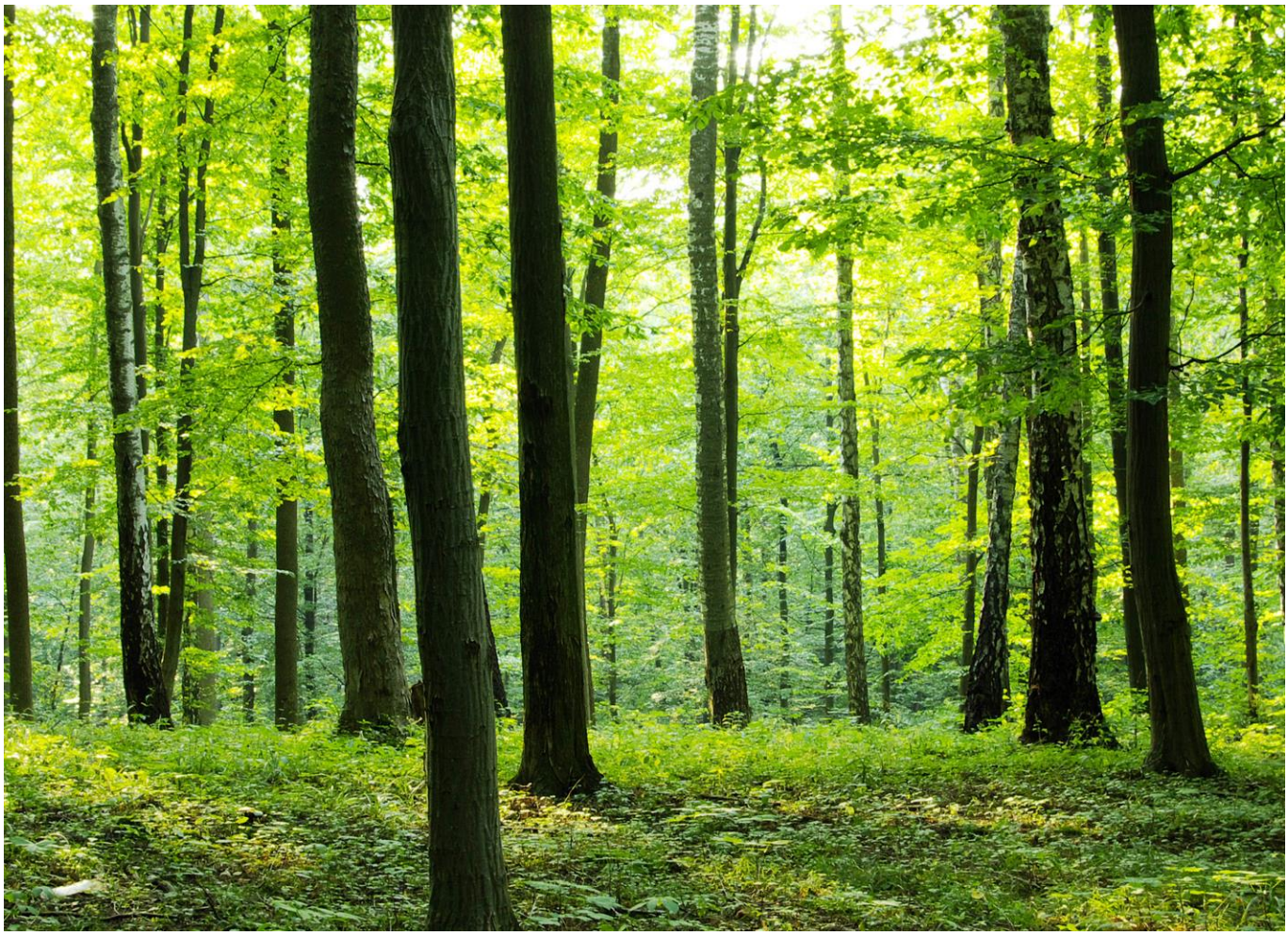

London Borough of Hillingdon

Hillingdon Water Sports Facility and Activity Centre (HWSFAC), Broadwater Lake, Moorhall Road, Harefield, UB9 6PE

Stage 1 and 2 Arboricultural Impact Assessment Report

2484793

RSK biocensus
EXPERTS IN ECOLOGY

RSK GENERAL NOTES

Project No.: 2484793

Title: Hillingdon Water Sports Facility and Activity Centre (HWSFAC)

Client: London Borough of Hillingdon

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1 INTRODUCTION

1.1 General

This report describes the results of a survey of trees at Hillingdon Water Sports Facility and Activity Centre (HWSFAC), Broadwater Lake, Moorhall Road, Harefield, UB9 6PE. The work was commissioned by the London Borough of Hillingdon in November 2022 and carried out by James Butler, principal arboricultural consultant at RSK, in the same month and consequent visits to update the survey in May 2023.

1.2 Purpose of the Report

The survey was carried out in connection with proposed development, in accordance with criteria outlined in the British Standard BS5837:2012[1]. The aim was to:

- identify the quality and value of the trees;
- categorise them in respect of their suitability for retention; and
- identify the impacts of the development on the arboricultural features present.

This report is principally concerned with trees in relation to the proposed development. Although obvious structural defects and the condition of trees have been noted, this survey was not undertaken with health and safety in mind, and a detailed hazard assessment was not carried out.

The results and recommendations in this report are valid for a maximum of two years.

1.3 Site Context

1.3.1 General

The survey area is within green belt land, located to the northwest of New Denham and is currently accessed off Moorfield road to the north of the M40, Junction 1. The site itself was a former quarry which is now derelict. It is surrounded by lakes to the north and west with naturalisation occurring, to the east is a canal which adjoins to the river Colne and to the south is an operational quarry. At present there is no public access apart from one residential dwelling at the entrance of the site.

1.3.2 Soil

The underlying soil types will affect structural aspects of building designs and foundation depths, and this will need to be considered in relation to existing, proposed and removed trees. To avoid conflicts between trees and built structures, engineering advice will be required, and foundations will need to be designed with due regard for trees and shrinkable soils.

[1] British Standards Institute (2012) *BS5837:2012 Trees in Relation to Design, Demolition and Construction-Recommendations.* British Standards Publications Ltd.

British Geological Society data indicates that the survey area may be sited on Seaford Chalk Formation and Newhaven Chalk Formation - Chalk[2]. This is only a best estimate as no soil samples were taken or lab analysis carried out for the purpose of this report.

If shrinkable clays are present, foundation design will need to take into account mature tree heights of existing and proposed trees.

1.3.3 Protected Species

The Wildlife and Countryside Act 1981 (as amended), The Conservation of Habitats and Species Regulations 2017 (as amended) and the Countryside and Rights of Way Act 2000 provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees.

A licence will be required where there will be impacts on protected species that could result in an offence under the above legislation. Although features suitable for roosting bats or nesting birds may have been noted, this report is not intended to assess the suitability of trees for protected species.

If the presence of a legally protected species is suspected while undertaking any tree work, then the task should be halted immediately, and appropriate advice should be obtained from an ecologist.

1.4 Statutory Designations

Trees can be afforded statutory protection in a number of ways, including;

- a tree preservation order (TPO);
- planning conditions;
- felling licences; and
- location within a designated conservation area (CA).

Protected trees can only be removed or pruned if permission is granted, either as part of a planning permission or in response to a separate application to the local authority (or the Forestry Commission).

The existence of a TPO or CA does not automatically mean that a tree deserves to be a material constraint in a planning context. A formally protected tree can be in poor physiological or structural condition, making it unsuitable for retention. In that case it is inappropriate that it should influence the future use of a site.

The Hillingdon Council web-search facility indicates that no trees on site are protected by a TPO, but the south east part of the site, where it borders Morhall Road, is within a CA (Widewater Lock, reference CA-23). The CA would protect tree T43.

A TPO can be applied at any time, so it is important to check for the latest information. Where a statutory designation applies, if any tree works or removals are required prior to planning consent, the local authority should be contacted in advance.

The majority of the site has been classified as ‘Site of Special Scientific Interest Mid Colne Valley’ (SSSI).

[2] http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html

1.5 Root Protection Area (RPA)

To ensure that a tree is not harmed by development activities, a theoretical RPA is calculated. The British Standard (BS5837) defines the RPA as *'the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability'*. It is initially plotted as a simple circle on the TCP with roots assumed to have colonised the ground around the tree radially.

The design layout should aim to retain and avoid the root protection areas of the higher category (A and B) trees altogether, so that they may continue to provide benefits without being impacted by construction. Once a design layout has been completed and tree removals agreed, the retained trees should be subject to a fenced zone encompassing the RPA or tree crown (whichever is larger) for the duration of works. No construction, level changes, installation of services, storage of spoil or materials, discharge of chemicals or any other activity which may affect tree health negatively should take place within this area.

In some instances, root growth may have been impeded by inhospitable ground conditions and so a simple circular root protection area may not be relevant to its protection. This may apply near roads, building foundations, retaining walls or water courses and, providing there is suitable rationale, the RPA can be adjusted to reflect this. A similar overall area should be allocated to the tree so that it can continue to thrive.

Where sites are heavily constrained by trees which can be embraced into the development, there may be a need to build very close to their root protection area and protective fencing. This often leads to issues at the construction build stage, particularly where extreme changes in levels are required. It is therefore prudent to observe a buffer from the edge of a RPA to allow for safe working space. A 5-metre buffer should be sufficient to avoid conflicts at construction stage.

Tree groups have been given an overall RPA from the outer crown edge based on the average DBH and any large individual trees within groups have also been plotted from the individual stems on the peripheries. The outer groups RPA should be regarded as an extra precautionary buffer zone which preferably should be avoided but some works maybe permitted within these with appropriate mitigation measures in place. Where no RPA's are showing on the outer edges of groups individual trees have been plotted.

1.6 Supplied Documents

This report was prepared using data collected on site and the following reports and plans:

- 2740X1 - Broadwater lakes (PS). dwg
- 0000_Mastermodel\230918_Simplified Masterplan.dwg

2 METHOD

2.1 General

All inspected trees and tree groups were categorised using the British Standard BS5837:2012 and the attached TCP; (Appendix 2) shows tree positions, numbers and retention categories. A schedule of the trees is included in Appendix 1, which includes species, physiological and structural condition, age, recommendations and retention values.

The survey followed the method described in Appendix 4 in accordance with guidance in BS5837:2012. The life expectancy and condition of each tree or tree group informs its suitability for retention.

2.2 Tree Categorisation

Trees were categorised in terms of their useful life expectancy and condition as summarised below. Full details of categorisation criteria are given in Appendix 5. Each category has three sub-categories relating to arboricultural (1), landscape (2) and cultural and conservation (3) qualities. Trees that have been categorised as A, B or C should be considered in the planning process, whereas trees categorised as U are not a consideration in the planning process.

Table 1: Tree categorisation table

BS5837:2012 Categories	Definitions	Retention implications to a site
Category A (marked light green on the TCP)	Trees of high quality and value able to make a substantial contribution to the site.	Every effort should be made to retain trees, and amendments to a proposed scheme should be identified in preference to tree removal.
Category B (marked mid-blue on the TCP)	Trees of moderate quality and value able to make a significant contribution to the site.	Where possible, amendments to a proposed scheme should be considered in preference to tree removal.
Category C (marked in grey on the TCP)	Trees of low quality and value in an adequate condition until new planting can be established; trees with impairments downgrading them from A or B category; OR young trees with a stem diameter of less than 150 mm.	The retention of trees may be advantageous in the short term, but they should not be seen as a constraint to development.
Category U (marked in dark red on the TCP)	Trees that have limited condition that will fail or die within 10 years and/or should be removed for reasons of arboricultural best practice	Not a material consideration in the planning process but may have other benefits.

