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Material: Injection Moulded ABS pegs

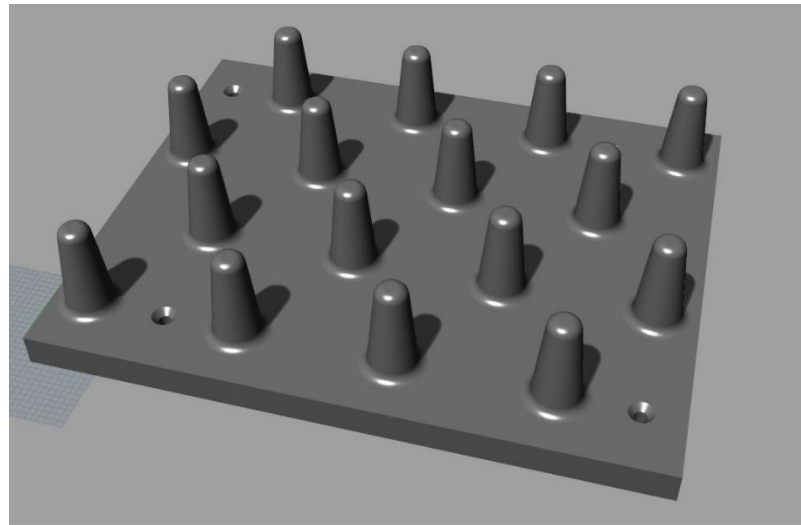
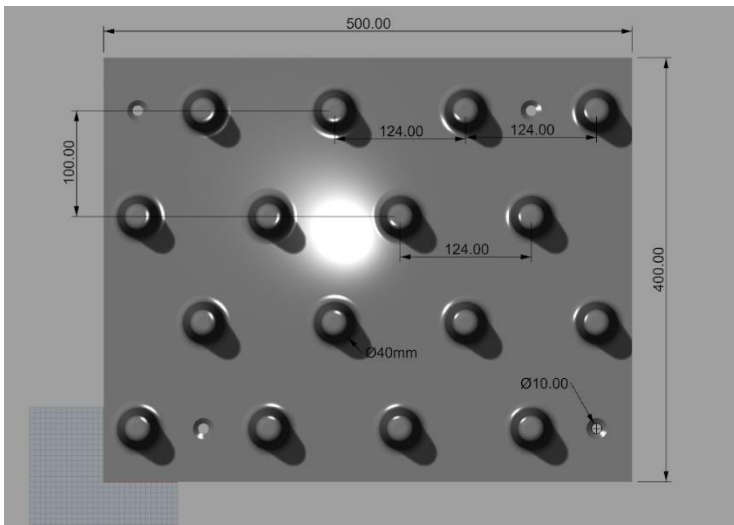
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BS5837:2012

**Trees in relation to design, demolition and construction –
Recommendations**

Tree Survey

Renewables First Ltd

**Naburn Weir,
3 The Walles Garden,
Naburn Hall,
Naburn,
YORK,
YO19 4RU.**

14 August 2018

Author: Christopher Schroeter ND Arb BSc (Hons) TechArborA

Matt Lomax
Renewables First Ltd
The Mill
Brimscombe Hill
Stroud
GL5 2QG

14/08/18

Tree Survey Report

Naburn Weir, 3 The Walles Garden, Naburn Hall, Naburn, YORK, YO19 4RU

Arbtech Consulting Limited (Arbtech) received written instruction on 12th July 2018 from Matt Lomax to attend Naburn Weir (3 The Walles Garden, Naburn Hall, Naburn, YORK YO19 4RU) (Site) to undertake an arboricultural survey to BS5837:2012 guidance to assess trees, hedges and major shrub groups growing on and within influencing distance of the site and to produce a schedule of trees, tree constraints plan, arboricultural impact assessment, arboricultural method statement and tree protection plan.

I am Christopher Schroeter, an arboricultural surveyor at Arbtech Consulting Ltd. I undertook the tree survey on 20th July 2018 and subsequently have produced this summary of my findings.

I passed the Extended Diploma in Arboriculture and Forestry in 2012 and hold a BSc (Hons) in Environmental Science. I also hold technician membership of the Arboricultural Association.

Tree Survey Executive Summary

A total of 19 individual trees and six groups of trees were surveyed.

The site is located on an island in the River Ouse south of York, 0.85ha in size. The north side of the island is navigable with locks, the south side has a weir to retain the upstream water levels. The island is open to the public and is comprised of managed grass land.

During the survey I categorised the group of trees using "Table 1 – Cascade chart for tree quality assessment" of the BS5837:2012.

