



BS 5837:2012 Arboricultural Survey

Bedhampton Waterworks
for:

E101 Hub 4 Ltd.

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BS 5837:2012 Arboricultural Survey

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Contents

Contents	3
1.0 Non-Technical Summary	4
1.1 Arboricultural Survey.....	4
1.2 Design recommendations	4
2.0 Overview	5
2.1 Introduction.....	5
2.2 Structure of the Report	5
2.3 Site Description	5
3.0 Planning background	6
3.1 National Planning Policy Framework.....	6
3.2 Local Planning Policy	6
4.0 Arboricultural Survey	7
4.1 Overview	7
4.2 Tree species, age and overall condition	7
4.3 Tree quality, value and significance on site and local landscape	7
4.4 Root Protection Areas (RPA)	7
4.5 Tree Preservation Orders (TPO) and Conservation Areas	7
5.0 Design recommendations	8
5.1 General recommendations.....	8
5.2 Maximise tree retention.....	8
5.3 Minimise residual effect of trees on development	8
5.4 Minimise residual effect of development on retained trees.....	8
5.5 Trees to be removed	9
6.0 Appendix 1 – Arboricultural Survey Schedule.....	10
6.1 Information recorded	10
7.0 Appendix 2 – Tree Survey and Constraints Plan	12
8.0 Appendix 3 – Methodology	13
8.1 Introduction.....	13
8.2 Arboricultural Survey.....	13

1.0 Non-Technical Summary

1.1 Arboricultural Survey

- 1.1.1 The 1ha site is a part of the wider Portsmouth Bedhampton Water Treatment Works and comprises several large mounds featuring sparsely vegetated land which has been colonised by scrub and grassland.
- 1.1.2 A tree survey in accordance with BS 5837:2012 was carried out by Enzygo Ltd. in December 2023, recording eleven mature trees in the South and Southeast of the site, including sycamore, pine and Norway maple. Four trees are of high value, four of moderate value and two of low value. One tree is unsuitable for retention.
- 1.1.3 The trees are not protected by Tree Preservation Order and do not lie within a Conservation Area.

1.2 Design recommendations

- 1.2.1 The site layout design should take into account the constraints posed by the trees on site and should seek to retain as many trees on site as possible to minimise the effect of the development on the amenity of the site and the local landscape as well as on the ecological value of the site. The retention of trees described in this report as being of high or moderate value should be prioritised.
- 1.2.2 *BS 5837:2012 Trees in relation to design, demolition and construction* chapters 5.2 and 5.3 describe the constraints posed by existing trees and outline the potential conflict between proposed structures and retained trees and how these can be avoided or minimised.
- 1.2.3 New structures, hard landscape, services and construction access should be designed outside the canopy spreads and Root Protection Areas (RPA) of retained trees as far as reasonably practicable. Lowering of ground levels within the RPA of retained trees is not acceptable. Specialist solutions to manage the conflict between the proposals and retained trees are available but may have an impact on costs of the construction phase considerably. These include access facilitation pruning, no-dig construction, temporary ground protection, specialist engineering for buildings and trenchless solutions for services.

2.0 Overview

2.1 Introduction

2.1.1 Enzygo Limited [Enzygo] have been commissioned by E101 Hub 4 Ltd. to prepare an Arboricultural Survey Report in accordance with BS 5837:2012 for a section of the Bedhampton Water Treatment Works site off Meyerick Road in support of a planning application for the development of a 150MWh battery energy storage facility.

2.1.2 This report should assist the preparation of the site layout, allowing the designer to consider the arboricultural constraints on site, including the retention of desirable trees (high and moderate value and/or trees which are found to be legally protected) and the protection of above and below ground parts of retained trees.

2.2 Structure of the Report

2.2.1 **Chapter 2.0** provides a brief description of the site and its location.

2.2.2 **Chapter 3.0** summarises the planning background, including national and local planning policies.

2.2.3 **Chapter 4.0** summarises the findings of the Arboricultural Survey, describing the overall species mix, age, condition and value of the trees recorded on site.

2.2.4 **Chapter 5.0** provides both general and site-specific design recommendations to assist with the development of any future site layouts which are sympathetic to the existing trees.