2.3 Distinction Between Individual Trees and Tree Groups

Trees have been recorded as individuals or as groups. BS5837:2012 sets out the description of a group as follows: "*The term "group" is intended to identify trees that form cohesive arboricultural features either **aerodynamically** (e.g. trees that provide companion shelter), **visually** (e.g. avenues or screens) or **culturally** including for biodiversity (e.g. parkland or wood pasture), in respect to each of the tree subcategories."*

Where a tree in a group has characteristics that distinguish it from the rest of the group, it is generally recorded as an individual. Such trees may *inter alia* include veteran trees, trees with significant defects, and specimen trees that stand out within the feature.

2.4 Constraints and Limitations

The trees were viewed from ground-level and from within the site boundary only. The trees were inspected using the Visual Tree Assessment method (Mattheck & Breloer 2015[3]) and guidance given in *Principles of Tree Hazard Assessment* (Lonsdale 2007[4]). Detailed inspections such as decay detection, soil assessment or aerial inspections have not been carried out.

Inspection was restricted in some areas by dense undergrowth, flooded/boggy areas, ivy cover and being within third-party gardens with restricted access. All findings were estimated in these instances.

Trees are living organisms and their health and condition is not static. Findings and recommendations in this report are therefore only valid for one year. The health and condition of the trees may also change with other factors such as extreme weather or development work.

The presence of shrinkable soils, and their relationship between tree root activity and volumetric changes in soils that may cause structural damage to buildings, is beyond the scope of this report and has not been investigated.

In some instances tree positions and canopy outlines were not shown on the supplied topographical survey, trees were plotted using a handheld GPS device (a note has been made within the tree data tables).

Bluesky's National Tree Map™ (NTM™) data was used for all off shore islands, this will record vegetation over 3 metres only and must be used as a guide only.

3 Mattheck, C. Breloer, H. (2015) *The Body Language of Trees, Encyclopedia of Visual Tree Assessment*. Karlsruhe Institute of Technology.

4 Lonsdale, D. (2007) *Principles of Tree Hazard Assessment and Management*. The Stationary Office

3 RESULTS

3.1 Summary

A total of 79 individual trees, 49 groups of trees, 6 hedges and 7 shrub groups were recorded. The most prominent tree features are the large wooded areas located to the west and south of the internal former quarry site with prominent individuals on the southern and eastern boundary of the lake: this includes groups G5, G9, G14, G18, G19, G36-37, G45 and trees T1-T4 and T18.

Of the 79 individual trees recorded: 1 was category A, 19 were category B, 46 were category C and 13 were category U.

Of the 34 groups recorded: 1 was category A; 14 were category B; 31 were category C and 3 were category U.

Charts 1 and 2 below, shows the distribution of the BS5837 quality categories recorded on site. Further details on the individual trees and tree groups can be found in Appendix 1- Tree Survey Data.

Chart 1: Distribution of BS 5837 categories for individual trees recorded

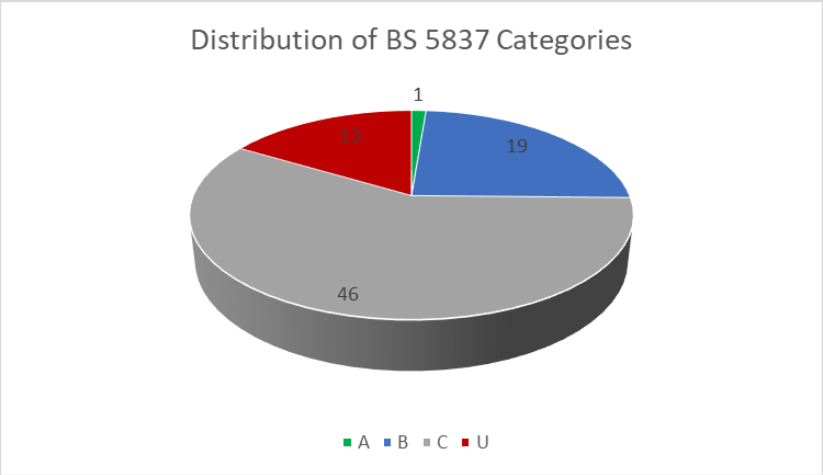
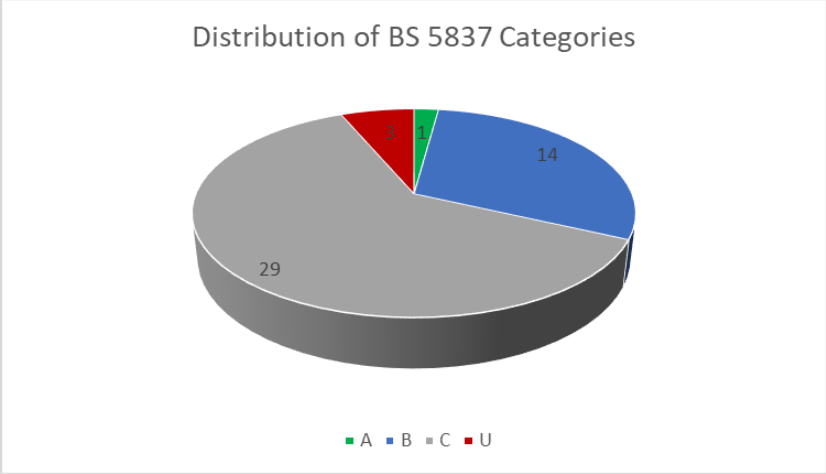


Chart 2: Distribution of BS 5837 categories for groups of trees recorded



3.2 General Observations

Whilst the retention of as many trees as possible would be desirable, the Category C features should not necessarily constrain the design layout. Instead, the proposed site layout should aim to retain the better quality, Category A and B features and avoid works within or very close to their root protection areas. To help achieve that objective it is recommended that arboricultural advice be sought early on in the design stage so that potential impacts can be addressed and adequately mitigated for well in advance of planning submission.

The survey area was split into two areas; the peninsula covering the derelict quarry site; and the eastern and southern areas covering the boundaries of the access and entrance roads. The northern parcel is private and access is restricted to the public, hence the current public amenity value of the site is low, but it has positive benefits for wildlife and habitat due to natural wilding of the undisturbed site. Throughout the northern parcel are dense areas of buddleia (*Buddleja davidii*) which is known to be invasive and now dominates especially within G2, G25, G26 and G31 restricting access and inhibiting other plant life. Through the internal quarry area is hardstanding areas, compacted stone vehicle tracks, concrete rubble and derelict small outbuildings.

The southern and eastern parcel consists of the access road off Moorhall Road which leads to the active quarry and Broadwater sailing club, this access road is heavily frequented by articulated lorries. Tree quality is generally poor in the southern section of the internal access road, but gradually improves going north where it borders the lake and canal to the east and extends to the private boating club.

Access was restricted in places due to dense undergrowth, inaccessible and offshore islands. These areas have been highlighted on the TCP (appendix 2).

3.2.1.1 *Peninsula* (main development area)

The dominant tree cover on the peninsula consists of two heavily wooded groups (G5 and G9) and less wooded groups (G1, G10). Tree group G5 and G9 are one of the better groups in arboreal terms with some large dominant trees within and has been awarded a category B. These groups are more of a woodland in character with large specimens, significant deadwood and wetland habitat. Individual trees of particular merit have been plotted on the TCP and RPA's are shown. The majority of the trees within G5 and G9 have slender stems with minimal lateral branches and a poor stem to crown ratio (small squat crown with long stem) but as a whole are significant both as landscape and habitat features. The southern section of tree group G5 (G5.1) and the northern section of G9 (G9.1) have been given a separate lower category C classification. This is due to deteriorating in quality either mainly consisting of small scattered silver birch (Betula pendula), thick dense areas of buddleia preventing access or having poor ground conditions which are in an unvegetated state.

To the far north of the site is G1 which is situated on a separate island accessed via a small footbridge within the lake. The terrain undulates with a central spine of raised land and trees are mainly situated on the edges forming picturesque scenes next to the lake. G10 is an area of naturally regenerated birch (*Betula spp*) trees with an average diameter of 100 mm, the trees are sparsely spaced internally getting denser along the edges. The trees are young and generally in good condition both in health and form however the rooting environment is considered poor due to the hard surfacing present.

To the east of the internal site bordering the lake are tree groups G26-32, these groups are all surrounded by areas of hardstanding and follow the same growth habits. The larger trees within these groups are willow which are multi-stemmed from just above ground level with large diameters, these stems are now failing in places and are of generally poor structural condition hence the category C classification. Situated sporadically between these groups are two good condition birch trees (T9 and T49) and two large mature willow (Salix alba) (T46 and T51) which have been awarded a category B classification due to being in an overall good condition or significantly large in size.

The groups mentioned above make up the core of the tree stock within this parcel, with smaller lesser value tree groups and scattered individuals situated in open cut areas of scrub and on the peripheries of the lake. This parcel has had no active management in regards tree pruning or felling and there are many significant failed trees and branches which pose a risk to anyone entering the site. The dominant species throughout is white willow with smaller areas of birch and individual intermittent appearances of self-set ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and hawthorn (*Crataegus monygyna*). These tree groups have all been awarded a category B classification apart from G10 (category C), and as a whole are significant both as landscape and habitat features.

At the southern section just north of the sinking sand area, are a row of good quality individual trees (T1-T4). These trees are all mature good quality specimens consisting of common beech (*Fagus sylvatica*), white willow (*Salix alba*) and Lombardy poplar (*Populus nigra 'Italica'*). These trees all have large diameters exceeding 900 mm with a veteran tree present (T2). All are category B trees apart from T2 which is an A3 due to its veteran features (for instance; historic limb failure, wounds, cavities, holes, and splits) and its considerable stem diameter (1800 mm).

Two individual trees (T44-45) grow within a residential garden at a gated entrance, both are of no particular arboricultural merit due to poor past management but do give the residents some screening from the adjacent access to the site.

Elsewhere the remaining trees are all Category C or U and generally of lesser value. This is due to their small stature, poorer structural or poor physiological condition.

3.2.1.2 *Southern and Eastern Parcel*

At the very east part of the parcel is G19 which is a narrow uniform tree group adjacent to the lake and access road. The trees have asymmetric crowns and lean heavily over the lake to the west with drooping branches touching the water. This group provides a large longitudinal screen from the access road to the lake and has been awarded a category B classification. Carrying north from this tree group is G45 (cat A) which follows the lake border but is significantly larger in size. This tree group also has some larger specimens within and acts as beneficial screen from the access road and a significant visual landscape feature for the users of the lake whilst acting as a green wildlife corridor stretching the entire east side of the lake.

