boards and hessian sacking wrapped in chestnut cleft pale.

6.9. Details of the various types of fencing is provided in Appendix 3.

6.10. The fence will have signs attached to it stating that it defines a CEZ and that no works are permitted beyond it.

6.11. An example of a tree protection sign is provided in Appendix 4.

6.12. The protective fencing may only be removed following completion of all construction works.

6.13. The following principles will be adopted by site personnel within the CEZ during construction, to ensure protection of retained trees:

- No level changes.
- No excavations.
- No fires.

- No use of herbicides.
- No storage of materials, machinery or access for construction workers.

Site Compounds & Facilities

6.14. Site compounds and facilities will be located outside of all RPAs and CEZs as identified on the TIPP.

Site Cranes, Piling Rigs and Machinery

6.15. The location of all drilling rig, supporting vehicles / equipment should be sited outside of RPAs to avoid soil compaction.

Pollution Control

6.16. Any storage or mixing station located outside of the construction exclusion zone will be located in a place that minimises the risk of contaminated runoff entering to prevent adverse physiological impacts on trees that may result from contact with rooting environments. This may be achieved by using a non-permeable membrane on the ground, surrounded by sandbags or sawdust to contain any spillage.

Temporary Ground Protection

6.17. Where it is not practical to protect RPAs by use of protective fencing, BS5837 allows for the fencing to be set back and the soil shielded by ground protection. A range of methods can be used including retaining existing hard surfaces or structures that already protect the soil, installing new temporary surfaces, or a combination of both. Whatever the choice of method, the end result must be that the underlying soil remains undisturbed and retains the capacity to support existing and new roots.

6.18. If fences are to be set back on a temporary the following specifications are recommended for use as temporary ground protection to protect roots and soil.

6.19. For pedestrian traffic, a plywood board with a minimum thickness of 40mm should be laid on a minimum of 100mm deep woodchip, with geotextile membrane beneath.

6.20. For small plant machinery with a gross weight of up to 2 tonne, interlinking aluminium or composite tracks with sufficient load bearing capacity should be laid on a minimum of 150mm deep woodchip, with geotextile membrane beneath.

6.21. For heavy machinery with a gross weight of up to 3.5tonne, interlinking aluminium or composite track with sufficient load bearing capacity should be laid over a minimum layer of 200mm deep woodchip, with a geotextile membrane beneath.

6.22. For weights above 3.5tonne a specialist temporary ground protection should be used that is capable of both supporting the required loads whilst providing protection to RPAs.

6.23. Any temporary protective surfaces must remain in place until all construction activity is finished.

6.24. Upon completion of construction works, the temporary ground protective measures should be removed working backwards from on top of the system. This will need to be done carefully

ensure that there is no excavation or compaction of the original surface or change in ground levels.

6.25. Once this material has been removed vehicular access to this part of the site will not be permitted.

Excavations and Removal of Existing Surfaces

6.26. All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air such as an Air Spade may be an appropriate alternative to hand digging, if available.

6.27. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.

6.28. If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 100-200mm behind the final face of the excavation.

6.29. Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots greater than 25mm in diameter should only be cut in exceptional circumstances. Roots greater than 100mm in diameter should only be cut after consultation with the project arboriculturist.

Upgrading Existing Surfaces

6.30. Where upgrading of existing hard surfaces is required, the preferred option will be to leave the surface in place and install the new surface specification on top.

6.31. If the retained surface is impermeable, it may be appropriate to remove or puncture sections to create a more favourable environment for roots beneath, before the new surface is laid, through consultation with the project arboriculturist.

6.32. Where the existing surface is to be removed or upgraded, the surface layer should be excavated down the existing subbase and the new surface specification installed on top, to prevent any damage to roots beneath.

6.33. It is recommended that where possible, new and upgraded hard surfaces should be porous (e.g. permeable brick paving, porous resin bound aggregate or tarmac) to allow the flow or water and oxygen to roots. Wet concrete should only be poured if an impermeable geotextile fabric has first been installed to prevent soil contamination from toxic leachate.

6.34. New surfaces and upgraded surfaces should be set back from the base of stems by a minimum of 500mm to allow space for future growth and minimise the risk of distortion with new surface.

