Arbor-Eco Consultancy

ARBORICULTURAL IMPACT ASSESSMENT

At

CARDIFF PENINSULA,
CARDIFF INTERNATIONAL POOL CAR PARK,
EMPIRE WAY,
CARDIFF INTERNATIONAL SPORTS VILLAGE,
GRANGETOWN, CARDIFF,
WALES

For:

RADCLIFFES CONSTRUCTION CONSULTANTS LIMITED

On Behalf Of:

CARDIFF PENINSULA CONSORTIUM LIMITED

This report was compiled by
Marco Bartolini
Arboricultural Consultant *TechArborA, (TE02501) FdScWM, PTI, Dip Mgmt*

Arboricultural ASSOCIATION Technician Member

This report is the responsibility of Arbor-Eco Consultancy.
It should be noted that whilst every effort is made to meet the client's brief,
no site investigation can ensure complete assessment
or prediction of the natural environment.

Report Number: MB240203-01

April 2024

EXECUTIVE SUMMARY

The development proposals for this property have been carefully considered by Ascot Design Ltd in consultation with Radcliffes Construction Consultants Ltd and Arbor-Eco Consultancy.

1. Many of the trees surveyed were secured with a stake and tie with evidence of strangulation to the stem. This vascular restriction has the potential to kill the tree.
2. Group 4 provided an element of shelter from the weather and sections of the group was growing within off-site positions. It provided good visual separation from neighbouring land across the bay but was significantly wind sculptured. This suppressed any growth and the trees were showing signs of wind-burn and similar effects that caused apical dieback.
3. Any tree loss would not be so significant that further planting would not reconcile. A good number of young trees can be replanted within the proposed development and this should be a consideration in the planning application.

Arbor-Eco Consultancy supports this Planning Application and proposed development layout in its current form. It must be remembered that there is no guarantee that this proposed development will be granted through the use of this report alone.

CONTENTS

1. INTRODUCTION

1.1 PROJECT BACKGROUND

Radcliffes Construction Consultants Ltd commissioned Arbor-Eco Consultancy to compile an Arboricultural Impact Assessment following the undertaking of an Arboricultural Survey of trees situated on land at Cardiff Peninsula, Cardiff International Pool Car Park, Empire Way (Fig 1). The appointed architects for this project are Ascot Design Ltd. the site is within the administrative boundary of Cardiff Council and within the county of South Glamorgan.

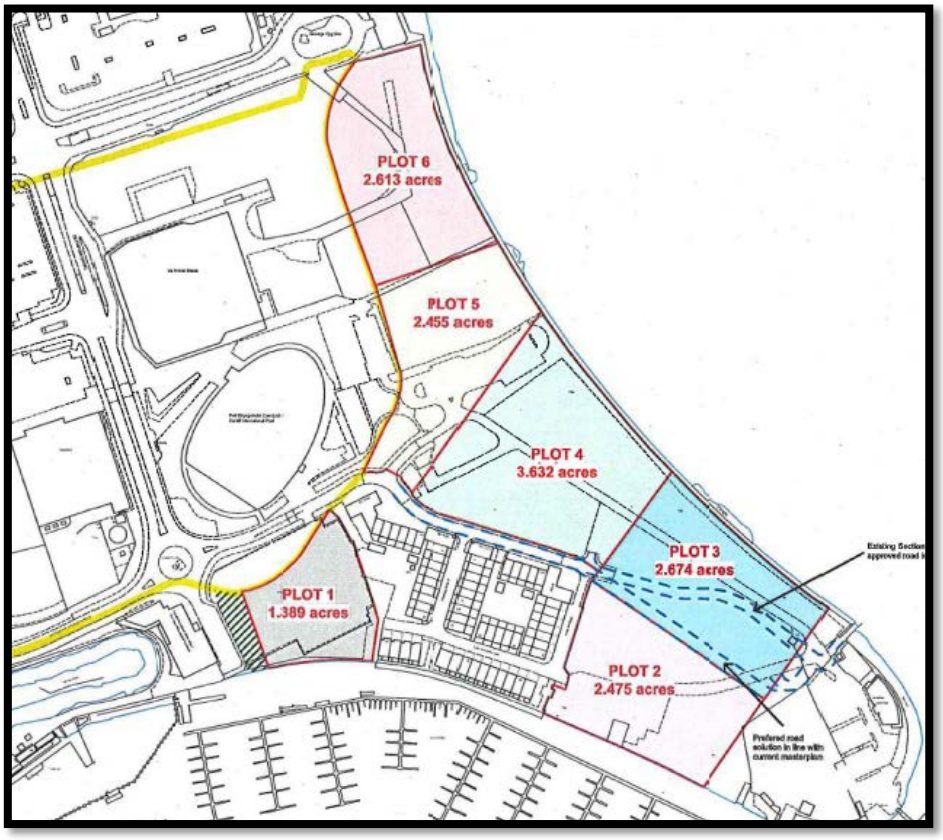


Fig 1: Plots 1 – 6 locations.

This report details the impact that the proposed development will have upon the site's existing tree stock and sets out recommendations for the subsequent mitigation or avoidance of impact. The study has been completed in accordance with guidance contained within British Standard BS5837:2012 'Trees in relation to design, demolition and construction – Recommendations'.

1.2 SITE DESCRIPTION

The proposed development of land is located within a sparsely populated area of the Cardiff Peninsula and situated towards the southern fringes of the city of Cardiff. The site is situated off a cul-de-sac, Empire Way, minor road. The site is dominated by the existing areas of hard surfacing (utilised as a car park), shrub boarders and scattered trees. The trees and vegetation surveyed were growing predominantly to the periphery of the site.

The site is delineated from neighbouring land by a mix of natural and artificial structures. To the north, the site abuts Empire Way, minor road. The eastern boundary was demarcated by properties off Dan Donovan Way, minor road. The southern boundary abutted the mouth of the River Ely and Cardiff Bay. The western boundary was delineated by a commercial building off Watkiss Way, minor road.

The trees were growing within areas of dense understorey with detritus around the root-plates along with bramble across the ground. A good number of trees showed strangulated symptoms of the stem as the stake and tie were present.

The site is centred at National Ordnance Survey Grid Reference ST 18049 72864. The topography of the survey area was generally flat with a gentle slope from north to south.

Arbor-Eco Consultancy, Tree Constraints Plan, Drawing Number MB240203-01-01 in Section 5 indicates the location of the trees surveyed.

1.3 DEVELOPMENT PROPOSALS

It is understood that the site surveyed will be the subject of a planning application to include the construction of a multi-occupancy senior living residential property. In addition, associated hard and soft landscaping of the site will also be undertaken.

1.4 DOCUMENTATION PROVIDED

This assessment is based upon the information provided by the clients' architect in addition to information collected by Arbor-Eco Consultancy. The documents and drawings considered are detailed within Table 1.1.

Author	Document	Document Number	Date
Cameo & Partners	Site Layout	-	Apr 2024
Ascot Design	Ground Floor Plan Site Layout	CPM-ASC-10-0000-DR-A-PL-0001	Feb 2024
Michael Gallie	Site Plan	10509/01	Nov 2023

Table 1.1: Documentation Provided

2. STATUTORY PROTECTION

2.1 TREE PRESERVATION ORDER AND CONSERVATION AREA DESIGNATIONS

Mr Ed Baker, *Pers comm*, (2024) Tree Protection Officer, Tree Protection Team / Tîm Amddiffyn Coed, Cardiff Council confirmed within an email of 15th April 2024 that none of the trees are the subject of a Tree Preservation Order (TPO).

Further examination of Cardiff Council (2024) Conservation Area pdf file (https://www.cardiff.gov.uk/) accessed on 15th April 2024, indicated that the site is not situated within a Conservation Area.