2.3 Site Description

2.3.1 The site is located within the wider Portsmouth Bedhampton Water Treatment Works, approximately 0.2km south of Bedhampton station and 1km west of Havant town centre, in a semi-industrial/semi-suburban location. A small brook (Hermitage Stream) forms the site's southern boundary, and the water treatment works are located to the immediate north, alongside ground mounted solar panels. A railway line passes the site in the Northwest, with a residential area beyond. The JDP Havant pipe supplier's storage yard is located to the east.

2.3.2 The site falls within the administrative boundary of Havant Borough Council.

2.3.3 The application boundary for the site is approximately 1hectares and comprises several large mounds featuring sparsely vegetated land which has been colonised by scrub and grassland.

2.3.4 A Public Right of Way (PRoW) passes the site in the South, with views into the site only partially blocked by mature boundary vegetation.

3.0 Planning background

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF) published by the government and updated in December 2023 sets out the framework objectives for development in England. These are used by Local Planning Authorities (LPA) both during the preparation of their local planning policies as well as to guide them in making individual decisions for Planning Applications.

3.1.2 The NPPF sets out several objectives concerning the natural environment, including trees, woodland and hedgerows. In addition to broad objectives addressing biodiversity and the challenges posed by climate change (e.g. flood resilience, species selection), the following paragraphs ask for the recognition of existing trees in relation to development:

- Paragraph 136 states that *“Trees make an important contribution to the character and quality of urban environments, and can also help mitigate and adapt to climate change. Planning policies and decisions should ensure (...) that existing trees are retained wherever possible.”*
- Paragraph 175 requests that *“Planning policies and decisions should contribute to and enhance the natural and local environment by (...) recognising (...) benefits (...) of trees and woodland”*.

3.2 Local Planning Policy

3.2.1 Development Management Policy DM8 *Conservation, Protection and Enhancement of Existing Natural Features* of the Havant Borough Core Strategy March 2011 highlights that

“Development will only be permitted where it protects and enhances local habitats and landscape distinctiveness and which addresses all of the relevant criteria as set out below:

1. *Protects natural features of nature conservation and/or amenity importance on the site, for example trees, woodlands, hedgerows, soils, streams, stream corridors, springs, ditches or ponds from damage, destruction and a deterioration in quality.*
2. *Sympathetically incorporates existing features into the overall design of the scheme including measures taken to ensure their continued survival.*

4.0 Arboricultural Survey

4.1 Overview

- 4.1.1 The arboricultural survey in accordance with BS 5837:2012 was carried out by Brynley Andrews, M.Arbor.A., in December 2023. At the time of the survey the trees were not in leaf.
- 4.1.2 Eleven individual trees were recorded during the walk-over survey. They are concentrated along the southern site boundary as well as around the site entrance in the Southeast.
- 4.1.3 A full schedule of all trees and tree groups recorded can be found in Appendix 1 – Arboricultural Survey Schedule.

4.2 Tree species, age and overall condition

- 4.2.1 The trees recorded on site are mainly of non-native species, including sycamore (*Acer pseudoplatanus*), Norway maple (*Acer platanoides*) and Monterey pine (*Pinus radiata*), with beech (*Fagus sylvatica*, T9) and ash (*Fraxinus excelsior*, T4) scattered between them. The trees are, overall, at their mature life stage, with the exception of the ash and a crack willow (*Salix fragilis*) which is located in the Southeast. They're in fair to good condition.

4.3 Tree quality, value and significance on site and local landscape

- 4.3.1 Due to their individual quality and the screening they provide along the southern site boundary, the majority of trees are of high value (T2, T7-T9, BS retention category A) or moderate value (T1, T4, T6, T6-1, T6-2, BS category B) respectively. Only the elder (T3) and the crack willow (T5) are of low value. Of the small group of Norway maple in the Southeast, dead tree T6 was assessed as being 'unsuitable for retention' (Category U).