To the east of the access road are five groups (G13-18, G36-39) and two trees (T18-19) bordering the canal which are of mixed quality and size. G14 and G36-39 being the dominant groups, which are made up of several large hybrid black poplar (*Populus x canadensis*) trees with an average diameter of 800-1000 mm and wide spreading crowns which can be seen from afar hence a category B classification. The trees within this group have some over extended limbs and are now in need of remedial works to

eliminate branch failures. Tree groups G13 and G15 are all pollarded willow trees which provide a low screen for the canal users and adjacent towpath. Due to management of pollarding over the years the trees have grown with a typical pollarded crown and associated defects of tight unions and poor branch attachment, both groups have therefore been awarded category C class. The remaining two groups, G16 and G17, are of no particular arboricultural merits but do offer some green screening for the canal users. Further north following the canal footpath is G40 which was probably planted as a hedge but is now unmanaged hedge with native species within such as Hawthorn (Crataegus monogyna). This category B group is now maturing and extends a considerable length of the access road to the boat club, this provides a much needed screen for the users of the canal waterways and footpaths and has a high amenity value. The remaining trees in and around the Boat club are category C with the exception of T47 and G47.

Going south following the access road there are scattered individual trees and small groups growing on either side in poor rooting environments. The unsuitable growing conditions have resulted either in poor structure and/or physiological condition. One group of trees situated on third party land are Leyland cypress (*Cupressocyparis leylandii*) which does act as beneficial screen for the garden it is situated within. All trees have been awarded a category C or U.

The remaining trees are all situated on third party land and form part of the street scene and greening of Moorhall Road. Trees T38 to T42 are all *sorbus* species of uniform size and character and form part of a structural landscape within a car park. The age of the trees and their condition is such that they could feasibly remain standing for a substantial amount of time and so they have been classed as a category B features. Two individual ash trees (T37 & T43) dominate the roadside due to their large stature and overhanging crowns. These two trees overall are in good health and provide beneficial greening of the frequented road, these trees have also been awarded a category B.

The remaining trees and groups have been categorised as lower, category C or U features either due to their small size, or because past management practices have left them as ungainly specimens of limited longevity.

One off shore island has been included (Island 1) but no physical data recorded due to restricted access. This group has been assumed as a category C classification due to the small size of the area and only a small amount of data was available using NTM™data indicating minimal trees over 3 metres present.

4 PROPOSALS AND IMPACTS

4.1 Development Proposal

The proposed Hillingdon Water Sports Facility and Activity Centre will consist of sailing, rowing, kayaking, and other water-based activities, as well as land-based activities such as camping and educational pursuits with associated access roads, parking and outbuildings.

4.2 Tree Removals

The proposed layout will require the removal of trees which equates to the loss of 18 of the individual trees and 5,619m^2 of tree groups. In addition to this 576 m^2 shrub groups of invasive buddleia will also need to be removed, 859 m^2 area of tree thinning and 2,215 m^2 (G10) with potential removal or transplant.

Of the 18 individual tree removals: 1 is category B, 13 are category C and 4 are category U tree .

Of the tree groups: 2 are category B, 12 are category C and 3 are category U.

The British Standard categories of the removed features are shown in table 2 below, which highlights the reason for tree removals. These tree removals are highlighted on the tree impact retention plan (TIRP, Appendix 3) with red shading and line work.

The loss of trees within the development footprint has been reviewed as part of the Ecological Impact Assessment and BNG. Replacement planting should be considered, to enhance the new development, and to provide compensation for the environmental losses incurred by the site layout.

Table 2: Tree removals and impacts

Tree id	BS5837:2012 Categories	Reason for removal and/or impact
G1	B	• Direct impact with footprint of activity shelters. • 162 m^2 total removal (two areas)
G1	B	• RPA impact with footpath.
SG1	N/A	• Shrub group is not in keeping with the proposed landscape scheme and due to the vigorous growth, future encroachment issues are anticipated. • 341 m^2 total removal (whole group).
SG2	N/A	• Shrub group is not in keeping with the proposed landscape scheme and due to the vigorous growth, future encroachment issues are anticipated. • 235 m^2 total removal (whole group).
G2	B	• Direct impact with access road. • 72 m^2 total removal (southern section). • Minor incursion into RPA (southern section).
G3	C	• Direct impact with go kart track, footpath, internal access road. • 235 m^2 total removal (access road).

Tree id	BS5837:2012 Categories	Reason for removal and/or impact
		• RPA impacted by go kart track and footpath.
G4	C	• Direct impact with footprint of go kart track and footpath. • 136 m^2 total removal. • RPA Impacted (go kart track).
G5	B	• Direct impact with footpaths and bird hide. • RPA impact with footpath.
G5.1	C	• Direct impact with caving, activity shelters and footpath. • 703 m^2 total removal.
G6	U	• Direct impact with access road and path. • 87 m^2 total removal.
G9	B	• RPA impact with footpath and activity shelter.
G9.1	C	• Minor impact with woodland activities and new planting. All proposed elements will be microsited after tree thinning operations to avoid valuable trees. • Tree thinning (30-50%) works required 859 m^2
G10	C	• Direct impact with activity field and camping. • Trees to be transplanted or replaced after inspection. • Two areas, 1555 m^2 and 660 m^2 (transplant/replace) • 110 m^2 total removal (toilet block).
G11	C	• Direct impact with parking and access road. • 16 m^2 total removal.
G12	U	• Category U group to be removed. • 7 m^2 total removal.
G26	C	• Direct impact with boat yard. • 938 m^2 total removal. • RPA Impact (minor).
G27	C	• Direct impact with boat yard. • 140 m^2 total removal.
G28	C	• Direct impact with workshop and activity shelter. • 1068 m^2 total removal.
G31	C	• Direct impact with access road and parking. • Three sections, 321 m^2 128 m^2 54 m^2 total removal.
G32	C	• Direct impact with anglers store. • 96 m^2 total removal.
G33	U	• Category U group to be removed. • 34 m^2 total removal.
T11	U	• Category U tree to be removed.

Tree id	BS5837:2012 Categories	Reason for removal and/or impact
T13	U	• Category U tree to be removed.
T47	U	• Category U tree to be removed.
T49	B	• Direct impact with boat yard. • Remove.
T50	C	• Direct impact with boat yard. • Remove.
T51	B	• RPA impact (minor) with boat yard.
T57-68	C	• Direct impact with parking and access road. • 12 trees to be removed.
T72	U	• Category U tree to be removed.
Island 1	C	• Removed as part of the dredging plan. • 1312 m^2 total to be removed.

4.3 Retained Trees

4.3.1 General

Efforts have been made by the design team to position the proposed development outside any significant trees RPA's with no impacts of significance envisaged. The remaining trees can be safely retained and protected. Protective fencing and ground protection will be required around retained trees and groups once a detailed scheme of construction is finalised which should include laydown areas and access routes. The physical tree protection should be to a sufficiently robust specification to ensure protection of its surrounding ground conditions. There are some instances where the layout of the footpath, go kart track still impinges onto the RPA of trees. These are described below, and mitigation for these incursions includes supervised works, and specialist construction methods applied where necessary.

A number of trees will also need to be pruned, mostly to provide adequate clearance over new road layouts, woodland activities and footpaths, whilst also taking into account sight lines.

Providing these works are carried out by suitably qualified and competent arboricultural contractors, then impacts will be negligible, and on the whole the visual appearance of trees will not be unduly affected. To the east of the proposed new internal road there are some areas highlighted in yellow within the TIRP for coppice management which these trees lend themselves to. These old large willow trees will provide some welcomed diversity as ongoing coppice stools. Therefore the RPA's associated within these trees have not been shown to have impacts within.

4.3.2 Anticipated Root Protection Area (RPA) Incursions

The proposed design has avoided unnecessary tree removals and impacts where possible. However, there are some impacts to tree RPA's, and these are shown with orange cross hatch on the TIRP and summarised within Table 2 above.

The main RPA impact is the proposed footpaths and pedal kart track with minor incursion from the internal access road.

Any excavation in these areas is highly likely to cause root damage and therefore a supervised 'no-dig' construction method will be required. As the proposed new footpaths are likely to be informal link paths a no dig above ground construction method using three-dimensional cellular confinement system could be used. This would avoid any need to excavate and provide a suitable surface and maintain permeability of the soil. All new surfacing within the development is proposed to be installed using this method.

The 2m acoustic fence that is proposed within the eastern section of G5 does have the potential to impact RPA's. Given its small stature it is felt that it could feasibly be installed under supervision with a 'no dig construction'. If the scheme is to go ahead as proposed, then works should aim to avoid encroaching in to the woodland as much as possible, and a precautionary approach should be taken when working in this area.

Tree group G10 will be impacted by the proposed camping and activity field. Within this area the category C trees which are growing through hard standing. Any removal of old hard surfaces and subsequent re-levelling of sub-soil within the RPA needs to be completed under supervision by an arboricultural consultant to ensure no significant roots are affected. After earthworks are completed the trees will be assessed for stability. The size of these trees is such that it would also be feasible to relocate, using a specialist arboricultural contractor with a tree spade or if this is not feasible due to poor root structure these trees will be replaced as part of the mitigation planting scheme. Numerous companies are available to carry out this operation, and if this is desired then it will need to be carried out prior to any construction and the receptor site be protected with robust fencing.

In all instances the works within these areas should be carried out under supervision of an arboriculturist, aiming to retain as much of the existing ground levels as possible. This should be detailed within a specific arboricultural method statement.

4.3.3 Facilitation Pruning

The lateral growth from some of the tree groups will need to be pruned to provide working space between the proposed activity shelters, bird hides, access road, footpaths and high rope area. This applies to groups G1, G2 G5, G9, and G10, providing works are carried out by suitably qualified arboricultural contractors, then it is unlikely to result in any lasting impact, or reduction to the visual internal screening aspect they provide.

Any pruning related to the installation of the footpath through groups G1, G5 and G9 will need to be confirmed once the route has been set out on site. As this will follow a route which results in the least disturbance to tree root zones and this can only be confirmed once the path is set out.

4.3.4 Coppice Management

Tree groups G26, G31 and G32 all have multi-stemmed from base level willow trees within. These trees should all be coppiced back to the appropriate stump level and will need future cyclical pruning management in place.

4.3.5 Services

Details of proposed drainage, and other underground services have yet to be provided.

4.3.6 Post-development Pressure

Foundations will need to take account of all trees (including those proposed in landscape schemes) and their mature heights, irrespective of the need to prune, to ensure that risk of below-ground damage is reduced as this may result in pressure to remove trees in the future.

At present the site has largely been left to naturalise which in turn has led to many fallen, dead and dangerous trees within the wooded areas. Increasing the frequency of usage will in turn have effects on how the site is managed in terms of health and safety and mitigating against tree risk harm to the users. Inevitably this will result in the need for trees to be removed or pruned in the interest of public safety.

The crowns of tree groups, G2, G5, G9 and the coppice areas will need repeated and regular pruning as it stands in close proximity to the proposed access road, parking and recreational areas. In time, this may lead to pressure for their removal, and unsympathetic pruning.

4.4 Impact Assessment Summary

The retention of the main woodland features within the site will continue to provide positive environmental, ecological, and landscape benefits. The screening value these features provide will largely remain intact, and so impacts from a wider landscape view are considered negligible. The amenity value of the site will improve due to the proposed development and is considered as an improvement in terms of social amenity value.

The proposed planting of native woodland, specimen trees, orchard trees and thorn buffers in combination with future management, ecological enhancements and retaining the significant woodlands and large coppice stools mitigates significantly against tree loss and therefore the proposed development is deemed beneficial from an arboricultural perspective.