Permanent 'No-Dig' Ground Protection

6.35. Where permanent hard surfaces are required within the RPA, there must be no excavation into the soil, either through the lowering of levels, other than the removal of turf or other surface vegetation. This is typically achieved using a three-dimensional cellular confinement system, which is capable of meeting load bearing needs while also protecting roots from the effects of compaction from regular vehicular movement.

6.36. A general method statement and product specification is provided in Appendix 5.

6.37. The methodology has been provided by the product manufacturer and it will be the responsibility of the contractor to ensure that whatever system is used, it is installed in accordance with the latest guidelines provided by the manufacturer.

6.38. It is recommended the final product to be used is specified by a Structural Engineer to meet the required load bearing requirements.

Installation of Boundary Treatments, Lighting Columns & Street Furniture

6.39. The erection of a new fence posts, lighting columns or street furniture will require 'hand-digging' in the location where any foundations or posts are required within RPAs, to prevent damage to tree roots.

6.40. Any soil removal during excavations must be undertaken with care to minimise root disturbance and avoid any damage to root bark.

6.41. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 10-20mm behind the final face of the excavation.

6.42. Roots greater than 25mm diameter should only be cut in exceptional circumstances and following approval by the project arboriculturist.

6.43. Fibrous clumps of roots must be retained where possible, with any exposed roots protected from desiccation by covering them with a damp hessian sack or damp sharp sand (**builders' sand must not be used**).

6.44. Prior to backfilling, roots must be surrounded with topsoil or sharp sand before the excavated earth is replaced. The soil must be free of contaminates and any foreign objects that may be potentially harmful to roots.

6.45. The construction of new boundary walls within RPAs must be undertaken using traditional methods of construction or strip foundations. Instead, walls should be build using a bridging lintel of concrete or to support the wall slightly above the roots to be retained, the specific design of which should be specified by a structural engineer.

Installation of Services

6.46. All services and utilities will be installed within existing service routes and where possible outside of RPAs.

6.47. Where installation of utilities or services is required within RPAs, working practices will be adopted in accordance with the National Joint Utilities (NJUG) 10, Vol 4, Issue 2, 2007

'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees'.

6.48. In accordance with 4.1.3 of NJUG 10 2007, acceptable techniques in order of preference include: a) Trenchless; b) Broken Trench; and c) Continuous Trench. Trenchless methods involve the use of thrust boring machinery, whilst broken and continuous trench methods require that excavations within RPAs are carried out using hand tools only.

6.49. For a proposal of this nature, broken or continuous trench methods are the most appropriate and should be undertaken as per NJUG 10, to prevent any damage to tree roots or disruption to soil rooting environments.

7. ABOUT THE AUTHOR & LIMITATIONS

Authors Qualifications & Experience

7.1. This report has been written by John Morris, Director at John Morris Arboricultural Consultancy Ltd. John has a First Class BSc (Hons) in Housing (Ulster University) and a Post Graduate Diploma (UK NQF Level 7) in Arboriculture & Urban Forestry (Myerscough College & University of Central Lancashire). John has worked in the housing, development and arboricultural sectors combined for 20 years and regularly undertakes continuous professional development (CPD) in all areas of arboriculture and wider business administration. John is a Professional member of the Arboricultural Association (AA) and Associate member of the Institute of Chartered Foresters (ICF).

Limitations

7.2. This report is for planning purposes and is not a detailed assessment of the health and condition of trees, however where defects have been identified works have been recommended to ensure site safety.

7.3. This report does not take responsibility for the effects of extreme weather conditions, vandalism, accidents or any works to trees or site conditions that occur without the authors knowledge, or that are not recommended within this report.

7.4. Tools used during the assessment have been limited to a sounding mallet, probe or binoculars. No invasive or diagnostic equipment has been used, nor have any aerial inspections, belowground root investigations, or soil, leaf or root samples been taken for further testing or analysis.

7.5. Trees were assessed on 17th and 18th October 2023 and the information gathered during the survey pertains to that moment in time.

7.6. The location of trees places reliance on the accuracy of the topographical survey unless otherwise caveated within the report.

7.7. All works recommendation as a result of the survey should be undertaken by a suitably qualified and insured arborist in accordance with BS3998:2020 *Tree Works – Recommendations* to prevent any structural or physiological impairment to trees.