4.4 Root Protection Areas (RPA)

- 4.4.2 The Root Protection Areas for each Category A to C tree and tree group has been calculated based on measured stem diameters. Both the radius and the area of each RPA are listed in Appendix 1 – Arboricultural Survey Schedule and shown on the plan included in Appendix 2 – Tree Survey and Constraints Plan.

4.5 Tree Preservation Orders (TPO) and Conservation Areas

- 4.5.1 The online tool provided on the Havant Borough Council website has confirmed that none of the trees included in this survey are protected by Tree Preservation Order. Old Bedhampton Conservation Area lies on the opposite side of the railway line and does not affect any of the trees on site.

5.0 Design recommendations

5.1 General recommendations

- 5.1.1 Design decisions should be based on the recommendations in chapters 5.2 and 5.3 of *BS 5837:2012 Trees in relation to design, demolition and construction* which describe the constraints posed by existing trees and outline the potential conflict between proposed structures and retained trees and how these can be avoided or minimised.

5.2 Maximise tree retention

- 5.2.1 It is recommended that the site layout design considers the safe retention of any trees which have been assigned the retention categories A, B and C as far as practicable to retain the ecological value and the mature character of the site and to minimise the potential visual impact the development may have on the surrounding landscape. The retention of legally protected trees should be a priority.

- 5.2.2 The trees most desirable for retention are listed below:

5.3 Minimise residual effect of trees on development

- 5.3.1 In addition to the desired retention of existing trees as described in 5.2 above, it is advised to consider the impacts any retained trees would have on the development, including excessive shading of sensitive building elevations and open spaces and the increased requirement for routine tree management near built structures (i.e. regular crown reduction near buildings).

5.4 Minimise residual effect of development on retained trees

Proposed buildings, structures and hard surfacing

- 5.4.1 The site layout design should allow generous distances between vertical structures and tree canopies and allow for the expected future expansion of crowns.
- 5.4.2 The location of new structures and hard surfacing within the canopy spread of existing trees and tree groups should be considered carefully. Excessive management of these trees to facilitate any such elements may cause an imbalance of stem/crown ratio, unbalanced crowns or unnatural shape of specific tree species. The future requirement for continuous tree management to limit any conflicts should remain minimal.
- 5.4.3 Where built structures and hard landscape elements are proposed within the Root Protection Areas of existing trees, specialist methodologies may have to be adopted to manage the conflict. These solutions may have an impact on costs of the construction phase and it may be

desirable to keep this to a minimum by developing a layout which is sensitive to the existing trees. Any vertical elements such as fences should be proposed at such a distance from tree stems as to allow for the future increase of the stem diameter and root buttresses.

Earthworks

- 5.4.4 Underground services and any proposed design elements requiring foundations (e.g. boundary treatments, street furniture, hard surfaces) should be placed outside of Root Protection Areas where possible.
- 5.4.5 Excavations for underground services may have an impact where they are proposed within the RPA of retained trees. Proposed above ground services may further conflict with parts of tree canopies.
- 5.4.6 The reduction of ground levels within the Root Protection Areas of retained trees are not acceptable. Where this can't be avoided, the removal of the tree may have to be considered.

Construction operations

- 5.4.7 Construction operations near retained trees are likely to cause accidental damage of tree trunks and low hanging branches. Where possible, the design should allow for reasonable distances between new structures and above ground parts of retained trees, including sufficient clear working areas around those structures.
- 5.4.8 Vehicle and plant movement during construction may further cause ground compaction which could lead to irreversible damage of tree roots and the rooting environment within the RPA of retained trees. The construction phase plans should ensure that site access routes, site compounds and internal routes are proposed outside the Root Protection Areas (RPA) of retained trees.