2.2 PROTECTED SPECIES

Bats: A bat survey must be performed on the relevant roost potential prior to demolition. If bats are found to be present, a Natural England licence will be required prior to demolition. Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2017, as amended (Habitats Regulations 2017, as amended). They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981, as amended. This protection means that bats, and the places they use for shelter or protection, are capable of being a material consideration in the planning process. As bats re-use the same roosts (breeding site or resting place) after periods of vacancy, legal opinion is that roosts are protected whether or not bats are present. The Natural Environment and Rural Communities (NERC) Act 2006 places a duty on public bodies to have regard for the conservation of biodiversity and maintains lists of species and habitats which are of principal importance for the purposes of conserving biodiversity in England and Wales. A number of bat species are listed on Section 41 (England) and Section 42 (Wales) of the NERC Act 2006.

Nesting Birds: The removal of relevant features must be undertaken outside of the bird nesting season (this generally extends between March and August but is weather dependent). If this is not possible the area concerned should be checked immediately prior to removal by a suitably qualified ecologist. Nesting and nest building birds are protected under the Wildlife and Countryside Act WCA 1981 (as amended). Some species (listed in Schedule 1 of the WCA) are protected by special penalties.

2.3 LAND DESIGNATIONS (NATURAL RESOURCES WALES)

For land you own or occupy, Natural Resources Wales can select all or part of it for protection. Natural Resources Wales will do this when it believes the site has features of special interest, such as its:

- wildlife
- geology
- landform

Natural Resources Wales will 'notify' (or designate) the land, for example, as a site of special scientific interest (SSSI).

Cardiff Peninsula is not situated within a designated Natural Resources Wales site at the time of writing the report.

2.4 OCCUPIERS' LIABILITIES ACT 1957 AND 1984

The Occupiers Liability Act 1957 regulates the area of Tort law in England and Wales.

An occupier of premises owes the same duty, the "common duty of care", to all his visitors whether by invite or otherwise. The common duty of care is a duty to take such care as in all the circumstances of the case is reasonable to see that the 'visitor' will be reasonably safe in using the premises for the purposes for which he is invited or permitted by the occupier to be there or for purposes other than that which they have been invited (trespassers).

3. ARBORICULTURAL IMPACT ASSESSMENT

3.1 INTRODUCTION

All trees within and closely surrounding the site have been surveyed and each has been identified with a unique number. The location of the trees can be found on Arbor-Eco Consultancy, Drawing Number MB240203-01-01 in Section 5.

A schedule of the trees surveyed can be found within Appendix 1.

3.2 DEVELOPMENT DESIGN AND LONG-TERM IMPACTS

3.2.1 Potential Impact on the Amenity Value of Trees

Impacts

Tree Removal

The proposed development will require the removal of a small element of hedgerow number H1 to permit its successful implementation.

Tree removal is required to achieve various aspects of the proposed development and soft landscaping as discussed below:

- **Construction of Proposed Residential Block:** Construction of the proposed new residential block will directly and indirectly require the removal of tree numbers 14 to 226 inclusive along with group G4 to facilitate the development. The trees, group and hedgerow (in part) to be removed are shown on Arbor-Eco Consultancy, Tree Protection Plan, Drawing Number MB240203-01-01, Section 5.
- All of the trees identified for removal were considered to be Category C, of low retention value.
- The group to be removed was recorded as Category C and of low retention value.
- The hedgerows were deemed to be Category C hedgerows with low retention value, and will be replaced with suitable species.

All of the trees, group and hedgerow should not be considered a constraint to the proposed development due to their limited life expectancy and overall condition.

Proposed Tree Works

To permit space for the proposed development and to provide working space for the hard and soft landscaping improvements it will be necessary to carry out tree work on this site prior to any other works being carried out. The proposed tree works are detailed in Table 3.1.

Tree No	Species	BS5837 Cat	Tree work and reason required
14	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
15	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
16	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
17	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
18	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.

Table 3.1: Tree Works Required (continues)

Tree No	Species	BS5837 Cat	Tree work and reason required
19	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
20	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
21	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
22	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
23	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
24	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
25	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
26	Elm cultivar (*Ulmus* sp.)	C1	Fell and grind stumps to facilitate the development.
G4	Mixed Species	C2	Prune back and remove stems to facilitate the development.
H1	Beech	C2	Fell and grind stumps to facilitate the development.

Table 3.1: (cont'd) Tree Works Required

Trees and vegetation that overhang the highway should be crown-lifted to at least 5.2 m above ground level to allow safe passage of high sided vehicles as well as being cut back sufficiently from the edge of the carriageway to allow clearance for wing mirrors. Trees and vegetation that overhang footways and footpaths should be crown-lifted to at least 2.5 m above ground level and cut back to ensure the footpath/way is at least 1.2 m in width. This is to allow safe passage for all footpath/way users including wheelchairs, mobility scooters, etc.

These heights have been selected as an acceptable standard and any vegetation below this may be deemed to be an obstruction. The local authority may enforce Section 154 of the Highways Act (1980) which allows a Local Authority to serve notice upon the owner of the trees/ vegetation informing them that they need to clear any obstructions safely.

Mitigation/Avoidance

At the time of writing this report a soft landscaping plan was not available.

New tree planting should be carried out in accordance with British Standard 8545:2014 Trees: from nursery to independence in the landscape – Recommendations.

3.2.2 Proximity of Trees to Proposed Structure

Impacts

Branch Spread

It is evident that an existing tree management regime existed, in the form of pruning (as was noted at the time of the inspection) and it is noted that any future conflict that may arise from the proposed development can be appropriately managed through continued management works to the trees, groups, hedgerows and shrub canopy. So long as such works are completed in accordance with best practice guidance, they will not cause significant harm to the health or amenity value of the tree.

Shading
It is unlikely that the new building will experience significant shading during the day as the sun tracks across the horizon. The orientation of the building and aspects of the windows would suggest that any shading of the southern face of the building will be felt in the mid to late afternoon during the winter should planting take place adjacent to the waters' edge. Therefore, it can be assumed that no significant shading of primary living spaces within the proposed new building is likely to occur due to existing or proposed trees.

Leaf Litter, Fruits, Pollen, Sap etc.
Whilst the majority of the retained trees are species associated with significant fruit fall, leaf and branch drop or sap exudate problems the inconvenience experienced can be overcome by implementing good housekeeping.

Mitigation/Avoidance
Trees across this site will be the subject of cyclical pruning as the trees continue to grow. Further works will be required in the future to prevent conflict occurring with the development or highway. However, such works will not be significant as to impact the long-term visual quality of the trees, groups and hedgerows.

With respect to leaf litter, it is noted that the sweeping up of leaves and cleaning of gutters, which may become blocked by falling leaves, is considered to be routine seasonal household maintenance and, as such, no notable conflict with the proposed development is considered to occur. Nonetheless it may prove appropriate in certain areas to use gutter guards, or otherwise enclosed gutters, to minimise the potential for leaf fall to cause blockage and an ongoing nuisance.

3.3 POTENTIAL IMPACTS FROM CONSTRUCTION PROCESSES OF THE PROPOSED DEVELOPMENT

3.3.1 Potential Root and Canopy Protection

To prevent harm occurring to retained trees during development it is recommended that demolition and construction works are excluded from the Root Protection Areas (RPA) of retained trees. Additionally, works should not be undertaken beneath the canopy spread of retained trees where this can be avoided.

The RPA represents the minimum area around trees that must be left undisturbed to ensure their survival. The roots typically occupy the top 600 mm of soil and the fine roots which absorb water, oxygen and nutrients are situated in the top 100 mm of soil. Any incursion into the rooting zone of a tree can cause a notable impact upon a tree's health.

Where existing buildings and areas of hard surfacing exists within the RPA of retained trees it is very likely that the rooting will have occurred asymmetrically due to the hard structures and the morphology of the roots is such that they are likely to have formed a fan shape with many roots running parallel to the man-made structures rather than being offset so far in to the site. The current RPA is shown in accordance with the guidance within BS5837:2012 which is effectively a presumed calculation of the extent of a trees' root system that is required to ensure the continued vigour of a tree.