Appendix 1: Tree Survey Criteria (BS5837:2012)

The assessment of the trees has been carried out in accordance with the guidance provided in Annexe C of BS5837, which requires that any tree on or influencing distance of the site with a stem diameter of over 75mm at 1.5m above ground level be recorded.

Stem diameter measurements were taken using a girthing tape or Biltmore stick, and in accordance with Annexe D of BS5837.

Height, crown spread, and canopy clearance measurements are recorded in accordance with the measurement convention detailed in paragraph 4.4.2.6 of BS5837.

The trees are categorised in an order defined in **Table 1** of BS5837, a copy of which can be seen below in **Figure 1**, but which can be summarised as:

- **Category A** Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years.
- **Category B** Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years.
- **Category C** Trees of low quality and value currently in adequate condition and able to remain until new planting can be established with a minimum useful life expectancy of 10 years, and young trees with a stem diameter less than 150mm.
- **Category U** Trees in poor structural condition or physiological decline that cannot be realistically retained in the context of current land use for more than 10 years.

Further subcategories 1-3 indicate the area(s) in which a tree or group retention value lies.

- Mainly arboricultural.
- Mainly landscape.
- Mainly cultural, including conservation.

Table 1 **Cascade chart for tree quality assessment**

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

Appendix 2 – Calculation of the Root Protection Area

Circle Radius

The circle radius has been calculated by obtaining the stem diameter (measured at 1.5m above the ground) in millimetres and multiplying it by 12. Where the tree is multi-stemmed, an average stem diameter is calculated by the following formula specified in section 4.6.1 (a) & (b) of BS5837.

For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter 1})^2 + (\text{stem diameter 2})^2 \ldots + (\text{stem diameter 5})^2}$$

For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

This total is then divided by 1000 to provide a circle radius in metres.

RPA Areas

The RPA has been assessed according to the recommendations set out in section 4.6 of BS5837. It is calculated by multiplying the radius squared by 3.142 (π).

Length of sides of a square

Section 5.5.3 of BS5837 recommends that the ground protection and barriers should be shown as a polygon surrounding the stem of the tree. With a circle, the distance from the edge of the circle to the centre will remain constant, but with a square, the distance from the centre of the tree to the sides of the square is less than the distance to the corner of the square. The area of the square must remain the same as the area of the circle. In order to ensure that it is the case, the length of side of the square is calculated at the square root of the RPA area.

Minimum barrier distance

This is the closest point that a side of the square can be to the centre of the tree.