5.5 Trees to be removed

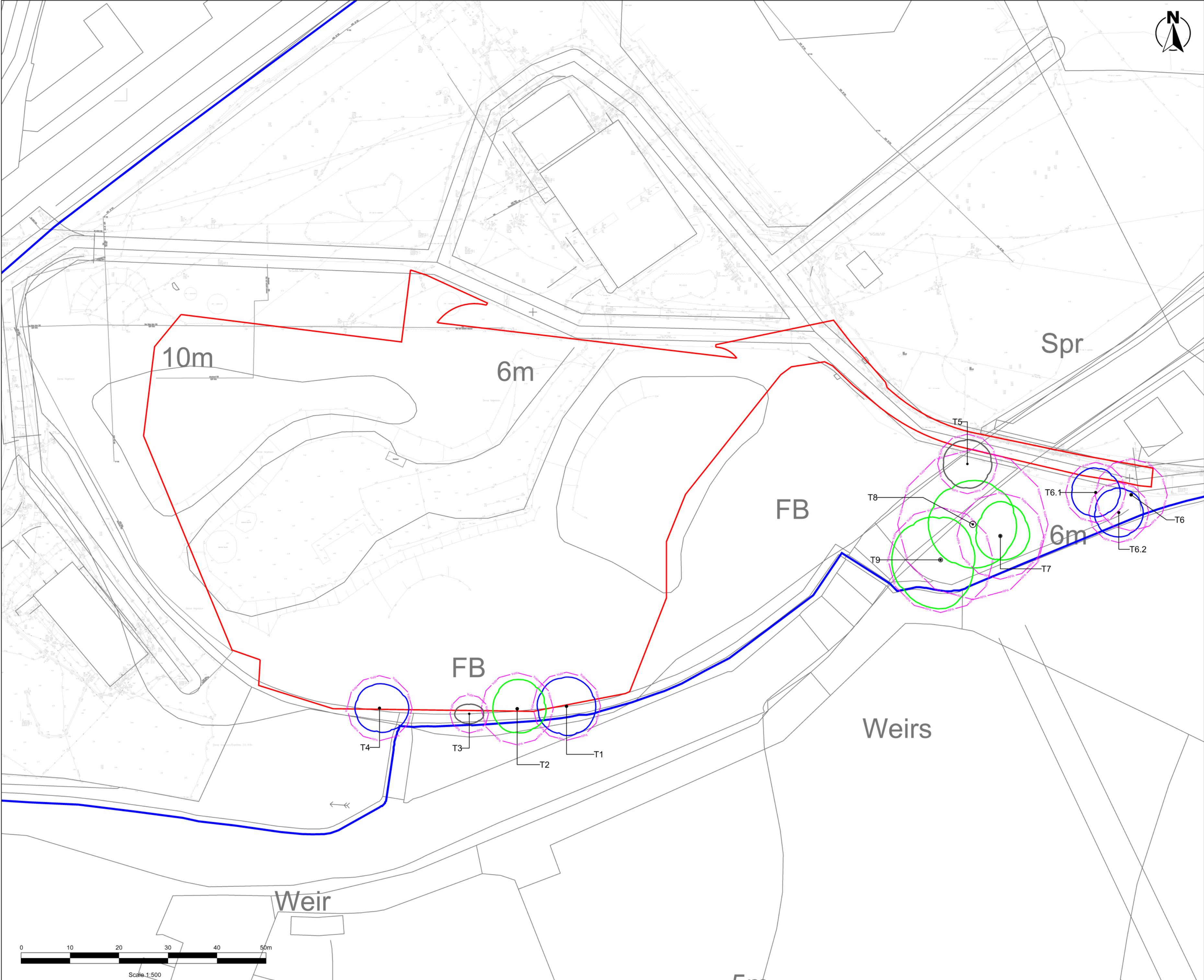
- 5.5.1 Whilst Norway maple T6 is 'unsuitable for retention', it should only be fully removed if a risk assessment finds that it is likely to cause harm to persons or properties. Reduction to a safe height is preferred to full tree removal, as standing deadwood has the potential of becoming a valuable habitat on site.