Demolition and construction work carried out within the RPAs of the retained trees will cause the greatest damage. 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 a 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.

In accordance with BS5837:2012, Section 4.6.2, an allowance for the modification can be made to the RPA of trees located adjacent to man-made or naturally occurring hard structures. In this case highways, access routes, footpaths (especially those that are kerbed) and underground services will affect the morphology of roots. The morphology of the roots is such that they are likely to have formed a fan shape with many roots running parallel to the hard structures rather than being offset in to the site. To determine the exact location of the roots of a tree it would be necessary to employ a root-radar for this work.

Section 7.4.2, Para 7.4.2.3 of BS5837:2012 permits the construction of new hard surfacing within the unmade ground of the RPA of a retained tree of no greater than 20%.

The RPA and canopy spread of each tree to be retained is shown on Arbor-Eco Consultancy, Drawing Number MB240203-01-01, Section 5. Additionally, details of the crown spread measurements are contained within Appendix 1 and a schedule of RPAs for trees on the site is located at Appendix 2.

Impacts

The proposed development of the site has been designed so that no major works are required within the RPAs of retained trees except perhaps in the form of construction and replacement hard surfacing. This detail was not known at the time of writing the report.

The construction works to develop sections of hard surfacing, such as the driveway has the greatest potential to cause harm to the retained trees. It is considered that the trees identified on Arbor-Eco Consultancy, Tree Protection Drawing MB240203-01-01, Section 5, will not be impacted upon with the adoption of tree protection measures and good working practices as described below.

Overall, it is considered that the potential for harm to occur to the root systems of retained trees can be adequately controlled through the adoption of appropriate working practices and erection of protective barriers to exclude access from vulnerable sections of trees RPAs.

Mitigation/Avoidance

Construction Exclusion Zones

To minimise the potential for harm to occur to the root systems and canopies of retained trees during development it will be necessary to implement construction exclusion zones throughout the site. These are areas surrounding the trees' RPAs and canopies in which no demolition or construction works, or related activities, will be undertaken. These zones will be demarcated by the erection of tree protection barriers prior to any works (with the exception of tree works) being carried out. The tree protection barriers can be installed as shown on Figure 3, Appendix 3 as this is a relatively low-impact development in terms of conflict with trees.

It is recommended that the exclusion zones are afforded protection at all times through the use of tree protection barriers and ground protection (specified in accordance with BS5837:2012). It must be noted that any hoarding and tree protection barrier uprights driven into the ground must adopt the procedures as specified within Section 3.3.9.

Where hard surfacing already exists on site, consideration should be given so that these areas will be retained and utilised as ground protection within the RPAs of retained trees until the replacement of hard landscaping is implemented into the construction phase of the development. The retention of the hard surfacing is deemed suitable ground protection and therefore the conflict with retained tree's roots is eliminated.

Where the replacement of hard surfacing is being considered then retaining the sub-base hard-core layer will also reduce the risk of root damage.

All works within the RPA of a retained tree shall be carried out under the supervision of the retained Arboricultural Consultant. All tree protection measures should be confirmed for their position and suitability prior to any construction works being carried out (See Section 3.3.13 for contact details).

3.3.2 Site Construction Access

Impacts

Construction access to the site will need to make use of the existing access routes in to the site off Empire Way, minor road. To minimise the potential for harm to occur to the crowns of the retained trees which overhang the route further access facilitation pruning works may be required over time due to seasonal extension growth to the existing vegetation. The extent of such pruning works should be revised prior to any construction traffic entering the site. Maximum heights of vehicles should also be investigated to ensure crown height is sufficient throughout the various phases of the development.

Additionally, where vehicles need to pass within close proximity to retained trees protective barriers should be installed to prevent vehicles accidentally encroaching into areas where retained trees are situated to minimise the potential for collision damage to trees stems occurring.

Mitigation/Avoidance

All trees surrounding the potential access routes should be adequately fenced and ground protection installed to ensure that no damage to these specimens occurs during construction.

The retained Arboricultural Consultant shall submit a summary written report or email to the local authority confirming that all tree protection measures are in place, fit for purpose and adequately signed prior to construction or demolition works being carried out.

3.3.3 Contractors Parking

Impacts

The location of contractor parking is yet to be determined but it is understood that it will occur within the site locations, due to the expanse of the site not being used, and well away from the RPAs of retained trees.

Mitigation/Avoidance

The Contracts Manager is to ensure that all highway laws are respected and **no parking** is to occur on any highway verge. No neighbouring property shall be inconvenienced by construction or contractor activity.

3.3.4 Site Cabins and Welfare Facilities

Impacts

The location of the Site Cabins and Welfare Facilities is yet to be determined; however, it is understood that it will occur in locations well away from the RPAs of retained trees.

Mitigation/Avoidance

Installation of protective barriers and ground protection to ensure that trees are protected from physical damage resulting from works to establish a Site Cabins and Welfare Facilities.

3.3.5 Delivery and Storage of Materials

Impacts

The proposed locations for site deliveries and materials storage during the development is yet to be determined; however, it is understood that it will occur outside of the RPAs of retained trees.

Mitigation/Avoidance
Ensure no storage occurs upon un-surfaced ground within the defined RPAs of the retained trees via the installation of protective barriers and ground protection.

3.3.6 Demolition of Existing Structures

Impacts
None required.

Mitigation/Avoidance
Where the use of 360-degree traversing vehicles is used, then they will be supervised by a banksman to ensure that any traversing arm shall not be in proximity to any retained tree.

Where hard surfacing is being replaced, then retention of the hard core sub-base layer shall be retained to prevent further incursion in to the rooting zones of these trees. The sub-base layer will provide the necessary protection to the underlying roots during this phase of development.

The location of the tree protection barriers and ground protection is shown on Arbor-Eco Consultancy, Tree Protection Plan Drawing Number MB240203-01-01, Section 5.

3.3.7 Construction of Buildings

Impacts
The proposed construction of the senior living residential building has been considered in proximity to retained trees and it is deemed that no impact should occur.

The locations of the tree protection barriers and ground protection is shown on Arbor-Eco Consultancy, Tree Protection Plan Drawing Number MB240203-01-01, Section 5.

Mitigation/Avoidance
To minimise the risk of damage occurring to the tree's crowns during the construction phase it may be necessary to undertake some access facilitation pruning works, as detailed in Section 3.2.1.

The potential for direct damage to the stems of the trees will be controlled by the installation of protective barriers as shown on Arbor-Eco Consultancy, Tree Protection Plan Drawing Number MB240203-01-01, Section 5.

3.3.8 Construction of New Hard Surfacing

Impacts
Examination of Ascot Design, Proposed Site Layout, indicates that the construction of the proposed hard surfacing (access driveway and parking bays) will not pass within the RPAs of any retained trees.

The potential for significant harm to occur to the retained trees can be controlled through adoption of appropriate working technique and tree protection measures along with adequate supervision.

No access shall occur within the Construction Exclusion Zone without the permission of the retained Arboricultural Consultant or Arboricultural Officer for the Local Authority (See Section 3.3.13 for more details).

Mitigation/Avoidance
Wherever it is intended to undertake construction operations within the Root Protection Areas of trees precautions must be taken to maintain the condition and health of tree's root systems. The proposed Site

Layout provided by Ascot Design, Proposed Site Layout, indicates that there will be no conflict with the retained trees. However, the following should be adhered to;

In particular:

- Works shall be conducted in such a manner as to prevent physical damage to roots during construction, such as soil compaction or root severance.
- Provision for water and oxygen to reach the roots must be made and the soil structure must not be disturbed.
- Provision must be made for future root growth and precautions taken to ensure that such root growth does not cause unacceptable levels of damage to the finished construction.
- The soil must not be compacted and soil bulk density must be maintained at suitable levels for tree root growth and function. In this respect, a soil bulk density of over 1.8g/cm^3 is likely to impede root growth and function.