It would be beneficial prior to the occupation of the site to create a woodland management plan for tree group G5. The following points highlight the objectives of what should be considered:

- increase natural biodiversity and enhance key benefit features of the woodland such as creation of new deadwood habitats and the reduction in height of some mature trees to form ‘habitat monoliths’ in preference to removal, in order to maintain certain functions such as bat roost potential or niche habitats for fungi, invertebrates and lichens;
- coppicing could be considered in small compartments to create an openness within the group;

- maintain and increase screening value provided between the woodland and surrounding areas;
- increase species mix and aim to ensure introduced species will survive climatic change; and
- ensure residents and visitors are not placed at unreasonable risk by trees.

5 GENERAL PROTECTION MEASURES

5.1 Pre-construction

5.1.1 Arboricultural Method Statement (Stage 3)

Once the construction details are provided, a detailed arboricultural method statement (AMS) should be compiled, detailing the exact location and nature of protective fencing, tree pruning, signage, timings and methods of works and other protection measures. All site operatives must be made aware of the nature of the protection detailed in the AMS and it should remain in place throughout construction.

5.1.2 Tree Works

Any tree works or tree removals required to facilitate the development should be carried out before construction begins and be in accordance with the British Standard, BS 3998:2010 Tree Work – Recommendations, once planning approval has been granted.

5.1.3 Tree Protection Measures

Any site offices, welfare units, and storage areas must respect the trees and their RPA, shown in pink on the supplied plans. These should be sited outside tree protection areas.

Tree protection fencing should be installed prior to demolition and any construction. This is to avoid damage to trees and preserve soil structure. The default BS5837 specification for fencing should be used for the large part of the site.

The fenced area will form a Construction Exclusion Zone and must remain undisturbed for the duration of demolition and construction unless approved works are required within it, such as removal of hard surfaces or installation of boundary treatments. Such works should be undertaken under arboricultural supervision and in line with an approved method statement. All site operatives should be made aware of the need to respect the fencing, and signage should be affixed to every third panel to ensure it is not moved.

Service runs and installation of utility cables also need to respect trees and their root protection areas. If any conflicts are highlighted, then the advice of either a consultant arboriculturist or the council Arboricultural Officer should be obtained.

The following precautions should be observed when working near to the Construction Exclusion Zone.

- No fires should be lit on site.
- No spoil, plant, machinery, construction materials or vehicles should track or be stored within the fenced area or leant against the fence panels.
- No fuel, chemical or other contaminated liquids must be discharged in proximity to trees or where it may flow toward tree RPAs.
- No construction activity of any kind should take place within the fenced areas and fencing must not to be moved.
- No spoil or materials to be stored or leant against fencing.
- Damage to fencing must be reported to the site manager and rectified as soon as possible. All fencing should be maintained so that it is fit for purpose.

5.2 Post-construction

5.2.1 Replacement Planting

A suitable landscaping scheme incorporating replacement planting will go some way to mitigate for the losses on the site. This should aim to integrate trees of differing sizes appropriate for the space afforded to them.

Suitable ground conditions and aftercare are vital to the success of new trees, and the recommendations provided in the British Standard, BS 8545[5] and the Trees and Design Action Group publication – Trees in the hardscape[6] should be followed. This includes ensuring that soils are not compacted prior to planting and that adequate below-ground space is provided with suitable volume requirements to support mature root growth and withstand compaction. Aftercare in the form of watering and sympathetic formative pruning in the first five years after planting will also help to ensure that the replacement trees thrive.

[5] British Standards Institute (2014) *BS 8545:2014 Trees: from nursery to independence in the landscape – Recommendations.* British Standards Publications Ltd.

[6] Trees and Design Action Group (2014) *Trees in Hard Landscapes: A Guide for Delivery.* TDAG Publication.

6 APPENDICES

APPENDIX 1: TREE SURVEY DATA

Tree Data Table **Broadwater Lake** **RSK**

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T1	Common Beech (Fagus sylvatica)	1	950	15	2	5	5	4	5	Mature	Fair	Fair	Large tree adjacent to desire line. Ivy clad preventing full assessment. Twin stemmed at 4m, minor dead.	30+	B	1	11.40	408.28
T2	White White willow (Salix alba)	1	1800	15	1	7	8	7	9	Veteran	Fair	Good	Access restricted due to quick sand. Twin stemmed at 2m, union good on northside. Ivy clad stems. Low hanging branches over desire line.	20+	A	13	21.60	1465.74
T3	Lombardy poplar (Populus nigra 'Italica')	1	2000	17	5	5	5	4	4	Mature	Good	Good	Twin stemmed at 4 m with ivy clad stem. Overall no significant defects.	30+	B	1	24.00	1809.56
T4	Lombardy poplar (Populus nigra 'Italica')	1	2500	18	4	4	4	4	4	Mature	Fair	Good	Splits into three main stems at 2m, good union. ;No significant defects noted	30+	B	1	30.00	2827.43
T5	Silver Birch (Betual pendula)	1	150	11	2	1	1	1	1	Young	Good	Good	No significant defects noted; Good future specimen.	40+	C	1	1.80	10.18
T6	Silver Birch (Betual pendula)	1	150	11	2	1	1	1	1	Young	Good	Good	No significant defects noted	40+	C	1	1.80	10.18
T7	Silver Birch (Betual pendula)	1	150	11	2	1	1	1	1	Young	Good	Good	No significant defects noted	40+	C	1	1.80	10.18
T8	Silver Birch (Betual pendula)	1	150	11	2	1	1	1	1	Young	Good	Good	No significant defects noted	40+	C	1	1.80	10.18
T9	Birch (Betula spp)	1	300	16	2	4	4	4	4	Semi Mature	Good	Good	No significant defects noted; Competing leaders.	40+	B	1	3.60	40.72
T10	Birch (Betula spp)	1	100	12	2	1	2	2	1	Young	Fair	Good	Slight asymmetric crown due to overshadowing of adjacent tree. Slender stem.	20+	C	1	1.20	4.52
T11	Birch (Betula spp)	1	100	8	3	1	1	1	1	Young	Poor	Fair	Exposed supporting roots.	<10	U	1	1.20	4.52
T12	White willow (Salix alba)	4	200	11	1	6	7	6	5	Early Mature	Fair	Good	Restricted access due to lower dense scrub. Multi stemmed from ground level. Adjacent to hard standing.	20+	C	1	2.40	18.10
T13	Black walnut (Juglans nigra)	1	350	13	2	6	6	6	6	Semi Mature	Fair	Good	Situated within small soil area surrounded by hard standing. Co dominant form with failed fork (cracks).	<10	U	1	4.20	55.42

Tree Data Table **Broadwater Lake** **RSK**

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T14	Horse chestnut (Aesculus hippocastanum)	1	450	12	0	4	4	4	4	Early Mature	Good	Good	No significant defects noted; Adjacent failed tree within lower crown.	30+	B	1	5.40	91.61
T15	Western red Cedar (Thuja plicata)	1	300	14	2	3	4	1	3	Early Mature	Fair	Fair	Situated on fence line of third party property. Minimal crown on east side due to adjacent tree.	20+	C	1	3.60	40.72
T16	Wild Cherry (Prunus avium)	1	400	14	4	3	4	1	4	Early Mature	Poor	Fair	Adjacent to hardcore track. Poor crown form, ivy clad throughout preventing inspection. Twin stemmed at 0.5m now competing for leadership.	10+	C	1	4.80	72.38
T17	Western red Cedar (Thuja plicata)	1	300	10	2	3	3	3	3	Early Mature	Fair	Fair	Located in third party property, measurements estimated.	20+	C	1	3.60	40.72
T18	Grey Poplar (Populus x canescens)	2	1250	24	6	10	11	9	10	Over Mature	Fair	Fair	Extra large tree adjacent to track. Twin stemmed from ground level. Wide spreading crown with some lower over extended large limbs. Some decay present at base.	20+	B	1	15.00	706.86
T19	Grey Poplar (Populus x canescens)	1	800	20	7	8	1	5	5	Mature	Poor	Fair	One sided crown towards the north. Ivy clad stem preventing inspection. Slight lean to north due to phototropism.	20+	C	1	9.60	289.53
T20	White willow (Salix alba)	1	600										Part of G19				7.20	162.86
T21	White willow (Salix alba)	1	650										Part of G19				7.80	191.13
T22	Wild Cherry (Prunus avium)	1	280	10	3	4	4	4	4	Semi Mature	Poor	Fair	Kinked trunk at base. Co dominant at 2m with v shaped union. Crossing rubbing branches.	10+	C	1	3.36	35.47
T23	Silver Birch (Betual pendula)	1	400	15	2	3	5	3	3	Early Mature	Fair	Fair	Ivy clad - preventing full inspection. Large over extended limb to south.	20+	C	1	4.80	72.38
T24	Ash (Fraxinus excelsior)	1	600	14	5	3	2	2	3	Early Mature	Fair	Fair	Ivy clad situated on third party kind. Twin stemmed at 2m. Slight asymmetric crown.	10+	C	1	7.20	162.86
T25	Ash (Fraxinus excelsior)	1	650	14	3	6	6	3	7	Mature	Poor	Fair	Adjacent to compacted layby with dirt mounded around base. Ivy clad stem. Asymmetric crown to west. Possible adb present. Low hanging branches over access road.	10+	C	1	7.80	191.13
T26	Sycamore (Acer pseudoplatanus)	5	230	12	2	3	4	4	5	Early Mature	Fair	Fair	Self set under barrier at layby causing kink at base of trunk. Ivy clad. Multi stemmed just above ground level. Many upright competing branches.	10+	C	1	2.76	23.93

Tree Data Table **Broadwater Lake** **RSK**

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T27	Ash (Fraxinus excelsior)	1	500	14	5	4	4	5	3	Early Mature	Fair	Fair	Set within verge. Ivy clad restricting full inspection. Mino low branches over access road and encroaching on utility line.	20+	C	1	6.00	113.10
T28	Goat willow (Salix caprea)	2	250	7	0	4	4	1	1	Mature	Poor	Fair	Situated within close proximity to access road. Significant mechanical damage to base. Stem splits into two with severe kinks present.	<10	U	2	3.00	28.27
T29	Ash (Fraxinus excelsior)	1	100	7	2	1	1	1	1	Newly Planted	Poor	Fair	Self set in poor rooting environment future mechanical damage predicted.	<10	U	1	1.20	4.52
T30	Ash (Fraxinus excelsior)	1	100	7	2	1	1	1	1	Newly Planted	Poor	Fair	Self set in poor rooting environment future mechanical damage predicted.	<10	U	1	1.20	4.52
T31	Ash (Fraxinus excelsior)	1	100	7	2	1	1	1	1	Newly Planted	Poor	Fair	Self set in poor rooting environment future mechanical damage predicted.	<10	U	1	1.20	4.52
T32	Ash (Fraxinus excelsior)	1	100	7	2	1	1	1	1	Newly Planted	Poor	Fair	Self set in poor rooting environment future mechanical damage predicted.	<10	U	1	1.20	4.52
T33	Ash (Fraxinus excelsior)	1	250	12	3	3	3	3	3	Young	Poor	Fair	Twin stemmed at 2m, progressing into co dominant form. . Barb wire within base of stem.	10+	C	1	3.00	28.27
T34	Hawthorn (Crataegus monogyna)	1	400	8	1	3	3	4	4	Early Mature	Fair	Fair	North of bus stop on third party land. Multi stemmed at 2m. Encroaching branches onto bus shelter.	20+	C	1	4.80	72.38
T35	Ash (Fraxinus excelsior)	1	300	8	1	5	5	5	5	Semi Mature	Poor	Fair	Situated on third party land. Twin stemmed at 0.5 m with poor union (included bark and fence within).	10+	C	1	3.60	40.72
T36	Ash (Fraxinus excelsior)	1	250	7	2	3	3	3	3	Young	Fair	Fair	Situated on third party land. Twin stemmed at 0.5m progressing into competing leaders.	10+	C	1	3.00	28.27
T37	Ash (Fraxinus excelsior)	1	600	13	2	7	7	7	7	Early Mature	Fair	Good	Situated on third party land. Exposed damaged roots on south side. Twin stemmed at 3m with minor bulge. Ivy clad northern stem. Encroaching brnaches over road.	30+	B	1	7.20	162.86
T38	Ash (Fraxinus excelsior)	1	300	8	3	4	4	4	4	Semi Mature	Good	Good	Uniform structural planting around adjacent car park. No sig defects.	40+	B	1	3.60	40.72
T39	Ash (Fraxinus excelsior)	1	300	8	3	4	4	4	4	Semi Mature	Good	Good	Uniform structural planting around adjacent car park. No sig defects.	40+	B	1	3.60	40.72