Figure 1: Site Location (Bing Maps)

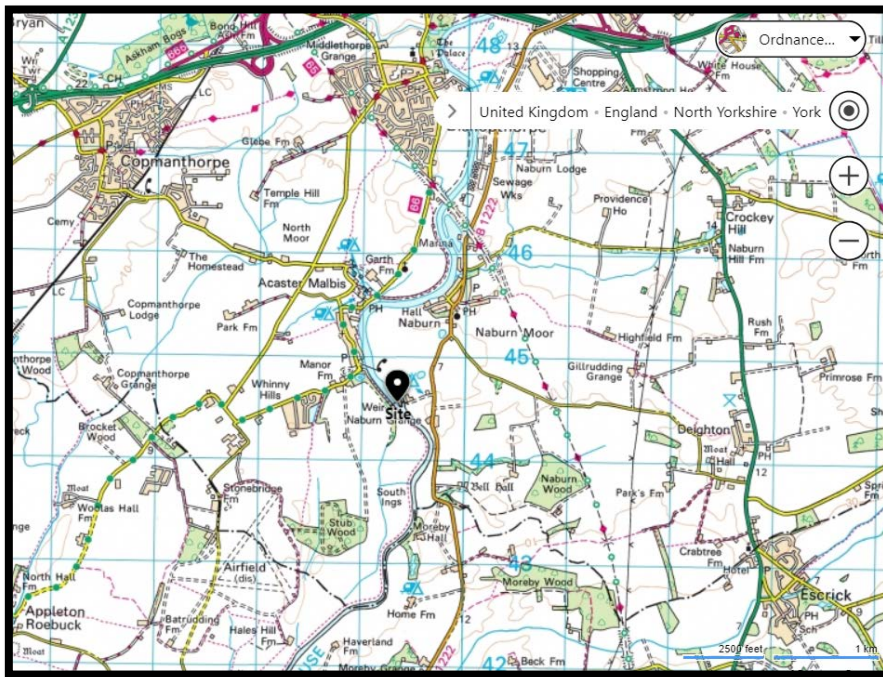


Figure 2: Aerial Image (Google Earth)



It is likely that arboricultural impacts can be addressed with arboricultural methodology or minor amendments to the proposal.

Individual notes on each tree's structural and physiological condition are found in the Notes section of the survey schedule.

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BS5837:2012 Scope

This standard recognises that there can be problems for development close to existing trees which are to be retained, and of planting trees close to existing structures. This standard sets out to assist those concerned with trees in relation to construction to form balanced judgements. It does not set out to put arguments for or against development, or for the removal or retention of trees. Where development, including demolition, is to occur, the standard provides guidance on how to decide which trees are appropriate for retention, on the means of protecting these trees during development, including demolition and construction work, and on the means of incorporating trees into the developed landscape.

Definitions

Arboriculturalist

An arboriculturalist (or arboricultural consultant) is a person who has, through relevant education, training and experience, gained recognized qualifications and expertise in the field of trees in relation to construction.

Tree Survey

A tree survey should be undertaken by an arboriculturalist and should record information about the trees on a site independently of and prior to any specific design for development. As a subsequent task, and with reference to a design or potential design, the results of the survey should be included in the preparation of a tree constraints plan, which should be used to assist with site layout design.

Tree Constraints Plan

A TCP is plan, typically delivered as an AutoCAD drawing (.dxf file format), prepared by an arboriculturalist for the purposes of layout design showing the root protection area and representing the effect that the mature height and spread of retained trees will have on layouts through shade, dominance, etc.

Root Protection Area

An RPA is a layout design tool indicating the area surrounding a tree that contains sufficient rooting volume to ensure the survival of the tree, shown in plan form in m².

Construction Exclusion Zone (also termed Tree Protection Zone)

A construction exclusion or tree protection zone is an area based on the RPA (in m²), identified by an arboriculturalist, to be protected during development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

Arboricultural Impact Assessment

This is a study, undertaken by an arboriculturalist, to identify, evaluate and possibly mitigate the extent of direct and indirect impacts on existing trees that may arise as a result of the implementation of any site layout proposal.

Tree Protection Plan

A TPP is plan, typically delivered as an AutoCAD drawing (.dwg file format), prepared by an arboriculturalist showing the finalized layout proposals, tree retention and tree and landscape protection measures detailed within the arboricultural method statement, which can be shown graphically.

Arboricultural Method Statement

This is a methodology for the implementation of any aspect of development that has the potential to result in loss of or damage to a tree. The AMS is likely to include details of an on-site tree protection monitoring regime.