To achieve the above requirements for tree root growth and function the proposed hard surfaces shall be designed so that:

- No excavation of bare ground is required for their installation; to ensure that physical root damage does not occur.
- The surface can be installed without compaction of the existing soils; thus, ensuring damage to the soil structure does not occur.
- The surface is permeable; thus, ensuring that oxygen and water can reach the root system and that CO^2 can diffuse vertically out of the soil as high concentrations can cause root suffocation.

Where existing areas of hard surfacing is proposed for renewal then it is recommended that only the surface layer is removed down to the existing hard-core base layer and rebuilt from this horizon. This will negate the requirement for excavating within the RPA of a retained tree and thus reducing the likelihood of damage to underlying roots.

3.3.9 Boundary and Ancillary Structures

Impacts

The exact details of any proposed boundary structures are not known at this time.

Mitigation/Avoidance

As a precaution, the location of any concrete foundations and supporting posts needs to be carefully considered to ensure no damage to the adjacent trees occurs. For example, due to the highly alkaline leachate produced during the curing process of wet concrete, the concrete should not be poured within the RPA of a retained tree unless an impermeable liner has been installed.

Foundations for any proposed retaining wall within an RPA should not be of traditional trench style but consideration made for an above ground bridged-lintel to allow for future growth both above and below ground.

Additionally, any new fence posts should not be constructed within 1.0 m of the stem of any retained tree. Consideration for the use of half-panels to relocate fence posts away from retained trees by measuring site boundaries beforehand is recommended. This will reduce the amount of excavation for post foundations required within the RPAs of the retained trees. Any excavation for fence posts in RPAs will need to occur by hand and under arboricultural supervision to ensure no root damage occurs (See Section 3.3.13 for contact details).

No machinery should be used for the installation of fence posts and ground protection may be a consideration in some circumstances.

In accordance with BS5837:2012 all areas of construction activity within the RPA should be supervised by the retained Arboricultural Consultant (See Section 3.3.13 for contact details).

3.3.10 Site Gradients

Impacts

There is no indication of any gradient changes planned.

Mitigation/Avoidance

None required.

3.3.11 Service Requirements

Impacts

As the adjacent sites were previously developed there are existing service connections throughout part of it and it as such it is considered that various opportunities to create new service connections without harming trees exist.

Mitigation/Avoidance

The methodology for the installation, maintenance or removal of any services within an RPA will be in accordance with NJUG Volume 4 'Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees'. This will include hand dug 'broken' trenches to ensure that maximum protection is given to tree roots.

It is advised that the installation of any new services and drainage occur outside the RPAs of the retained trees. It is also advised that CCTV and lighting columns should not be situated in locations which will place future pressure on trees for crown pruning due to visibility/shadowing. Any lighting bollards, road signage or similar structures that require to be fixed to the ground with underground services shall be fitted outside of the RPAs of retained trees.

All areas of construction activity within the RPA of a retained tree should be supervised by the retained Arboricultural Consultant (See Section 3.3.13 for contact details).

3.3.12 Preconstruction Recommendations

Auditable systems of site monitoring should be made available to the Local Planning Authority/Arboricultural Officer and included within the program of development construction as recommended within BS5837:2012. This should include a schedule of events whereby periods of supervision or input from the Project Arboriculturist is required (See Section 3.3.13 for contact details).

Carry out all tree works prior to any demolition or construction activity taking place.

A pre-commencement site meeting involving all interested parties should be convened to confirm;

- Confirmed location for Tree Protection Measures;
- Hard surfacing construction;
- Underground Services Installation Methodology;
- Site Compound location and set-up;
- Parking locations;
- Audit and Periods of Supervision.

3.3.13 Contact Details

Name: Marco Bartolini
Position: Arboricultural Consultant
Mobile: 07542 093882
Email: arborecoconsultancy@gmail.com

Arboricultural Officer
Local Authority: Cardiff Council
Address: Development Management, County Hall, Cardiff, CF10 4UW
Phone: 029 2087 2087

3.3.14 Additional Considerations

Planning Context; National Planning Policy Framework

It is important to note that trees are a material consideration in the UK planning system and existing trees are an important factor requiring forethought when assessing the development potential of a site, whether they are within the working area or within such proximity to it that they may be affected by construction operations.

Environmental Benefits of Trees

It is worthwhile noting that the trees can intercept many of the hostile elements humans and animals need shelter from. Trees provide shading and offer significant humidity regulation and a cooling effect felt at ground level. All trees will consume a considerable amount of ground water that will regulate the local hydrology and may assist with the removal of local flooding issues. A mature tree will consume tens of thousands of litres of water during a year. A group of trees can provide an element of acoustic dampening effect at ground level and growing next to a road many tree species have been linked with the sequestration of impurities from the atmosphere. Finally, the trees will provide some shelter from prevailing winds and inclement weather. Therefore, it can be seen that the trees will benefit, rather than hinder, the landscape in which they are growing.

Net Benefit for Biodiversity

A net benefit for biodiversity (NBB) is defined as, 'the concept that development should leave biodiversity and ecosystems in a better state than before, through securing long term, measurable and demonstrable benefit, primarily on site.

4. ARBORICULTURAL IMPACT ASSESSMENT & METHOD STATEMENT

An Arboricultural Method Statement maybe a consideration for this project where identified trees are in potential conflict with the proposed development.

The purpose of a method statement is to ensure that all site operations can occur with minimal risk of adverse impact upon trees that are to be retained. The document will identify all areas where specific working methods will be required to ensure protection to trees. The document will also specify the location, specification and extent of tree protection barriers.

5. DRAWINGS

Drawing MB240203-01-01 Tree Constraints Plan

Drawing MB240203-01-02 Tree Protection Plan

General Notes
Do not scale off drawing - refer to the tree data schedule for accurate crown spread measurements.
Depictions of tree canopies are based on measurements taken to four cardinal compass points.
No liability of any kind Is accepted for any omissions or inaccuracies in respect of this plan.
The original of this drawing was produced in colour; a monochrome copy should not be relied upon.

Key

- **Trees** — Showing Canopy extents, category colour and tag number (with category). (T1-B)
- **Category A** — Trees of high quality with an estimated remaining life expectancy of at least 40 years.
- **Category B** — Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
- **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.
- **Category U** — Trees in such a condition that they can not realistically be retained as living trees in the context of the current land use for longer than 10 years.
- **Tree Groups** — Shown as dashed centre/boundary line. Colour represents category (see above)
- **BS 5837:2012 Root Protection Area**

N

1:250
0 5 10m

Arbor-Eco Consultancy
2 Daisy Lane, Locks Heath, Hants. SO31 6RA.
Email: arboreconsultancy@gmail.com
Telephone: 07542 093882
Arboricultural Consultant
Marco Bartolini

Client	Radcliffes Construction Consultants Limited
Project	Cardiff Peninsular Plot 1
Drawing Title	**Tree Constraints Plan**

Scale	Date	DB	CB
1:250 - A1	16/04/2024	CS	MB

Drawing Number	Rev
MB240203-01-01	A

General Notes
Do not scale off drawing - refer to the tree data schedule for accurate crown spread measurements.
Depictions of tree canopies are based on measurements taken to four cardinal compass points.
No liability of any kind Is accepted for any omissions or inaccuracies in respect of this plan.
The original of this drawing was produced in colour; a monochrome copy should not be relied upon.

Empire Way

Sewage Ppg Sta

Cardiff International White Water / Dwr Gwyn Rhyngwladol Caerdydd

River Ely

Viewes

68 to 102

114

18

20

ESS

T1-C1
T2-C1
T3-C1
T4-C1
T5-C1
T6-U
T7-C1
G1-C2
H1-C2
H2-C2
T8-C1
T9-C1
T10-C1
T11-C1
T12-C1
G2-C2
Scrub
G3-U
T13-C1
T14-C1
T15-C1
T16-C1
G4-C2
T17-C1
T18-C1
T19-C1
T20-C1
T21-C1
T22-C1
T23-C1
T24-C1
T25-C1
T26-C1

Tree Protective Fencing.