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T40	Ash (Fraxinus excelsior)	1	300	8	3	4	4	4	4	Semi Mature	Good	Good	Uniform structural planting around adjacent car park. No sig defects.	40+	B	1	3.60	40.72
T41	Ash (Fraxinus excelsior)	1	300	8	3	4	4	4	4	Semi Mature	Good	Good	Uniform structural planting around adjacent car park. No sig defects.	40+	B	1	3.60	40.72
T42	Ash (Fraxinus excelsior)	1	300	8	3	4	4	4	4	Semi Mature	Good	Good	Uniform structural planting around adjacent car park. No sig defects.	40+	B	1	3.60	40.72
T43	Ash (Fraxinus excelsior)	1	700	14	6	9	10	8	8	Mature	Fair	Fair	Situated on third party land. Access restricted due to being fenced off. Over extended lower limbs now competing for leadership.	30+	B	1	8.40	221.67
T44	Ash (Fraxinus excelsior)	1	900	10	5	0	0	0	0	Mature	Poor	Poor	Situated on third party land. Standing snag.	<10	U	3	10.80	366.44
T45	Common Lime (Tilia x europaea)	1	450	15	4	4	5	3	4	Early Mature	Fair	Fair	Situated on third party land. Multi stemmed at mid stem, tight fork unions present.	20+	C	1	5.40	91.61
T46	White willow (Salix alba)	1	650	13	4	6	6	6	4	Early Mature	Fair	Fair	Situated with concrete and structures within rpa.	20+	B	12	7.80	191.13
T47	Birch (Betula spp)	1	180	6	2	2	1	0	1	Semi Mature	Poor	Fair	Poor rooting environment. Decay within main stem and failed top.	<10	U	1	2.16	14.66
T48	Birch (Betula spp)	1	300	11	3	3	3	3	3	Semi Mature	Fair	Good	Situated on top of dirt bank. Co dominant form with a tight v shaped union at 3m.	20+	B	12	3.60	40.72
T49	Birch (Betula spp)	1	220	13	2	2	2	2	2	Semi Mature	Good	Fair	No significant defects noted	30+	B	12	2.64	21.90
T50	Goat willow (Salix caprea)	1	350	9	2	6	3	4	4	Early Mature	Good	Good	Situated at bottom of dirt bank. Some include bark and crossing branches. Upright growth within crown.	20+	C	12	4.20	55.42
T51	White willow (Salix alba)	4	437.5	10	3	7	7	8	3	Over Mature	Poor	Fair	Originally a larhe dbh tree, which has biw failed multiple times. Tree is multi stemmed from ground level with large trunks arising. Intrinsic feature for habitat and dead wood habitat on the ground.	30+	B	3	5.25	86.59
T52	Birch (Betula spp)	1	200	11	3	3	1	1	2	Semi Mature	Fair	Fair	Poor rooting environment. Buried root flare. Slight asymmetric crown due to shadowing of adjacent tree. Bowed trunk.	20+	C	12	2.40	18.10
T53	Birch (Betula spp)	1	180	10	3	1	3	3	1	Semi Mature	Fair	Fair	Poor rooting environment. Buried root flare. Slight asymmetric crown due to shadowing of adjacent tree. Bowed trunk.	10+	C	12	2.16	14.66
T54	Birch (Betula spp)	1	100	7	3	1	1	0	0	Young	Poor	Poor	Pooely formed tree being overshadowed.	<10	U	1	1.20	4.52

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T55	Birch (Betula spp)	1	200	10	2	3	1	1	2	Semi Mature	Poor	Fair	Situated withing concrete. RPA approx. 90% hard surfacing.	10+	C	1	2.40	18.10
T56	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T57	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T58	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T59	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T60	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T61	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T62	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T63	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T64	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T65	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T66	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T67	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T68	Birch (Betula spp)	1	50	6	2	1	1	1	1	Young	Fair	Fair	Small natural regen. Poor rooting environment with hard surfacing throughout.	20+	C	1	0.60	1.13
T69	White willow (Salix alba)	1	150	7	3	2	2	2	2	Semi Mature	Fair	Poor	Isolated self set tree. Sparse and stunted growth.	20+	C	1	1.80	10.18
T70	White willow (Salix alba)	2	325	11	3	4	6	2	5	Early Mature	Fair	Fair	Set on edge of lake. Twin stemmed from ground level. Minor dead wood. Asymmetric crown to west.	20+	C	1	3.90	47.78
T71	White willow (Salix alba)	1	200	8	3	2	3	3	1	Semi Mature	Poor	Fair	Situated within concrete structure with limited life expectancy.	<10	U	1	2.40	18.10

Tree Data Table **Broadwater Lake** **RSK**

Ref	Species	Stems	Dbh mm	Height m	Lwr CH	Canopy Spread (m)				Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
						N	S	E	W									
T72	White willow (Salix alba)	1	200	7	3	1	1	1	1	Semi Mature	Poor	Poor	Situated within concrete structure with limited life expectancy.	<10	U	1	2.40	18.10

Ref. No.	Dominant Species	Lesser Species	Av Diameter mm	Av Height m	Lwr CH	Av spread m	Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
G1	White willow (Salix alba)	Common Lime (Tilia x europaea);Birch (Betula spp);Common alder (Alnus glutinosa);Common alder (Alnus gultinosa)	250	14	0	7	Early Mature	Fair	Fair	Situated on a separate island. Trees located along the peripheries as ground undulates within central spine. Failed stems and branches throughout, larger stem failures from multi stemmed willows. Dense undergrowth throughout. Desire line present with evidence of branches being cut for access.	40+	B	23	3.00	28.27
G2	White willow (Salix alba);Birch (downy/silver) (Betula pubescens/pendula)	Butterfly bush (Buddleja davidii)	200	12	2	5	Semi Mature	Good	Fair	Lakes side group which opens up for fishing spots. Dense Butterfly bush (Buddleia davidii) to east restrict ing access. Larger specimen's to north west of group with young birch to east. Willow are majority multi stemmed from just above ground level.	40+	B	23	2.40	18.10
G3	White willow (Salix alba);Silver Birch (Betual pendula)		250	10	0	5	Semi Mature	Poor	Fair	Situated south of lake. Many multi stemmed willow have significant lean or have failed. Dense undergrowth throughout restricting access. One early mature birch tree to east of group in a good condition.	20+	C	23	3.00	28.27
G4	White willow (Salix alba);Birch (Betula spp)		200	10	3	3	Young	Fair	Fair	Situated south of lake. Many slender upright stems with minimal lateral branches. Desire lines present to fishing spots.	30+	C	2	2.40	18.10
G5	White willow (Salix alba);Alder (Alnus gultinosa)	Birch (Betula spp);Ash (Fraxinus excelsior)	400	16	0	5	Young to early mature	Fair	Good	Large self set woodland, areas of mature multi stemmed willow with root plate and stem failures. Dense undergrowth present with minimal saplings. Areas of canopy break with standing dead. Young birch present. Hung up stems and branches. No evidence of woodland management. Mature willows approx. 500 dbh have grown with poor form and now buckling on own weight. Many failed stems on west side near lake side. Plotted by eye as not included on the topo.	40+	B	123	4.80	72.38
G5.1	White willow (Salix alba), Butterfly bush (Buddleja davidii)	Birch (Betula spp)	200	11	0	4	Young to early mature	Fair	Good	Situated on the southern section of the main woodland. Poor ground conditions and trees are of smaller stature and sparsely spaced in places. Area not surveyed due to dense buddleia.	30+	C	2	2.40	18.10
G6	Birch (Betula spp);Alder (Alnus gultinosa);White willow (Salix alba)		100	5	0	1	Young	Poor	Dead	Small group of predominantly dead insignificant trees. One slightly bigger sycamore in centre of group.	<10	U	23	1.20	4.52
G7	Sycamore (Acer pseudoplatanus)		280	12	5	3	Semi Mature	Fair	Fair	No indicators of decay, disease or dysfunction noted. Cluster of insignificant trees.	30+	C	2	3.36	35.47
G8	White willow (Salix alba);Alder (Alnus gultinosa)		300	8	0	4	Semi Mature	Fair	Good	Adjacent to lake. Willows leaning into water. Alders to east are better upright specimens. Ivy clad and dense scrub undergrowth present.	40+	C	3	3.60	40.72
G9	White willow (Salix alba);Birch (Betula spp)	Alder (Alnus gultinosa)	300	12	0	3	Semi Mature	Fair	Fair	Restricted access due to dense vegetation. To east of group are larger willows overhanging access road. Majority of trees have slender stems with upright form. Some failed trees and trees of particular no arb significance. Small birch trees adjacent to desire line running on northern boundary. Trees densely grown together. Overall no significant defects. Low hanging branches over track to east.	40+	B	2	3.60	40.72