6.1 Information recorded

Ref	Sequential tree reference as per Tree Survey Plan
Species	Common name (<i>Scientific name</i>)
Ht (m)	Estimated tree height in metres
Stem dia (cm)	Stem diameter measured in accordance with BS5837:2012 Annex C
Canopy Spread	Estimated branch spread (in metres) at four cardinal points
Clear crown	Height of the lowest branch(es) including cardinal point(s) where applicable
Life stage	YNG -Young SM -Semi-mature EM - Early mature M - Mature OM - Over-mature (including veteran trees)
RULE	Remaining useful life expectancy estimated in years
Cond.	G - Good F - Fair P - Poor
Notes	Including observations and notes on: Defects and other structural and physiological abnormalities, nesting birds, bat roost potential (where possible), notes on surrounding land incl. soil compaction, Tree Preservation Orders and Conservation Area (where information is available), notes on limited access/inspection, off site location and preliminary management recommendations (in italics)
BS Cat.	Retention category and sub-category in accordance with BS5837:2012 A - High Quality 1 - Mainly arboricultural value B - Moderate Quality 2 - Mainly landscape value C - Low Quality 3 - Mainly cultural value U - Unsuitable for retention
RPA (m)	Radius of Root Protection Area calculated in metres (Radius of RPA= 12x stem diameter). This will usually be capped at 15m for trees with a stem diameter larger than 1.25m
RPA (m²)	Area of Root Protection Area (relevant if RPA is not circular due to pre-existing site conditions, incl. water courses, retaining structures and building foundations). Rounded up to nearest m². This will usually be capped at 707m² for trees with a stem diameter larger than 1.25m.

Ref	Species	Ht (m)	Stem dia (mm)	Canopy spread (m)				Clear crown	Life stage	RULE	Cond.	Notes (Including preliminary management recommendations)	BS Cat.	RPA (m)	RPA (m ²)
				N	E	S	W								
T1	Sycamore (<i>Acer pseudoplatanus</i>)	9	400, 400	6	6	6	6	2	M	20+	Good	Bifurcated ivy-covered, ground level raised 1-4metres.	B2	6.84	147
T2	Sycamore (<i>Acer pseudoplatanus</i>)	14	600	6	6	5	5	3	M	20+	Good		A2	7.20	163
T3	Common or black elder (<i>Sambucus nigra</i>)	4	250, 200	2	3	2	3	2	M	10+	Fair		C1	3.84	46.3
T4	Common ash (<i>Fraxinus excelsior</i>)	11	300, 450	5	6	5	5	2	YNG	10+	Good		B2	6.48	132
T5	Crack willow (<i>Salix fragilis</i>)	7	175	5	5	5	5	1	YNG	40+	Fair		C1	2.10	13.85
T6	Norway maple (<i>Acer platanoides</i>)	14	600	5	5	5	5	5	M	<10	Poor	Dead by gate 2 others good	U	7.20	163
T6.1	Norway maple (<i>Acer platanoides</i>)	14	600	5	5	5	5	5	M	10+	Good		B2	7.20	163
T6.2	Norway maple (<i>Acer platanoides</i>)	14	600	5	5	5	5	5	M	10+	Good		B2	7.20	163
T7	Monterey pine (<i>Pinus radiata</i>)	17	720	7	6	5	5	1.8	M	40+	Good		A2	8.64	234.5
T8	Monterey pine (<i>Pinus radiata</i>)	17	1320	9	9	9	9	2	M	40+	Good		A2	15.84	788.2
T9	Common beech (<i>Fagus sylvatica</i>)	17	875	9	7	10	10	2	M	40+	Good		A2	10.50	346.3

7.0 Appendix 2 – Tree Survey and Constraints Plan



- NOTES**
- Do not scale from this drawing for construction purposes
 - This drawing is to be read in conjunction with all relevant drawings and documents associated with this project.
 - All surveyed information including levels and layout is provided by others
 - All existing and proposed dimensions, levels and locations to be checked and verified by the main contractor on site prior to the commencement of the works and any anomalies reported to the engineer.

KEY - Tree Survey and Tree Constraints Plan

Tree Categories BS 5837 (2012)

- Tree Category A
- Tree Category B
- Tree Category C
- Tree Category U

Root Protection Area (RPA)

PL03	28/03/25	Applicant name updated	VM	GB	RG
PL02	24/04/24	Topo survey added	VM	GB	RG
PL01	30/01/24	For Planning	VM	GB	RG
Rev	Date	Description	DRA	CHK	APP

Project
Bedhampton Waterworks

Client
E101 Hub 4 Ltd.