Sections of G1 and H1 to be removed.

Shared Surface

Existing path

Existing bound walk

Proposed canopy

Line of building overhead

Dining terrace

Reception terrace

Key

- Trees — Showing Canopy extents, category colour and tag number (with category).
- Category A — Trees of high quality with an estimated remaining life expectancy of at least 40 years.
- Category B — Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
- 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.
- Category U — Trees in such a condition that they can not realistically be retained as living trees in the context of the current land use for longer than 10 years.
- Tree Groups — Shown as dashed centre/boundary line. Colour represents category (see above).
- BS 5837:2012 Root Protection Area
- Tree Protective Fencing
- Trees for Removal

N

1:250
0 5 10m

Arbor-Eco Consultancy
2 Daisy Lane, Locks Heath, Hants. SO31 6RA.
Email: arboreconsultancy@gmail.com
Telephone: 07542 093882
Arboricultural Consultant
Marco Bartolini

Client	Radcliffes Construction Consultants Limited
Project	Cardiff Peninsular Plot 1
Drawing Title	**Tree Protection Plan**

Scale	Date	DB	CB
1:250 - A1	19/04/2024	CS	MB

Drawing Number	Rev
MB240203-01-02	A

REFERENCES AND BIBLIOGRAPHY

Ancient woodland, ancient trees and veteran trees: advice for making planning decisions (2024) https://www.gov.uk/guidance/ancient-woodland-ancient-trees-and-veteran-trees-advice-for-making-planning-decisions Accessed on 15/04/24.

Arboricultural Advisory Information Services. (2007) 'Practice Note 12. Through Trees to Development'.

Arboricultural Association. (2009) Guidance Note 7. *Tree Surveys: A guide to Good Practice*. The Arboricultural Association, Stonehouse.

Biodiversity Net Gain (2024) https://www.gov.uk/guidance/understanding-biodiversity-net-gain Accessed on 15/04/24.

British Standards Institution. (2010) *British Standard 3998:2010; Tree work – Recommendations.* British Standards Institution, London.

British Standards Institution. (2012) *British Standard 5837:2012, Trees in relation to design, demolition and construction – recommendations.* British Standards Institution, London.

British Standard Institution. (2014) *British Standard 8545:2014 Trees: from nursery to independence in the landscape – Recommendations.* British Standards Institution, London.

Cardiff Council (2024) Conservation Area pdf file (https://www.cardiff.gov.uk/) Accessed on 15/04/24.

Johnson & More **(**2004) *Tree Guide, Collins*. London.

Lonsdale, D. (1999) Principles of Tree Hazard Assessment and Management. DETR, London.

Magic Mapping (2024) https://magic.defra.gov.uk/ Accessed on 15/04/24.

Mattheck, C., Breloer, H. (1994) *The Body Language of Trees: A Handbook for Failure Analysis*. Department of the Environment; Lonsdale, D. (Ed) Research for Amenity Trees. HMSO, England.

Mr Ed Baker, *Pers comm*, (2024) Tree Protection Officer, Tree Protection Team / Tîm Amddiffyn Coed, Cardiff Council.

National Design Guide (2024) (https://www.gov.uk/government/publications/national-design-guide/national-design-guide-accessible-version) Accessed on 15/04/24.

National House Builders Council (NHBC) (2017) Standards Part 4.2, Building Near Trees. Milton Keynes.

National Planning Policy Framework (2024). https://www.gov.uk/guidance/national-planning-policy-framework/. Department for Communities and Local Government. Accessed on 15/04/24.

National Joint Utilities Group. (2007). Volume 4: NJUG Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees. NJUG, London.

Planning Practice Guidance. (2024). Tree Preservation Orders and trees in Conservation Areas. http://planningguidance.planningportal.gov.uk. Accessed on 15/04/24.

Phillips, R. (2006) *Mushrooms. A Comprehensive Guide*. MacMillan Publishers Ltd, London.

Roberts *et al.* (2013) *Tree Roots in the Built Environment. Research for Amenity Trees No.8*. Arboricultural Association, Stonehouse.

Slater, D. (2018) *Natural bracing in trees: management recommendations*. The Arboricultural Journal.

Strouts, R.G., Winter, T.G., (2004) *Diagnosis of Ill Health in Trees*. Forestry Commission, Office of the Deputy Prime Minister; Research for Amenity Trees. TSO, England.

Tree Council (2024) https://treecouncil.org.uk/science-and-research/ash-dieback/ Accessed on 15/04/24.

APPENDICES

APPENDIX 1

Table A1.1 – Tree Survey Schedule

Tree No.	Species	No. Stems	Diam (mm)	H't (m)	H't 1st Branch (m)	Branch Spread (m)				Crown Clearance (m)				Age	Phys Cond	Struc Cond	Est. Remain Contrib (Years)	Cat	Comments	Preliminary Management Recommendations
						N	E	S	W	N	E	S	W							
1	Elm cultivar (*Ulmus* sp.)	1	220	7.0	0.5 N	2.5	2.0	2.0	3.0	0.0	0.0	0.0	0.0	EM	G	G	10+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath.	Remove stake and tie.
2	Elm cultivar (*Ulmus* sp.)	1	130	6.0	0.5 S	1.0	1.5	1.5	2.0	0.0	0.0	0.0	0.0	EM	G	G	10+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath.	Remove stake and tie.
3	Elm cultivar (*Ulmus* sp.)	1	170	5.0	0.5 S	1.5	1.5	2.0	2.0	0.0	0.0	0.0	0.0	EM	G	G	10+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath.	Remove stake and tie.
4	Elm cultivar (*Ulmus* sp.)	1	160	6.0	0.5 E	1.5	2.0	2.0	2.5	0.0	0.0	0.0	0.0	EM	G	G	10+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath.	Remove stake and tie.
5	Elm cultivar (*Ulmus* sp.)	1	130	6.0	0.5 W	1.5	1.0	1.0	1.0	2.0	2.0	2.0	2.0	EM	G	G	20+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath.	Remove stake and tie.
6	Elm cultivar (*Ulmus* sp.)	1	90	5.0	0.0 E	0.5	2.0	2.0	1.0	0.0	0.0	0.0	0.0	EM	F	G	10+	U	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath. • Significant dieback in canopy.	Remove stake and tie.
7	Italian Alder (*Alnus cordata*)	1	110	5.0	0.0 E	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	EM	G	G	10+	C1	• Fastigiate cultivar. • Artificial structures within RPA. • Stake and tie present. • Managed due to proximity of footpath. • Suckers at base of stem.	Remove stake and tie. Remove suckers.

Table A1:1 Tree Survey Schedule (continues)