Ref. No.	Dominant Species	Lesser Species	Av Diameter mm	Av Height m	Lwr CH	Av spread m	Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
G9.1	White willow (Salix alba); Birch (Betula spp) Butterfly bush (Buddleja davidii)		200	8	0	3	Young	Fair	Fair	Situated on the northern section section of the main woodland. Poor ground conditions with hard standing and trees are of smaller stature and sparsely spaced in places. Area not surveyed due to dense buddleia.	30+	C	2	2.40	18.10
G10	Silver Birch (Betual pendula)		100	8	2	2	Young	Good	Good	Natural regen which are sparsely spaced internally within group with densely grown slightly larger trees on the outer boundaries. Hardstanding throughout.	40+	C	2	1.20	4.52
G11	Birch (Betula spp)		100	9	1	3	Young	Fair	Fair	Densely self set group, slender stems. Minor asymmetric crowns.	10+	C	2	1.20	4.52
G12	Birch (Betula spp)	Sycamore (Acer pseudoplatanus)	100	7	0	2	Young	Poor	Fair	Self set within iron weighbridge, defects at base of trunks due poor rooting environment.	<10	U	2	1.20	4.52
G13	White willow (Salix alba)		600	14	3	5	Mature	Poor	Fair	Lapsed pollard east of track. Low hanging branches. Leaning stems.	20+	C	2	7.20	162.86
G14	Hybrid black poplar (Populus x canadensis)		1000	20	5	10	Over Mature	Fair	Fair	Dominant tree group with large dbh. Slight asymmetric crowns. Twin stemmed at ground level (2 trees). Over due a crown reduction due to target area. Situated on a bank adjacent to a ditch.	20+	B	2	12.00	452.39
G15	White willow (Salix alba)		400	4	2	4	Mature	Poor	Fair	Pollarded trunks at 4m. Situated on opposite aide of ditch.	30+	C	2	4.80	72.38
G16	Hazel (Corylus avellana)	Hawthorn (Crataegus monogyna)	100	6	0	5	Semi Mature	Fair	Fair	No indicators of decay, disease or dysfunction noted	30+	C	2	1.20	4.52
G17	Ash (Fraxinus excelsior)		250	18	8	6	Early Mature	Poor	Fair	Poorly formed trees, ivy clad with possible adb.	10+	C	2	3.00	28.27
G18	Hybrid black poplar (Populus x canadensis)	Ash (Fraxinus excelsior)	300	16	3	7	Early Mature	Fair	Fair	Ivy clad stems. Two hung up failed limbs. Asymmetric crowns.	20+	B	23	3.60	40.72
G19	White willow (Salix alba);Ash (Fraxinus excelsior)	Hawthorn (Crataegus monogyna)	250	8	0	5	Mixed	Fair	Fair	Adjacent to track and lake. Trees lean towards the west over lake. Trees are uniform in with each other in structure. Asymmetric growth. Trees are smaller in size at southern end with Butterfly bush (Buddleia davidii) throughout. Good wildlife corridor.	30+	B	2	3.00	28.27

Ref. No.	Dominant Species	Lesser Species	Av Diameter mm	Av Height m	Lwr CH	Av spread m	Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
G20	White willow (Salix alba)	Birch (Betula spp)	200	10	2	4	Semi Mature	Fair	Fair	Situated on third party land beyond fence. Ivy clad. Poor crown forms. Failed branches.	10+	C	2	2.40	18.10
G21	Leyland cypress (Cupressocyparis leylandii)		300	12	0	4	Early Mature	Fair	Good	Screening hedge on third party land.	30+	C	2	3.60	40.72
G22	Ash (Fraxinus excelsior)	Hawthorn (Crataegus monogyna)	300	10	0	3	Early Mature	Fair	Fair	Lapsed boundary hedge. Previously trees have been pollarded at fence height but are now lapsed. Ash have largest dbh. Ash are now multi stemmed upright form with compression forks.	20+	C	2	3.60	40.72
G23	Ash (Fraxinus excelsior)		200	10	3	5	Semi Mature	Fair	Fair	Situated on verge on top of bank. Screen for residents. Ivy clad throughout. No arb merits.	20+	C	23	2.40	18.10
G24	White willow (Salix alba)	Butterfly bush (Buddleja davidii)	200	7	0	4	Semi Mature	Poor	Fair	Trees situated within edge of shore line with Butterfly bush (Buddleia davidii) through out. Poor rooting environment with plied heaps of stone and recently cut vegetation.	30+	C	2	2.40	18.10
G25	White willow (Salix alba)	Birch (Betula spp);Butterfly bush (Buddleja davidii)	250	9	0	7	Early Mature	Poor	Fair	Restricted access in places due to dense undergrowth. Some positions and measurements estimated. Multi stemmed Willow throughout with failed and failing branches. Sporadic birch are well formed and better quality.	40+	C	23	3.00	28.27
G26	White willow (Salix alba);Butterfly bush (Buddleja davidii)	Birch (Betula spp)	100	8	0	4	Semi Mature	Fair	Fair	Adjacent to internal track and hard standing. Small scrubby willow with a larger mutli stemmed Birch and one other Willow.	30+	C	2	1.20	4.52
G27	White willow (Salix alba);Butterfly bush (Buddleja davidii)		300	10	0	4	Early Mature	Poor	Fair	Hard standing on south and north side. Minimal sound rooting environment. Mutli stemmed willow trees with root flare buried. Arising from the ground with poor stem formation. Piled up hardcore debris present.	20+	C	23	3.60	40.72
G28	White willow (Salix alba)		200	8	0	5	Early Mature	Fair	Fair	Rooting within lake. Poor rooting environment to north. RPA not needed.	30+	C	23	2.40	18.10

Ref. No.	Dominant Species	Lesser Species	Av Diameter mm	Av Height m	Lwr CH	Av spread m	Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
G29	White willow (Salix alba)		150	7	0	4	Semi Mature	Fair	Fair	Rooting within lake. Poor rooting environment to north. RPA not needed.	30+	C	2	1.80	10.18
G30	White willow (Salix alba);Butterfly bush (Buddleja davidii)	Birch (Betula spp)	300	8	0	4	Mixed	Poor	Fair	Situated around and within hard standing. Dense undergrowth present restricting access. The large willow trees are multi stemmed with numerous failures and decay present. Smaller trees have upright form and minimal lateral branches due to insufficient space. Further south the group opens up with better formed young birch trees. Hung up and wind blown present. Concrete debris throughout.	30+	C	23	3.60	40.72
G31	White willow (Salix alba);Butterfly bush (Buddleja davidii)	Birch (Betula spp)	200	8	0	4	Mixed	Fair	Fair	Dense undergrowth preventing full access. Majority of trees are small self set birch and willow. One large mutli stemmed willow to north with previous failures and highly likely more to follow soon. One birch tree to south with good form. Remaining trees insignificant from an arb perspective.	40+	C	2	2.40	18.10
G32	Birch (Betula spp)		100	100	0	3	Semi Mature	Poor	Fair	Set within concrete. Grown with poor form and severely bowed basal trunks.	<10	U	2	1.20	4.52
G33	White willow (Salix alba);Poplar sp		150	5	0	4	Semi Mature	Fair	Fair	Group situated on boundary of silt lagoon. Small insignificant willow to north with poor scrubby form with failed branches. One category B poplar tree within lagoon. Standing dead tree present. Hard surface track to north group.	20+	C	2	1.80	10.18
G34	White willow (Salix alba);Butterfly bush (Buddleja davidii)	Hawthorn (Crataegus monogyna)	200	12	0	5	Early Mature	Fair	Fair	In accessible in places due to dense undergrowth and water. One large better quality willow to the south.	40+	C	2	2.40	18.10
G35	White willow (Salix alba);Butterfly bush (Buddleja davidii)	Hawthorn (Crataegus monogyna)	200	12	0	5	Early Mature	Fair	Fair	In accessible in places due to dense undergrowth and water. One large better quality willow to south.	40+	C	2	2.40	18.10
G36	Hybrid black poplar (Populus x canadensis)		1000	17	4	15	Mature	Fair	Good	Situated on grass verge next to access track. Three large trees with dense lower undergrowth. Tree to north multi stemmed. Over extended branches present.	20+	B	2	12.00	452.39
G37	Hybrid black poplar (Populus x canadensis)		800	17	8	13	Mature	Fair	Good	Situated on grass verge next to access track. Over extended limbs. Ivy clad and dense undergrowth restricting full assessment.	30+	B	2	9.60	289.53

Ref. No.	Dominant Species	Lesser Species	Av Diameter mm	Av Height m	Lwr CH	Av spread m	Age class	Struc Condition	Phys Condition	General Observations	Est remaining LE	BS cat	Sub Cat	RPA Radius M	RPA Area M2
G38	Hybrid black poplar (Populus x canadensis)		850	17	8	12	Early Mature	Fair	Good	Ivy clad and dense undergrowth restricting full assessment. Situated on grass verge next to access track. No indicators of decay, disease or dysfunction noted.	30+	B	2	10.20	326.85
G39	Hybrid black poplar (Populus x canadensis)		1000	17	8	14	Mature	Good	Good	Ivy clad and dense undergrowth restricting full assessment. Situated on grass verge next to access track. No indicators of decay, disease or dysfunction noted.	30+	B	2	12.00	452.39
G40	Ash (Fraxinus excelsior);Hawthorn (Crataegus monogyna)		150	7	0	3	Semi Mature	Fair	Fair	Linear single row feature, with native hedgerow species and sporadic maturing ash trees.	40+	B	2	1.80	10.18
G41	Ash (Fraxinus excelsior)	White Willow (Salix alba)	250	13	6	8	Early Mature	Poor	Poor	Situated on grass verge next to access track. ADB present. Some trees in poor physiological health.	10+	C	2	3.00	28.27
G42	Ash (Fraxinus excelsior)	White Willow (Salix alba)	300	13	4	7	Semi Mature	Fair	Fair	Small group within grass area. No significant arb merits.	20+	C	2	3.60	40.72
G43	Silver Birch (Betual pendula)		350	11	4	8	Early Mature	Fair	Good	Set within third party land. Screen for property. Most are multi stemmed mid trunk from historical pollarding.	30+	B	2	4.20	55.42
G44	Ash (Fraxinus excelsior)	Holly (Ilex aquifolium)	100	8	0	2	Young	Fair	Fair	No indicators of decay, disease or dysfunction noted. Self set insignificant group on fence line.	20+	C	2	1.20	4.52
G45	Ash (Fraxinus excelsior);White Willow (Salix alba)	Hawthorn (Crataegus monogyna)	300	12	0	6	Early to semi mature	Good	Good	Adjacent to track and lake, large liner gropu following the lake boundary with small cuttings for lake access presnet. Excellent screening and wildlife feature. Dense undergrowth in places with some large Ash trees throughout.	40+	A	2	3.60	40.72
G46	Hawthorn (Crataegus monogyna)	Elder (Sambucus nigra)	100	6	0	3	Early Mature	Fair	Good	Dense scrubby tree group. No significant arb merits, has some habitat value.	40+	C	2	1.20	4.52
G47	White Willow (Salix alba);Goat Willow (Salix caprea)	Ash (Fraxinus excelsior)	300	10	0	6	Semi Mature	Good	Good	Large group situated on boundary of lake. No indicators of decay, disease or dysfunction noted.	40+	B	2	3.60	40.72
Island 1	White willow (Salix alba)	Common Lime (Tilia x europaea);Birch (Betula spp);Common alder (Alnus glutinosa);Common alder (Alnus gultinosa)	200	8	0	3	Early Mature	Fair	Fair	Situated on a separate island. All measurements/species estimated and National tree map data used to plot crown cover and tree points.	40+	C	2	2.40	18.10

Hedge Data Table **Broadwater Lake** **RSK**

Ref	Dominant species	Av height m	Av spread m	Comments
H1	Mixed species	4	2	Boundary hedge on third party land.
H2	Leyland Cypress (Cupressus × leylandii)	3	2	Boundary hedge on third party land.