Drawing Title
Tree Constraints Plan

Status	Date	Scale	
For Planning	30/01/2024	1:500 @ A2	
Drawn	Designed	Checked	Approved
BA/VM	--	GB	RG
DWG No.			Revision
3055.001.ENZ.XX.00.DR.AR.45.101			PL03

8.0 Appendix 3 – Methodology

8.1 Introduction

- 8.1.1 This report and the methodology adopted to carry out the Arboricultural Survey is based on recommendations outlined in *British Standard (BS) 5837:2012 Trees in relation to design, demolition and construction- Recommendations*. This was published by BSI Standards Limited and came into effect on 30th April 2012. It supersedes BS 5837:2005 which is withdrawn.

8.2 Arboricultural Survey

- 8.2.1 A tree survey or arboricultural survey is a ground-based visual assessment of existing trees and tree groups on a site. It records the location of trees, the species, the estimated height and canopy spread, the stem diameter, and the tree's life stage, remaining useful life expectancy (RULE) and overall condition. Any distinctive features and abnormalities such as structural defects and physiological condition which may or may not have an adverse effect on the health or stability of the tree are also recorded, together with any signs of nesting birds and bat roost potential. Where ground conditions may influence the tree's growth, health and stability, such as water logging, ground compaction and severe level changes, this would also be recorded.
- 8.2.2 The site walkover includes an assessment of the overall value and quality of the trees on site by assigning a retention category to each tree and tree group. This assists stakeholders in deciding which trees should be removed or retained in the event of development occurring. There are four categories: A (high quality), B (moderate quality), C (low quality) and U (unsuitable for retention). For trees in categories A to C, these should qualify under one or more subcategories: 1 (mainly arboricultural qualities), 2 (mainly landscape qualities) and 3 (mainly cultural values).
- 8.2.3 The findings of the tree survey are recorded in an Arboricultural Survey Schedule supported by a Tree Survey and Tree Constraints Plan, both appended to the report.
- 8.2.4 The survey includes all trees which have a stem diameter of at least 75mm at 1.5m height or measured in accordance with BS 5837:2012 Annex C.
- 8.2.5 The tree survey usually records individual trees (labelled "T" on the Tree Survey and Tree Constraints Plan and in the Tree Survey Schedule), but may also group trees of similar age, species and condition into Groups (labelled "G"). Trees may also be grouped where they form a homogeneous unit (e.g. tree belts and woodland groups) which is unlikely to be directly

affected by the development (labelled “G” for small groups or “W” for Woodland Groups, as appropriate). Hedgerows are also recorded where present (labelled “H”).

- 8.2.6 To determine the location of trees, groups and hedgerows on site, Enzygo Ltd. use a handheld GPS tracking device with an accuracy of up to 1-2m. It enables the surveyor to plot trees onto a base plan, usually a digital copy of a topographic survey or an OS map tile, and to simultaneously record all tree survey information required for a full tree survey schedule to BS 5837:2012.
- 8.2.7 Following the completion of the site survey this is then uploaded into a Computer Aided Design (CAD) programme in order to produce the Tree Survey and Tree Constraints Plan, with the tree survey information converted into a corresponding Tree Survey Schedule.
- 8.2.8 The survey includes any trees outside the site boundary which may be affected by any development proposals by overhanging canopies or by Root Protection Areas which are likely to extend into the site. These trees are normally found within 15m from the site boundary.
- 8.2.9 In addition to a site walk-over survey, a desk-study is carried out which includes the calculation of Root Protection Areas (RPA) in accordance with BS 5837:2012 clause 4.6 as the minimum area of land around the stem of a tree which should be protected during construction.
- 8.2.10 In line with standing advice by the Forestry Commission and Natural England for any veteran trees on site, the Root Protection Area will be a *“buffer zone around an ancient or veteran tree”* which *“should be at least 15 times larger than the diameter of the tree [and] 5m from the edge of the tree’s canopy if that area is larger than 15 times the tree’s diameter”*.
- 8.2.11 The desk study includes liaison with the relevant local authority to establish whether any of the trees on site are protected by Tree Preservation Order (TPO) or whether Conservation Areas affect the legal status of any trees. Some local authorities provide online mapping tools on their website which identify any legal tree protection.

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