Tree No.	Species	No. Stems	Diam (mm)	H't (m)	H't 1st Branch (m)	Branch Spread (m)				Crown Clearance (m)				Age	Phys Cond	Struc Cond	Est. Remain Contrib (Years)	Cat	Comments	Preliminary Management Recommendations
						N	E	S	W	N	E	S	W							
8	Italian Alder (*Alnus cordata*)	1	120	7.0	0.0 N	2.5	2.5	2.0	1.5	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Recently crown lifted and crown reduced for CCTV. • Artificial structures within RPA.	-
9	Italian Alder (*Alnus cordata*)	1	270	11.0	0.5 N	3.5	5.0	5.0	1.5	0.0	1.0	3.0	3.0	EM	F	G	10+	C1	• Recently crown lifted and crown reduced for CCTV. • Artificial structures within RPA.	-
10	Italian Alder (*Alnus cordata*)	2	220	11.0	0.5 E	2.0	2.5	3.0	1.5	1.0	0.5	1.0	1.0	EM	G	F	10+	C1	• Bifurcated at ground level. • Dense understorey restricted survey. • Recently crown lifted and crown reduced for CCTV. • Artificial structures within RPA.	-
11	Italian Alder (*Alnus cordata*)	2	220	10.0	4.0 S	1.5	2.0	2.5	2.5	4.0	4.0	4.0	4.0	EM	G	F	10+	C1	• Bifurcated at ground level. • Dense understorey restricted survey. • Recently crown lifted and crown reduced for CCTV. • Artificial structures within RPA.	-
12	Elm cultivar (*Ulmus* sp.)	2	350	10.0	1.0 E	5.0	2.5	3.5	5.0	1.0	1.0	1.0	1.0	EM	F	F	10+	C1	• Asymmetrical canopy due to poor past management. • Bifurcated at 1.0 m above ground level. • Recently crown lifted and crown reduced for CCTV. • Artificial structures within RPA.	-
13	Common Alder (*Alnus glutinosa*)	1	100	6.0	0.0 N	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Artificial structures within RPA. • Suckers at base of stem. • Growing within planting pit ad edge of car park. • Bark wound to stem – vehicle strike. • Stake and tie present.	Remove stake and tie. Remove suckers at base of stem.
14	Elm cultivar (*Ulmus* sp.)	1	260	10.0	0.0 W	2.0	2.5	2.0	1.0	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Artificial structures within RPA. • Suckers at base of stem. • Growing within planting pit ad edge of car park. • Stake and tie present.	Remove stake and tie. Remove suckers at base of stem.
15	Elm cultivar (*Ulmus* sp.)	1	130	5.0	0.0 S	2.0	1.5	2.0	1.5	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.

Table A1:1 (cont'd) Tree Survey Schedule (continues)

Tree No.	Species	No. Stems	Diam (mm)	H't (m)	H't 1st Branch (m)	Branch Spread (m)				Crown Clearance (m)				Age	Phys Cond	Struc Cond	Est. Remain Contrib (Years)	Cat	Comments	Preliminary Management Recommendations
						N	E	S	W	N	E	S	W							
16	Elm cultivar (*Ulmus* sp.)	3	320	4.0	0.0 W	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
17	Elm cultivar (*Ulmus* sp.)	1	90	3.0	0.0 S	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
18	Elm cultivar (*Ulmus* sp.)	1	150	5.0	0.0 S	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
19	Elm cultivar (*Ulmus* sp.)	1	100	3.0	0.0 W	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
20	Elm cultivar (*Ulmus* sp.)	2	170	5.0	0.5 S	2.0	2.0	2.0	2.0	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
21	Elm cultivar (*Ulmus* sp.)	1	90	4.0	0.0 W	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
22	Elm cultivar (*Ulmus* sp.)	1	200	6.0	0.0 N	2.5	2.5	2.5	2.5	0.0	0.0	0.0	0.0	EM	F	G	10+	C1 Int	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
23	Elm cultivar (*Ulmus* sp.)	1	180	6.0	0.0 S	2.5	2.5	2.5	2.5	0.5	0.5	0.5	0.5	EM	F	G	10+	C1 Int	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
24	Elm cultivar (*Ulmus* sp.)	1	200	6.0	0.0 N	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	EM	F	G	10+	C1 Int	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.

Table A1:1 (cont'd) Tree Survey Schedule (continues)

Tree No.	Species	No. Stems	Diam (mm)	H't (m)	H't 1st Branch (m)	Branch Spread (m)				Crown Clearance (m)				Age	Phys Cond	Struc Cond	Est. Remain Contrib (Years)	Cat	Comments	Preliminary Management Recommendations
						N	E	S	W	N	E	S	W							
25	Elm cultivar (*Ulmus* sp.)	1	220	6.0	1.0 W	2.5	2.5	2.5	2.5	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
26	Elm cultivar (*Ulmus* sp.)	1	170	6.0	0.5 W	2.5	2.0	2.0	3.0	0.5	0.5	0.5	0.5	EM	F	G	10+	C1	• Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
G1	Italian Alder Elm cultivar Beech (*Fagus sylvatica*) Goat Willow (*Salix caprea*)	1	70	4.0	0.0 N	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	Y EM	F	F	10+	C2	• Managed group for footway and car park with dieback from heavy pruning. • Artificial structures within RPA. • Detritus around root plate. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
G2	Buddleia (*Buddleia davidii*) Italian Alder Elm cultivar Bramble (*Rubus fruticosa spp agg*)	1	60	3.0	0.0 W	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	Y EM	F	F	10+	C2	• Managed group for footway and car park with dieback from heavy pruning. • Managed for CCTV tower. • Artificial structures within RPA. • Detritus around root plate. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.
G3	Buddleia Common Alder Italian Alder	1	50	2.0	0.0 N	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	Y EM	P	F	<10	U	• Self-set developing trees at edge of car park. • Root and stem damage by vehicles.	Remove.
G4	Buddleia Elm cultivar Bramble Goat Willow Maidenhair tree (G*ingko biloba*) Corsican Pine (*Pinus nigra*)	1	150	5.0	0.0 E	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	Y EM	F	G	10+	C2 Int	• Part managed boundary group. • On and off-site trees. • Growing adjacent to car park and river edge on high revetment. • Provides good visual separation. • Artificial structures within RPA. • Detritus around root plate. • Wind sculptured. • Dense understorey restricted access.	Clear detritus and dense understorey to facilitate next inspection.

Table A1:1 (cont'd) Tree Survey Schedule (continues)

Tree No.	Species	No. Stems	Diam (mm)	H't (m)	H't 1st Branch (m)	Branch Spread (m)				Crown Clearance (m)				Age	Phys Cond	Struc Cond	Est. Remain Contrib (Years)	Cat	Comments	Preliminary Management Recommendations
						N	E	S	W	N	E	S	W							
H1	Beech	1	50	0.5	0.0 W	0.25	0.25	0.25	0.25	0.0	0.0	0.0	0.0	EM	G	G	10+	C2	• Managed boundary hedgerow with sections of open canopy.	-
H2	Beech	1	50	0.5	0.0 E	0.25	0.25	0.25	0.25	0.0	0.0	0.0	0.0	EM	G	G	10+	C2	• Managed boundary hedgerow with sections of open canopy.	-

Key

Age Class
Y: Young = tree within first third of average life expectancy
EM: Early mature = tree within second third of average life expectancy
M: Mature = tree within final third of average life expectancy
OM: Over mature = tree beyond average life expectancy
V: Veteran = shows signs of retrenchment and in decline.
D: Dead.

Physiological Condition
G: Good = no health problems
F: Fair = symptoms of ill health that may be remedied
P: Poor = poor health
D: Dead

Structural Condition
G: Good = no structural defects
F: Fair = remedial structural defects
P: Poor = significant structural defects
D: Dead

000: Estimated measurement due to access restrictions

RPA: Root Protection Area

Major deadwood: branches in excess of 50 mm diameter
Minor deadwood: branches/twigs less than 50 mm diameter

Int: Interim category due to access restrictions.

Table A1:1 (cont'd) Tree Survey Schedule

APPENDIX 2

Table A2.1 – Root Protection Areas of Trees and Hedgerows Surveyed

Tree No.	Species	Diam (mm)	Approximate Root Protection Radius (m)	Root Protection Area (m^2)
1	Elm cultivar (*Ulmus* sp.)	220	2.7	23
2	Elm cultivar (*Ulmus* sp.)	130	1.8	10
3	Elm cultivar (*Ulmus* sp.)	170	2.1	14
4	Elm cultivar (*Ulmus* sp.)	160	2.1	14
5	Elm cultivar (*Ulmus* sp.)	130	1.8	10
6	Elm cultivar (*Ulmus* sp.)	90	1.2	5
7	Italian Alder (*Alnus cordata*)	110	1.5	7
8	Italian Alder (*Alnus cordata*)	120	1.5	7
9	Italian Alder (*Alnus cordata*)	270	3.3	34
10	Italian Alder (*Alnus cordata*)	220	2.7	23
11	Italian Alder (*Alnus cordata*)	220	2.7	23
12	Elm cultivar (*Ulmus* sp.)	350	4.2	55
13	Common Alder (*Alnus glutinosa*)	100	1.2	5
14	Elm cultivar (*Ulmus* sp.)	260	3.3	34
15	Elm cultivar (*Ulmus* sp.)	130	1.8	10
16	Elm cultivar (*Ulmus* sp.)	320	3.9	48
17	Elm cultivar (*Ulmus* sp.)	90	1.2	5
18	Elm cultivar (*Ulmus* sp.)	150	1.8	10
19	Elm cultivar (*Ulmus* sp.)	100	1.2	5
20	Elm cultivar (*Ulmus* sp.)	170	2.1	14
21	Elm cultivar (*Ulmus* sp.)	90	1.2	5
22	Elm cultivar (*Ulmus* sp.)	200	2.4	18
23	Elm cultivar (*Ulmus* sp.)	180	2.4	18