Shrub Data Table

Broadwater Lake

RSK

Ref	Dominant species	Lesser species	Av height	Av spread	Comments
SG1	Butterfly bush (Buddleja davidii)		6	4	Dense group adjacent to lake.
SG2	Cherry laurel (prunus laurocerasus) eleagnus spp, butterfly bush(Buddleja davidii)	Ash (fraxinus excelsoir)	4	3	Small group alongside fence line. One ash tree with adb. Insignificant self set trees.
SG3	Bramble (rubus fruticosus)		5	3	Scrub group with insignificant self set trees. Hawthorn, ash, horse chestnut. Partially on third party land in southern aspect.
SG4	Butterfly bush (Buddleja davidii)		3	4	Bordering lake, poor scrappy form.
SG5	Butterfly bush (Buddleja davidii)		3	4	Bordering lake, poor scrappy form.
SG6	Butterfly bush (Buddleja davidii)		3	1	Following shore line of lake.
SG7	Butterfly bush (Buddleja davidii)		2	1	On shoreline with poor form.

APPENDIX 2: TREE CONSTRAINTS PLAN

RSK biocensus
EXPERTS IN ECOLOGY

18 Frogmore Rd
Hemel Hempstead
HP3 9RT
01442 437500

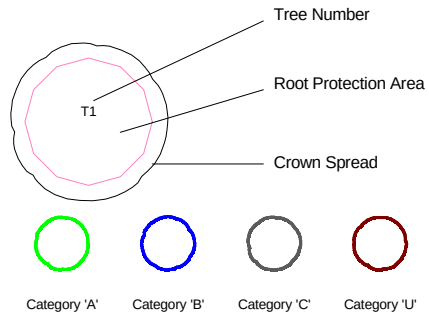
Tree Constraints Plan

SCALE : 1 : 5000 @ A3

DATE : 28/09/2023

MAP FILENAME : Broadwater Lake

N



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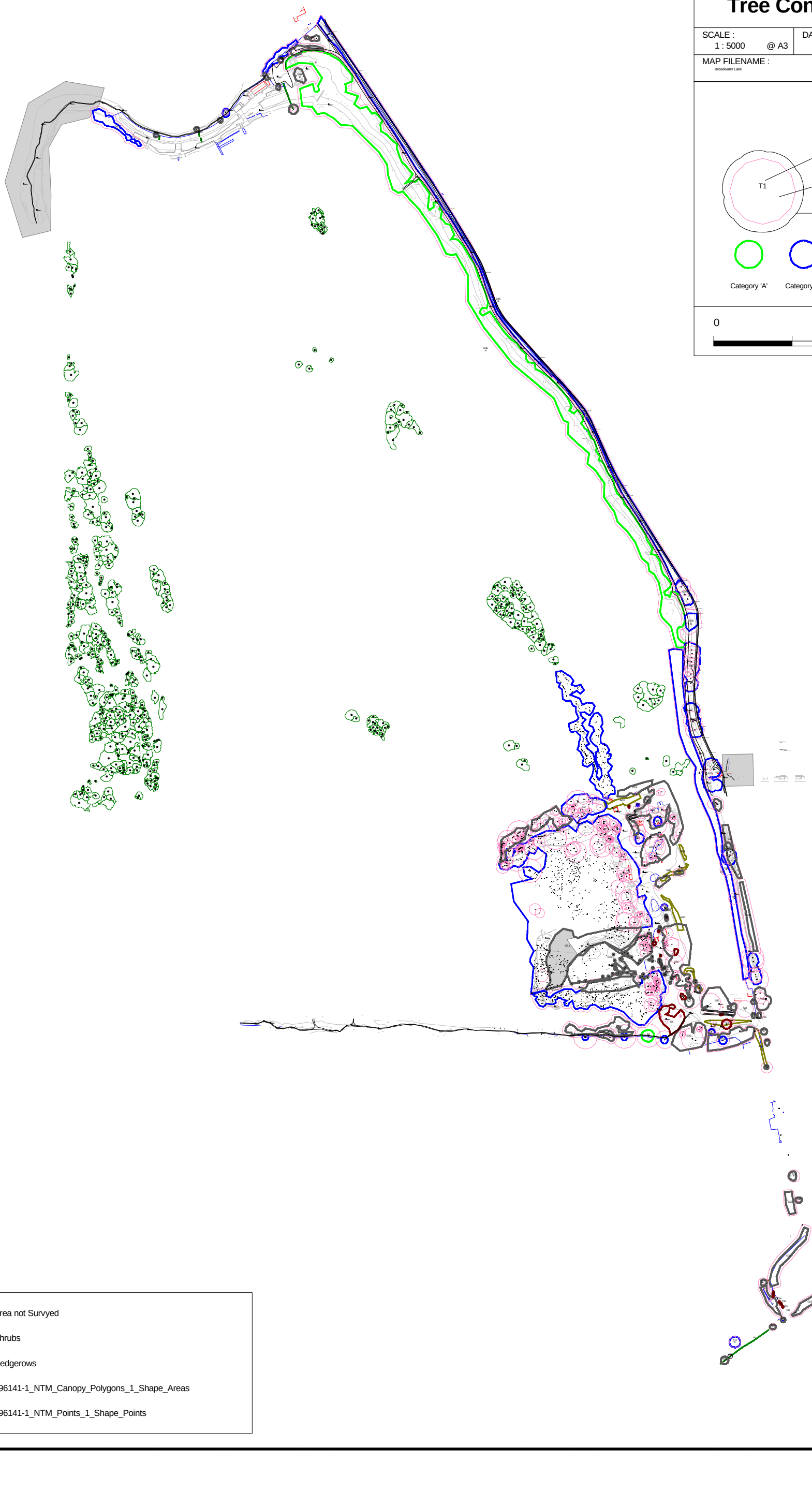
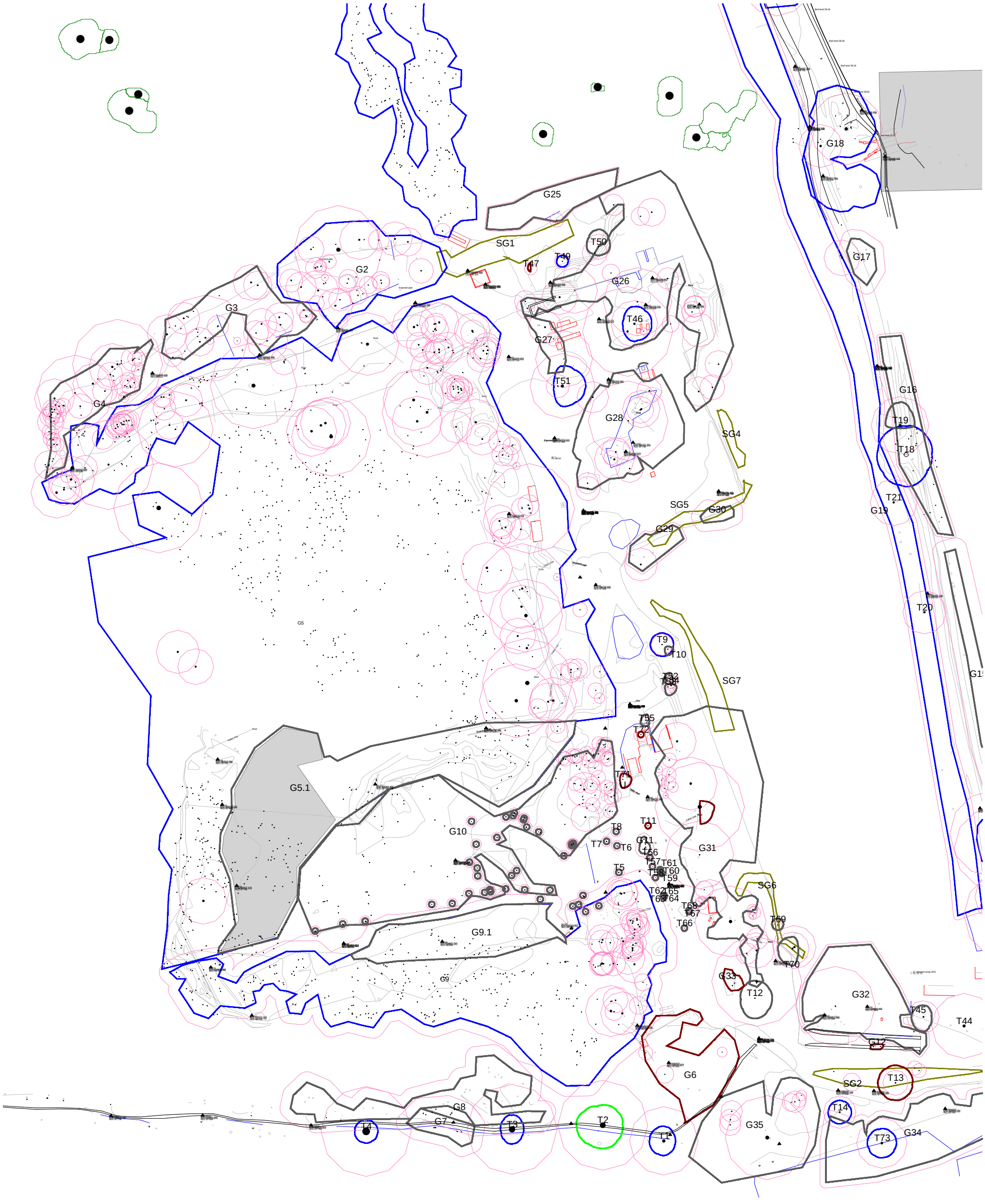




Area not Survyed

Shrubs

Hedgerows

196141-1_NTM_Canopy_Polygons_1_Shape_Areas

196141-1_NTM_Points_1_Shape_Points

APPENDIX 3: TREE IMPACT AND RETENTION PLAN

RSK biocensus
EXPERTS IN ECOLOGY
18 Frogmore Rd
Hemel Hempstead
HP3 9RT
01442 437500