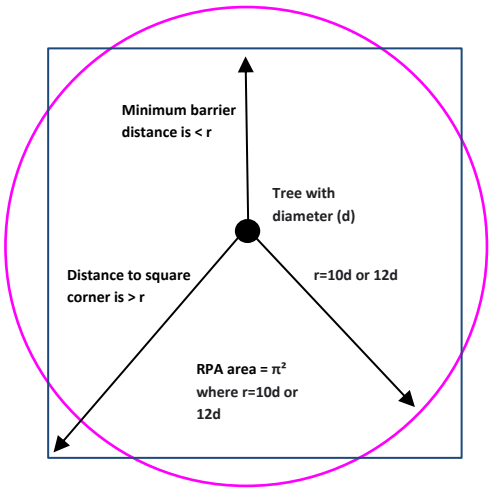


Figure 1. Illustration of area calculations and minimum barrier distances

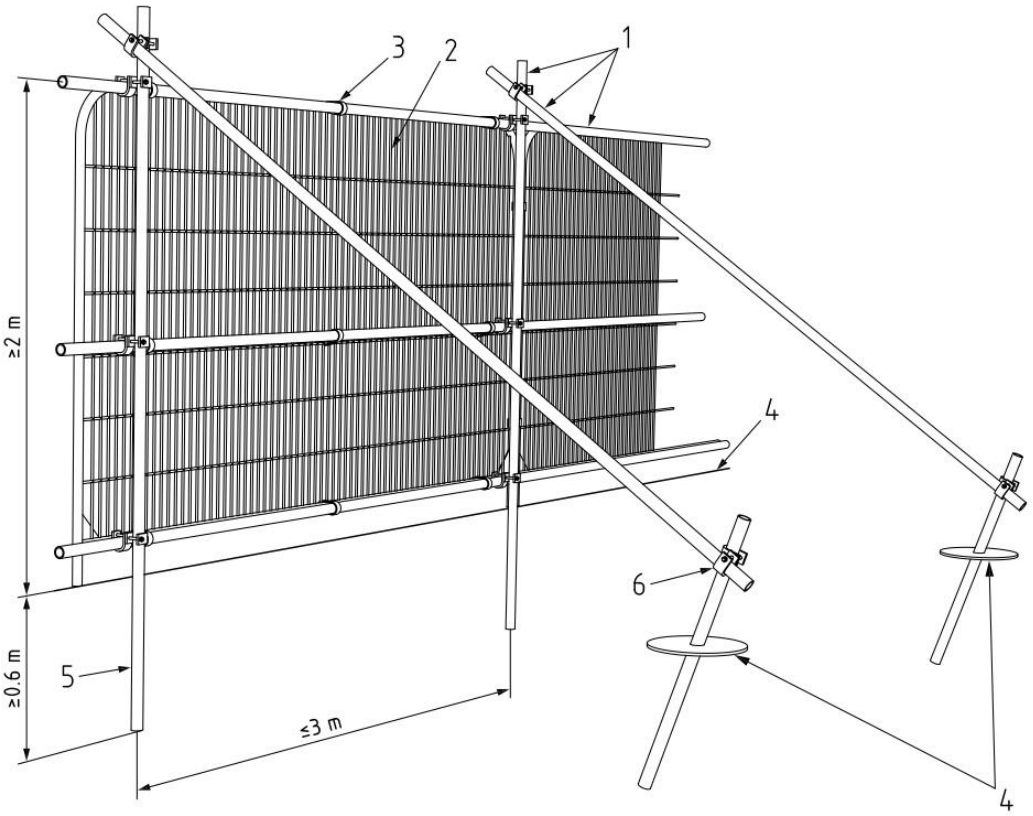
Figure 1 illustrates the differences between a square and a circle in area. Where the distance from the centre of the tree to the corner of the square is greater than the radius of the circle (r), but the distance from the centre of the tree to the side of the square is greater than the radius of the circle (r), the total area will remain the same. The minimum barrier distance from the tree is calculated by taking the length of the side and dividing it by two.

Clarification note on the RPA radius

The RPA radius is not the automatic minimum distance of the tree protection. It is a notional figure for use as a means of calculating the actual area of the RPA. BS5837 clarifies this under *Section 3.7 Root Protection Area (RPA) – layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the trees viability, and where the protection of the roots and soil structure is treated as a priority.*

Appendix 3 – Example of Tree Protective Fencing

Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Appendix 4 – Example of Tree Protective Signs

Appendix 5 - Permanent 'No-Dig' Ground Protection

When considering damage to tree roots by installation of new hard surfaces for roads, car parks, cycle lanes or pedestrian footpaths, the risk of oxygen depletion caused by compaction of subsoil's, site clearance damaging the root source and type of reinforcement are areas which need to be given due consideration.

Other risk factors are:

- Creating an impermeable surface
- Causing a rise in the water table due to construction
- Increasing ground levels
- Contamination of subsoil's

Typically, a three-dimensional cellular confinement system is a load bearing system which protects roots from the effects of compaction from regular vehicular movement. The recommended product for this solution is CellWeb (or similar). Whatever system is used, the result must be that the underlying soil (rooting environment) remains undisturbed and retains the capacity to support existing and new roots. The final product to be used must be specified by a Structural Engineer to meet the required load bearing requirements.

1. Compaction	
When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting proposed use:	
Californian Bearing ratio (CBR) – Standard test method for measuring soil strength	CBR should be greater than 3% (check soils report or confirm with structural engineer)
Soil type	
Water table (if required)	
Maximum load required	E.g Pedestrian >1,000kg GVW
Acceptable rut depth (if required)	
Reinforcement type	E.g. Cellweb Cellular Confinement 75mm deep
Type and Depth of engineered infill material	Clean, angular stone. Usually 40mm to 20mm.
2. **Dig (site strip)**	
Site stripping will damage tree roots; however, the use of no-dig construction elevates the access road requiring edge protection.	
3. Preparation and laying separation later	

Remove surface vegetation	Where permanent hard surfaces are required within the Root Protection Area, there must be no excavation into the soil, either through the lowering of levels and/or scraping, other than the removal of turf or other surface vegetation. It is desirable for works to be carried out using hand tools. If machinery is used it should be sited outside of the Root Protection Area and a mechanical arm used to reach into the works area, under arboricultural supervision. A suitable herbicide suitable may be used for clearance of vegetation but this must not be harmful to the tree root system. Tree roots must be protected. Pay close attention to avoid roots close to the surface.
Place geotextile separation filtration layer	Use a Treetex T300 non woven Goetextile over the prepared sub-grade. Overlap dry joints by 300mm.