Table A2-1: RPA and Approximate Root Protection Radius of Trees, Groups and Hedgerows Surveyed (continues)

Tree No.	Species	Diam (mm)	Approximate Root Protection Radius (m)	Root Protection Area (m^2)
24	Elm cultivar (*Ulmus* sp.)	200	2.4	18
25	Elm cultivar (*Ulmus* sp.)	220	2.7	23
26	Elm cultivar (*Ulmus* sp.)	170	2.1	14
G1	Italian Alder Elm cultivar Beech (*Fagus sylvatica*) Goat Willow (*Salix capreae*)	70	0.9*	3*
G2	Buddleia (*Buddleia davidii*) Italian Alder Elm cultivar Bramble (*Rubus fruticosa spp agg*)	60	0.9*	3*
G3	Buddleia Common Alder Italian Alder	50	0.9*	3*
G4	Buddleia Elm cultivar Bramble Goat Willow Maidenhair tree (G*ingko biloba*) Corsican Pine (*Pinus nigra*)	150	1.8*	10*
H1	Beech	50	0.9*	3*
H2	Beech	50	0.9*	3*

Key:
000: estimated dimensions due to access restrictions
*: Average measurement taken around centre of group or hedgerow

Table A2-1: (cont'd) RPA and Approximate Root Protection Radius of Trees, Groups and Hedgerows Surveyed

APPENDIX 3

Headings for Protective Barrier Notices and Example Sign

Root Protection Area (RPA) Model Notice

DON'T excavate within this area
DON'T use any form of mechanical plant with this area
DON'T store materials, plant or equipment within this area
DON'T move plant or vehicles within this area

DO contact the Local Authority Arboricultural Officer or owner of the tree if excavation within this area is unavoidable
DO protect any exposed roots uncovered within this area with dry sacking
DO backfill with a suitable inert granular and top soil material mix as soon as possible on completion of work

ANY WORK in this area requires permission from the Local Authority Arboricultural Officer

PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.

TREE PROTECTION AREA

KEEP OUT !

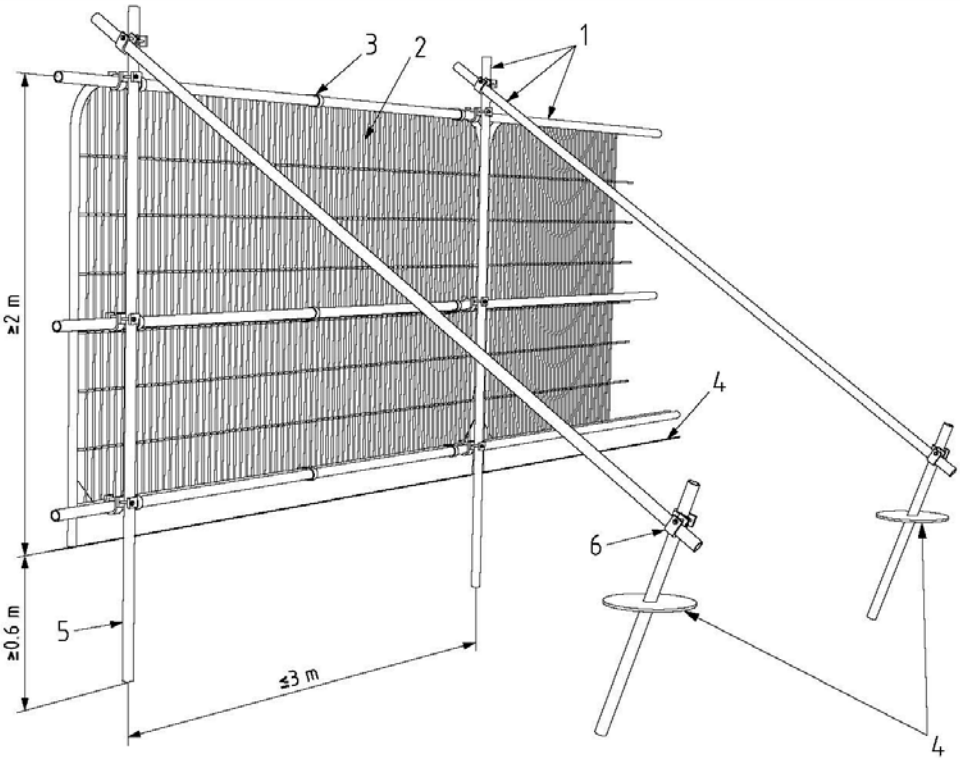
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION

ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

APPENDIX 4

Details of Protective Barrier (Default and Variant)

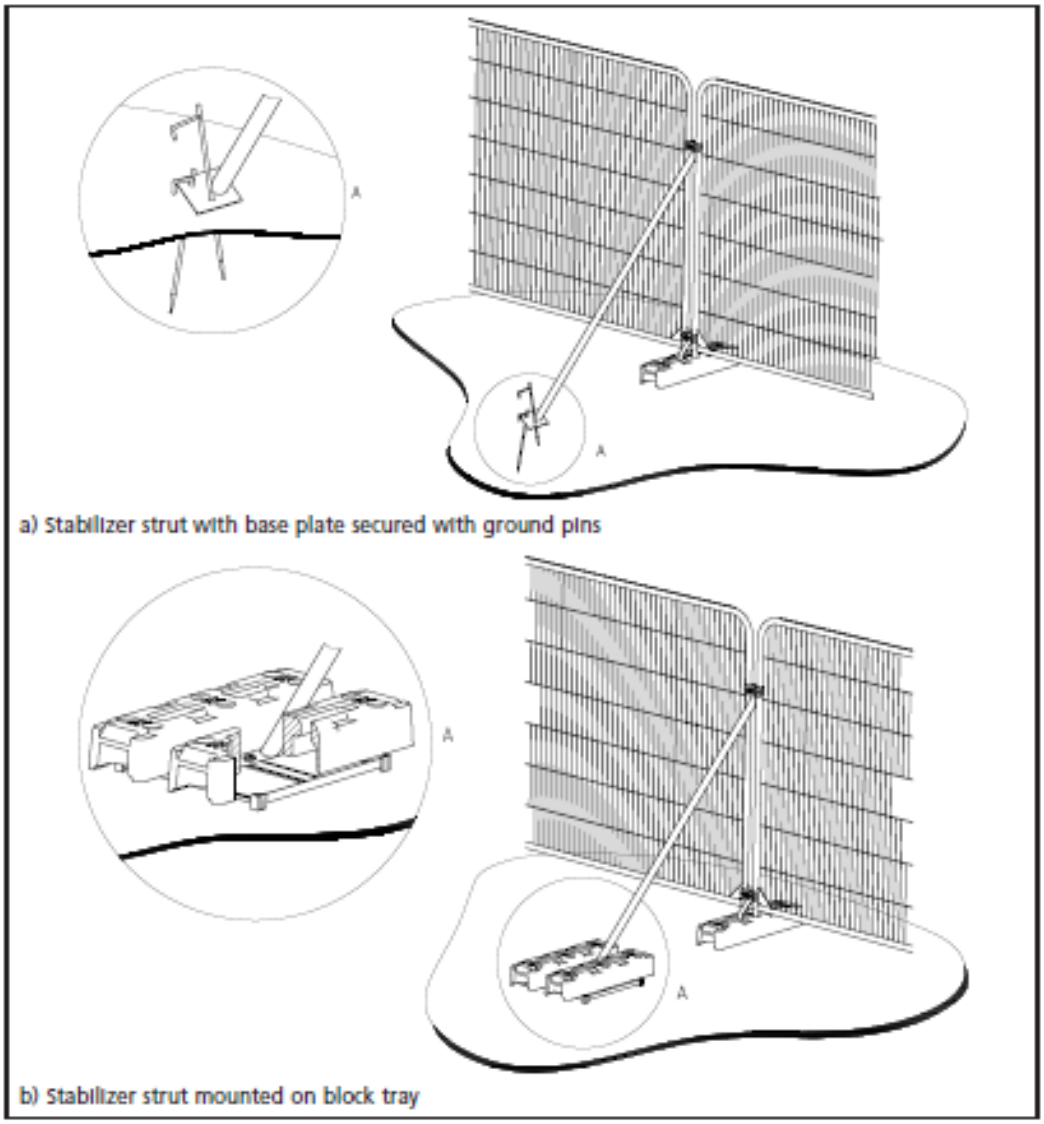
Figure 2 **Default specification for protective barrier**