Methodology

The methodology used to assess the trees was the British Standard 5837:2012 'Trees in Relation to Design, Demolition and Construction - Recommendations' tree survey method. The aim of the survey is to establish which trees are moderate and good quality; suitable for retention and justifying protection. And, which trees are low or poor quality; either undesirable or unsuitable to retain and protect.

The tree survey includes all trees included in the land survey red line boundary plan, as well as any that may have been missed, and it should categorize trees or groups of trees, including woodlands for their quality and value within the existing context, in a transparent, understandable and systematic way. Where the arboriculturalist has deemed it appropriate, the trees have been tagged with small metal or plastic tags, placed as high as is convenient on the stem of each tree.

Whilst master plan proposals for the development of the site might be available, the trees have been surveyed without taking these into consideration. All detailed design work on site layout should take into consideration the results of the tree survey (and the TCP).

Trees forming groups and areas of woodland (including orchards, wood pasture and historic parkland) are identified and considered as groups where the arboriculturalist has determined that this is appropriate, particularly where they contain a variety of species and age classes that could aid long-term management. It is often expedient to assess the quality and value of such groups of trees as a whole, rather than as individuals. However, an assessment of individuals within any group has been undertaken if they are open-grown or if there is a need to differentiate between them.

The quality and value of each tree or group of trees has been recorded by allocating it to one of the four categories; **A**, **B**, **C**, or **U** (highest to lowest quality respectively). The categories are differentiated on the tree survey plan by colour, or by suffixing the category adjacent to the tree identification number on the TCP.

The survey schedule lists all the trees or groups of trees. The following information is also provided:

- I. reference number (to be recorded on the tree survey plan);
- II. species (common or scientific names);
- III. height in metres (m);
- IV. stem diameter in millimetres (mm) at 1.5 m above adjacent ground level or immediately above the root flare for multi-stemmed trees;
- V. branch spread in metres taken at the four cardinal compass points;
- VI. height of crown clearance above adjacent ground level in metres (m);
- VII. age class (Newly planted, Young, Semi-mature, Early mature, Mature, Over mature);
- VIII. physiological condition (e.g. good, fair, poor, decline and dead);
- IX. structural condition (e.g. good, fair, poor and ivy);
- X. preliminary management recommendations, including further investigation of suspected defects that require more detailed assessment and potential for wildlife habitat; and
- XI. The retention category referring to the quality and useful contribution in years; **U** = <10yrs; **A** = >40yrs; **B** = >20yrs; **C** = >10yrs. The retention sub category referring to the type of amenity; 1 = Arboricultural; 2 = Landscape; 3 = Cultural including conservation (see Table 1 Cascade chart for tree quality assessment).

Recommendations

We make the following recommendation to ensure that no conditions relating to arboriculture are attached to any planning consent secured; obtain an arboricultural report to include:

- a) An arboricultural impact assessment (AIA);
- b) An arboricultural method statement (AMS); and
- c) A tree protection plan drawing (TPP).

Limitations

Trees were inspected from using visual observation from ground level only. Trees were not climbed or inspected below ground level. Inaccessible trees will have best estimates made about the location, physical dimensions and characteristics. Trees have been grouped where BS5837 guides us that it is expedient to do so. Trees have been excluded from the survey if they are found by us to be sufficiently far away from the proposed developable area or if they are outside of the red line boundary plan showing the expectations of our Client for the extent of the survey. BS5837 does not draw any distinction between trees subject to statutory protection, such as a Tree Preservation Order ("TPO"), and those trees without. This is principally because a detailed planning consent overrides any TPO protection. Consequently, we do not seek to offer any comparison between or infer any difference in the quality or importance of TPO trees and other trees.

Appendices

The following documents were released to the Client as appendices to this report:

- Survey Schedule (PDF)
- Tree Constraints Plan drawing (DXF & PDF)

If you require clarification of information contained herein, please do not hesitate to contact us via 01244 661170.

Yours Sincerely,



Christopher Schroeter

Arboricultural Consultant

cs@arbtech.co.uk

07519109350

Appendix 1: Schedule of Trees

BS5837:2012 Tree Survey

Arbtech Consulting Ltd.