4. Application of Cellular Confinement and Backfill Material

The three-dimensional cell structure, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system.

Expand the Cellweb 2.56m wide panels to the full 8.1 metre length. Pin the Cellweb panels with staking pins to anchor open the cells and staple adjacent panels together to create a continuous mattress. Infill the Cellweb with a no fines angular granular fill (typically 4-20mm) within each open cell. The use of cellular confinement reduces the bearing pressure on the subsoil by stabilising aggregate surfaces against rutting under wheel loads. Comparisons between cellular confinement and traditional aggregate and geogrid-reinforced structures demonstrate a 50% reduction in construction thickness of the granular material.

5. Examples of Surfacing Options

Block Paving:

Lay second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections

Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth.

Place block pavers as per manufacturers instructions.

Tarmac:

Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.

Loose Gravel:

Ensure Cellweb is completely filled.

Place decorative aggregate to required depth

NOTE: A treated timber edge should be provided to restrict gravel movement.

Grass Blocks:

Place second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections

Place 50/50 rootzone bedding layer to the required depth

Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix.

Seed as per architects instructions.

(Alternatively the Grass Blocks may be infilled with gravel.)

Concrete Slab:

Lay Cellweb as previous and place second layer of Treetex Geotextile directly over the filled panels. Pour concrete base as specified.

6. Edge Retention

Conventional kerb retention set in concrete trenches is likely to cause damage to tree roots and should be avoided. Effective edge retention within the RPA must be custom designed to avoid significant excavation into existing soil surfaces. Generally, the use of pre-formed edging or treated timber secured by metal pins or wooden pegs will be sufficient to ensure minimal impact on the trees.

CellWeb™

Tree Root Protection System



The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.

Potential loss of existing tree due to poor construction techniques.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases leads to death. CellWeb™ can be sensitively installed close to and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees during and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2005) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving trees open to decay, less stable and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective driveways and roadways in the vicinity of tree roots.

The CellWeb™ system overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.

Glyneboume Wood.

Pedestrian path to recreational wood and built using a CellWeb™ foundation which was covered with DuoBlock and then filled with woodchip to create a porous surface.

Product features

CellWeb™ comprises an expandable cellular mattress that is then filled with a clean stone sub-base and above a Treetex T300 Geotextile.

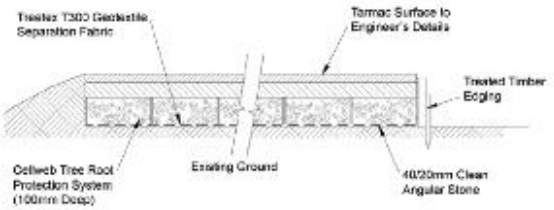
The honeycomb-like structure is made of robust high-density polyethylene (HDPE) that is simply stretched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CellWeb™ this is achieved without compaction and without reduction in permeability.

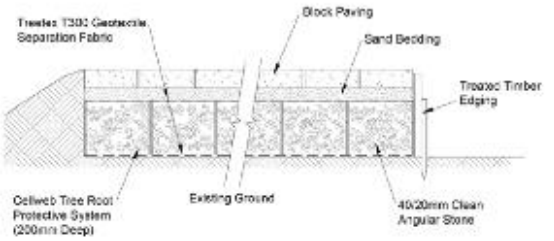
Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to nearby tree roots. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CellWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CellWeb™ significantly reduces surface rutting, increasing the long-term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CellWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CellWeb's green credentials.

- No excavation – Soil structure remains undisturbed; risk of root damage minimised.
- Porous infill – Allows tree roots to conduct moisture and gas exchange.
- No compaction – No need to compact the infill to achieve a load-bearing structure.
- Lateral stability – Structure remains rigid to vertical loads.





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