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

Figure 3 **Examples of above-ground stabilizing systems**



APPENDIX 5

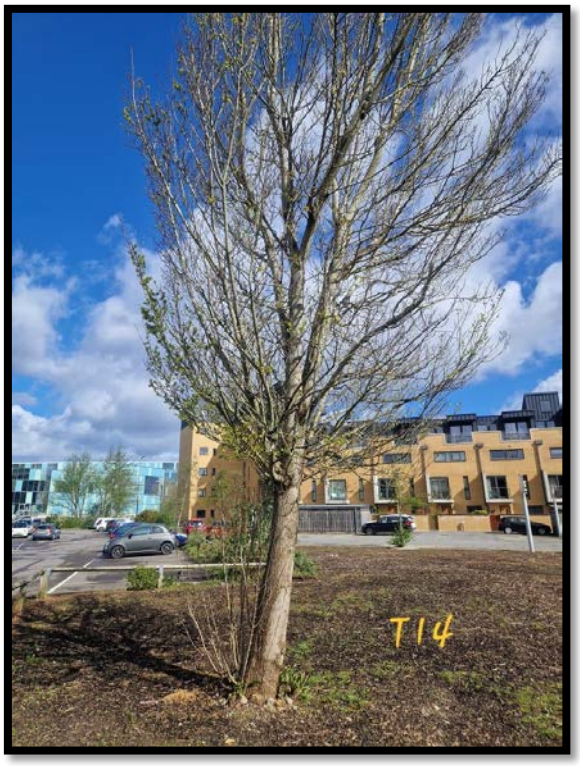
Photographic Montage


G4


G4 West


G4 centre


G4 East


T14


G3


T8,9,10,11,12


G2


H1, H2


T1,2,3


G1 North
savills

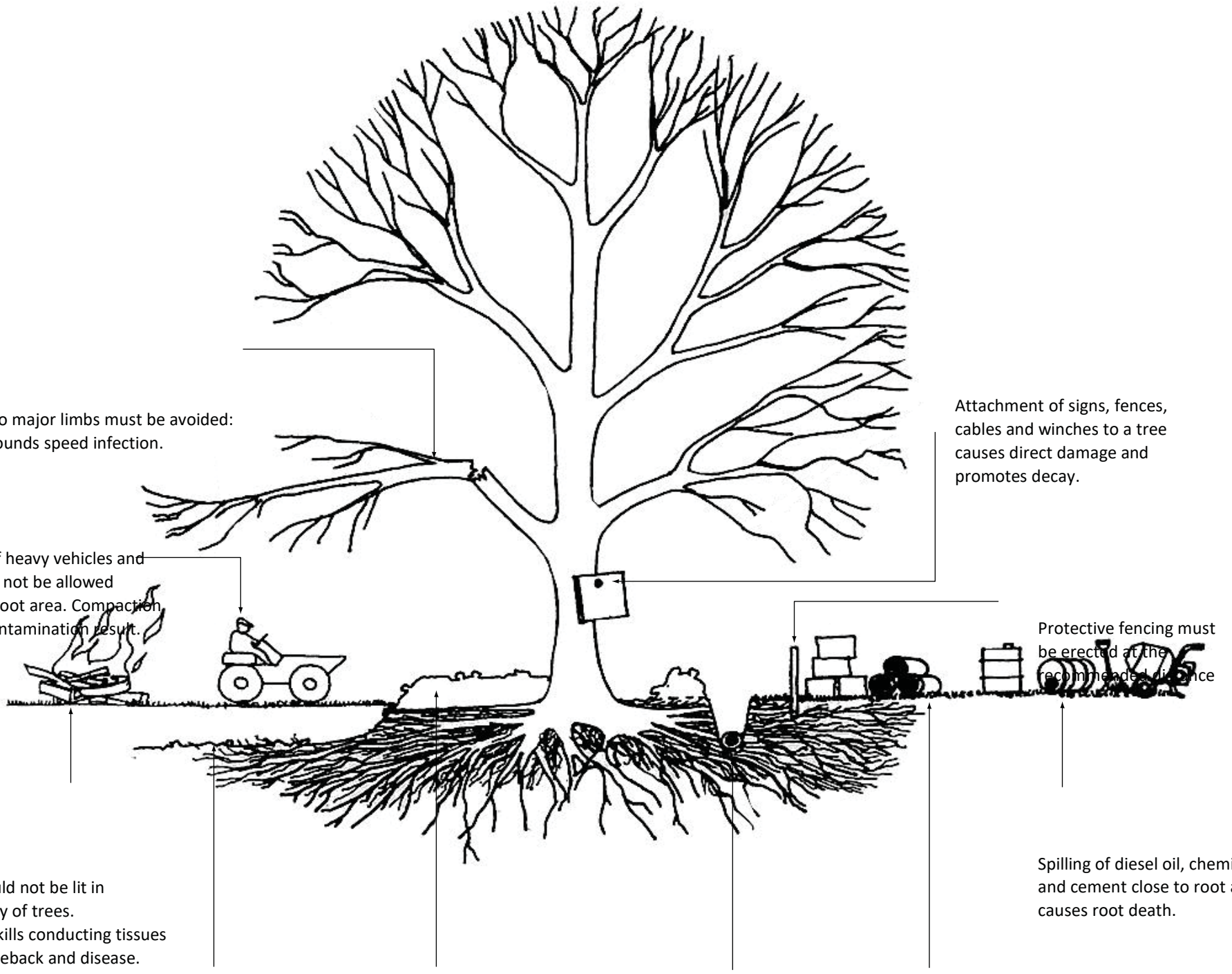

G1

APPENDIX 6

Trees; Causes of Death – Construction Site

Common Causes of Tree Death

The use of properly positioned protective fencing can prevent tree deaths occurring.
For site offices and contractors.



Damage to major limbs must be avoided: ragged wounds speed infection.

Attachment of signs, fences, cables and winches to a tree causes direct damage and promotes decay.

Parking of heavy vehicles and cars must not be allowed near the root area. Compaction and oil contamination result.

Protective fencing must be erected at the recommended distance

Fires should not be lit in the vicinity of trees.
The heat kills conducting tissues causing dieback and disease.
The soil beneath is also sterilised.

Spilling of diesel oil, chemicals and cement close to root area causes root death.

Lowering ground levels severs roots causing severe dieback and Instability.

Raising ground levels even for only a few weeks and by merely several centimetres can suffocate roots, close off the lenticels on the stem causing severe dieback or suffocation.

Trenches dug within root areas may sever roots, causing instability and reduce longevity.

Storage of materials within root area causes compaction and root suffocation.

Source: http://www.aie.org.uk/vault/dsp1.htm - Adapted by Marco Bartolini