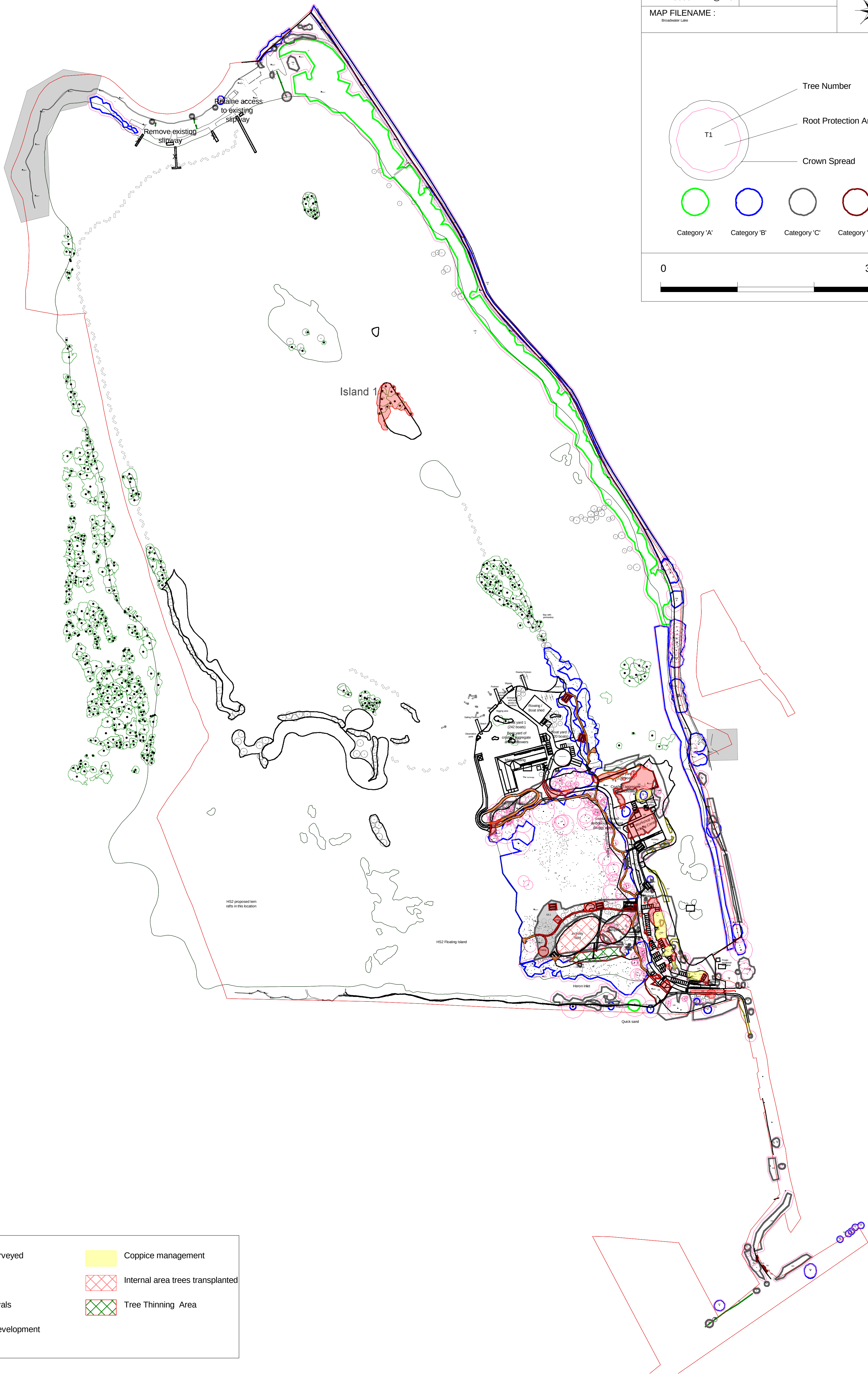
Tree Impact Removal Plan

SCALE : 1 : 5000 @ A3	DATE : 28/09/2023	N
MAP FILENAME : Broadwater Lake		

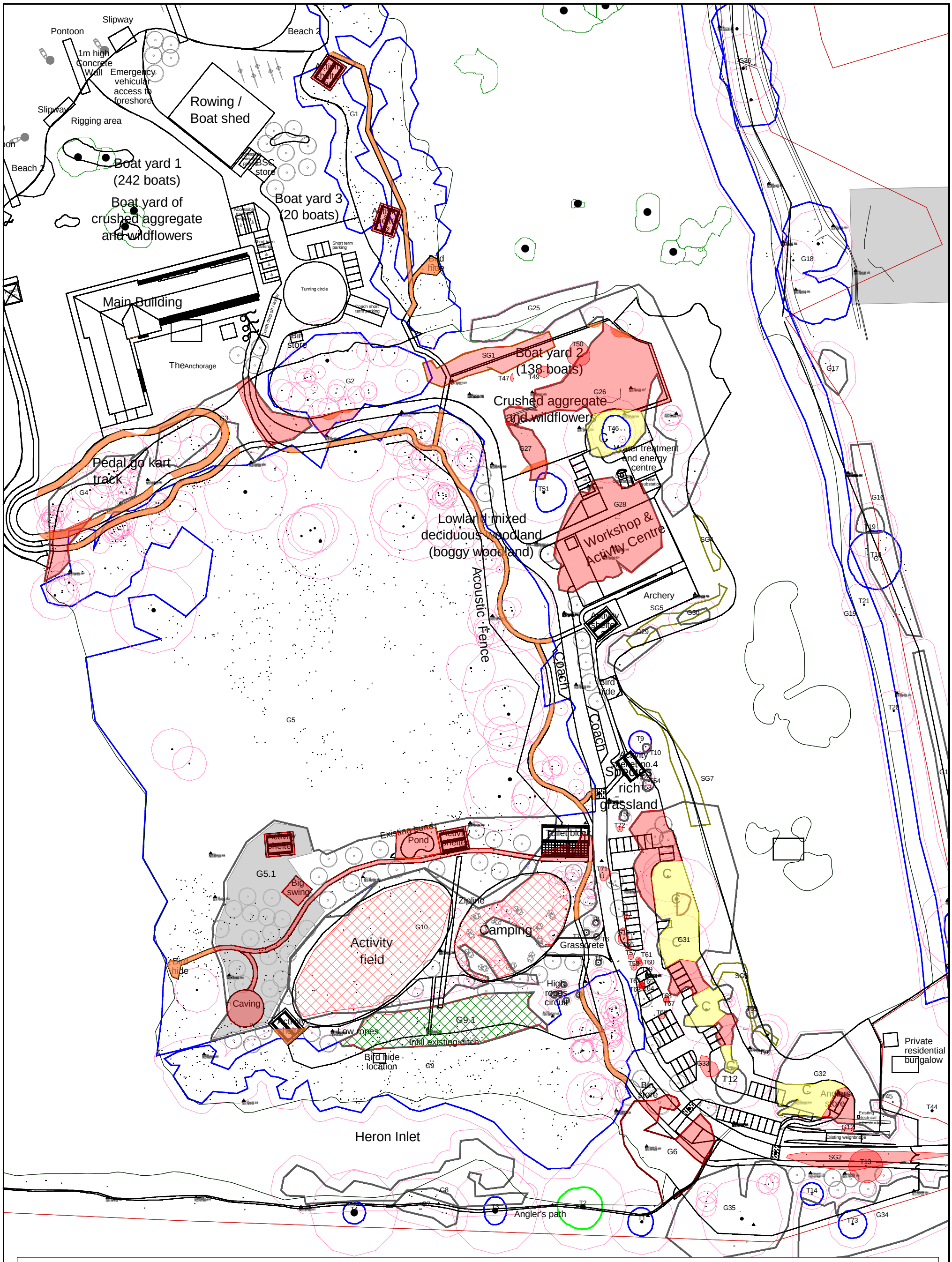
Tree Number
Root Protection Area
Crown Spread
T1

Category 'A' | Category 'B' | Category 'C' | Category 'U'

0 300m



Area not Surveyed	Coppice management
RPA Impact	Internal area trees transplanted
Tree Removals	Tree Thinning Area
Proposed development	


Slipway
Pontoon
1m high Concrete Wall
Emergency vehicular access to foreshore
Slipway
Rigging area
Beach 2
Beach 2
Rowing / Boat shed
Boat yard 1 (242 boats)
BSC store
Boat yard of crushed aggregate and wildflowers
Boat yard 3 (20 boats)
Main Building
The Anchorage
Bin store
Turning circle
Short term parking
Coach short term parking
Coach short drop off / layby
Accessible parking
Pedal go kart track
G1
G2
G3
G4
G5
G5.1
G6
G8
G9
G9.1
G10
G17
G18
G25
G26
G27
G28
G29
G30
G31
G32
G33
G34
G35
G36
SG1
SG2
SG3
SG4
SG5
SG6
SG7
T2
T4
T5
T6
T9
T10
T12
T13
T14
T19
T20
T21
T45
T46
T47
T49
T50
T51
T53
T54
T55
T72
T73
Boat yard 2 (138 boats)
Crushed aggregate and wildflowers
Water treatment and energy centre
Workshop & Activity Centre
Archery
Activity shelter no.4
Species rich grassland
Toilet block
Lowland mixed deciduous woodland (boggy woodland)
Acoustic Fence
Coach
Coach
Bird hide
Bird hide
Existing bunker
Pond
Activity shelter
Activity shelter
Big swing
Zipline
Camping
Activity field
Grassecrete
Caving
Activity shelter
Low ropes
Infill existing ditch
Bird hide location
High ropes circuit
Bin store
Angler's path
Heron Inlet
Private residential bungalow
Anglers Store
Existing electrical infrastructure
Existing weighbridge
Area not Surveyed
RPA Impact
Tree Removals
Proposed development
Coppice management
Internal area trees transplanted
Tree Thinning Area

APPENDIX 4: TREE SURVEY KEY

Reference

Each tree or group has been assigned a sequential number.
T- Tree
G-Group

Species

Represents the genus, species and if appropriate cultivar of the tree. The common name is provided first, with the scientific name in brackets.

Stems

Number of stems present.

Measurements

- DBH - Stem diameter in millimetres measured at 1.5 m above ground level. Where the stem is divided below 1.5 m, measurement is taken as directed by BS5837 Annex C.
- Height – Tree height measure in metres to the nearest half metre.
- Lower crown height – Lower crown height above ground in metres of the first lowest significant branch.

Age Classification

The following classification is employed:

- Y - Young: saplings and young trees under 10 years of age.
- SM – Semi Mature: trees older than 10 years but less than one third of the life expectancy of their species, normally making substantial extension growth.
- EM – Early Mature: trees between one-third and two-thirds of the life expectancy of their species. More or less full height and large girth, increasing only slowly.
- M – Mature: trees beyond two-thirds of the life expectancy of their species. No significant extension growth.
- OM – Over Mature - a tree having reached its maximum life span and is declining in health and size due to old age.
- V – Veteran: trees that shows features of biological, cultural or aesthetic value that are characteristic of an individual surviving beyond the typical age range for the species.

Structure Condition

An assessment of the structural/safe condition of the tree categorised into:

- GOOD - a tree in a safe condition with no significant defects.
- FAIR - a tree in a safe condition at present but with defects or with significant defects that can be remediated.

- POOR - a tree with significant defects that cannot be remediated.

Physiological Condition

An assessment of the physiological condition (i.e. health/vitality) of the tree categorised into:

- GOOD - a tree in a healthy condition with no significant problems.
- FAIR - a tree generally in good health with some problems that can be remediated.
- POOR - a tree in poor health with significant problems that cannot be remediated.
- DEAD - a tree without sufficient live material to sustain life.

General Observations

Observations made by the assessor relating to the category classification and arboricultural merits or concerns.

Estimated Remaining Contribution in Years

The estimated remaining contribution in years is an estimate based on currently known factors of the possible remaining life of the tree as an asset. Clearly, it is impossible to predict changes in condition which may occur in the future and this reflects what is considered reasonable under existing circumstances; the classification that has been used is in accordance with the BS5837.

The estimated remaining contribution in years will be dependent on the interaction of the typical longevity of the species, its current age and condition with prevailing environmental factors. The estimated remaining contribution in years also dependent on future tree management that can extend useful life in some instances.

Tree Categorisation Using BS 5837 Methodology

The trees surveyed were categorised using the method explained in BS5837. This method categorises individual trees, groups and woodlands in a systematic way.

Groups are identified as those trees forming a single arboricultural feature with trees that provide companion shelter, are avenues or screens or cultural.

Initially the surveyor will determine if the tree should be regarded as a U category tree. U category trees are those that are of low value that have little future due to physiological and structural condition.

Other trees are graded A, B or C. The initial category should reflect the tree's value in making an important contribution to the amenity of the site over a period of time. The higher the tree category, the longer the perceived time period.

A subcategory is included 1, 2 or 3. This subcategory reflects the type of value the surveyor feels the tree presents in regard to its value to 1 – arboricultural, 2 – landscape, 3 – cultural or conservation context.

The cascade chart used is included as Appendix 5 of this report.

APPENDIX 5: BS5837:2012 CASCADE CHART

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