Client: Matt Lomax
 Project: Naburn weir
 Survey Date: 20/07/2018
 Surveyor: Christopher Schroeter



Unit 3
 Well House Barns
 Chester
 CD4 0DH
 Phone: 01244 661 170

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
Estimated Measurements													
G1 A Group <i>See comments</i>	5	1	75	N	1	0	Y	A: 2.5 R: 0.89	Good	C: Good S: Good B: Good	Group of approximately 20 crack willow at the bottom of 3m incline.	C.1.2 10 to 20 yrs	
Estimated Measurements													
G2 A Group <i>See comments</i>	6	1	150	N	2	0	SM	A: 10.2 R: 1.8	Good	C: Good S: Good B: Good	Group of approximately 20 crack willow in the middle of a 3m incline.	C.1.2 10 to 20 yrs	
Estimated Measurements													
G3 A Group <i>See comments</i>	6	1	120	N	2	3	SM	A: 6.5 R: 1.43	Fair	C: Fair S: Fair B: Good	Group of five hawthorn; apical dieback in crown to the north; basal area mulched with woodchip.	C.1.2 20 to 40 yrs	
Estimated Measurements													
G4 A Group <i>See comments</i>	6	1	100	N	1	3	SM	A: 4.5 R: 1.19	Good	C: Good S: Fair B: Good	Group of two hawthorn; basal area mulched with woodchip.	C.1.2 20 to 40 yrs	
Estimated Measurements													
Age Classifications:	N	Newly planted	EM	Early Mature				Condition:	C	Crown	Stems:	Ø	Diameter
	Y	Young	M	Mature					S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature					B	Basal area	ERC:	Estimated Remaining Contributio	

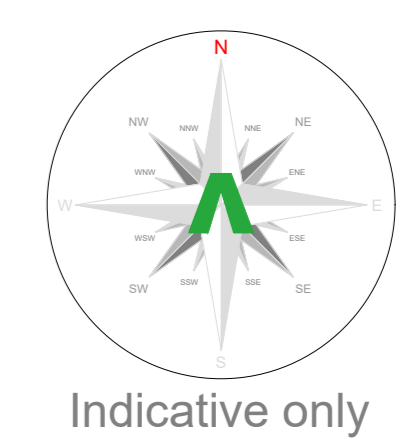
Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)						
G5											
A Group <i>See comments</i>	4	1	75	N	2	0	SM	A: 2.5 R: 0.89	Fair	C: Fair S: Fair B: Fair	C.1.2 10 to 20 yrs
				E	1	0					
				S	2	0					
				W	2	0					
G6											Estimated Measurements
A Group <i>See comments</i>	12	1	170	N	6	3	M	A: 13.1 R: 2.04	Fair	C: Fair S: Fair B: Fair	C.1.2 10 to 20 yrs
				E	6	2					
				S	6	3					
				W	6	0					
1											
Common Ash <i>Fraxinus excelsior</i>	9	1	210	N	4	0	SM	A: 20 R: 2.52	Good	C: Good S: Good B: Fair	B.1 20 to 40 yrs
				E	3	0					
				S	2	0					
				W	4	0					
2											
Sycamore <i>Acer pseudoplatanus</i>	13	1	490	N	5	2	M	A: 108.6 R: 5.87	Good	C: Good S: Fair B: Good	B.1 20 to 40 yrs
				E	4	2					
				S	4	1					
				W	5	2					
3											Estimated Measurements
Crack Willow <i>Salix fragilis</i>	15	2	335 (Eq)	N	2	10	M	A: 50.9 R: 4.02	Fair	C: Fair S: Fair B: Fair	B.1 20 to 40 yrs
				E	2	10					
				S	10	0					
				W	6	4					
4											Estimated Measurements
Crack Willow <i>Salix fragilis</i>	15	1	450	N	6	1	M	A: 91.6 R: 5.39	Fair	C: Fair S: Good B: Fair	B.1 20 to 40 yrs
				E	7	0					
				S	4	5					
				W	6	3					
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:	C	Crown	Stems:	Ø	Diameter	
	Y	Young	M	Mature		S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition	
	SM	Semi-mature	OM	Over Mature		B	Basal area	ERC:		Estimated Remaining Contributio	

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
5										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	12	3	206 (Eq)	N	5	0	SM	A: 19.2 R: 2.47	Fair	C: Fair S: Fair B: Fair	C.1 10 to 20 yrs Located on river bank; evidence of <i>Cameraria ohridella</i> infection; estimated due to health and safety		
				E	3	0							
				S	4	0							
				W	4	0							
6										Estimated Measurements			
Crack Willow <i>Salix fragilis</i>	10	1	100	N	1	8	SM	A: 4.5 R: 1.19	Fair	C: Poor S: Fair B: Fair	C.1 10 to 20 yrs Located on river bank; suppressed by neighbouring trees; estimated due to health and safety.		
				E	1	8							
				S	1	8							
				W	1	8							
7										Estimated Measurements			
Common Ash <i>Fraxinus excelsior</i>	14	5	297 (Eq)	N	3	0	SM	A: 39.9 R: 3.56	Fair	C: Fair S: Fair B: Fair	C.1 10 to 20 yrs Growing on river bank at waters edge; deadwood in lower crown; estimated due to health and safety.		
				E	5	2							
				S	4	2							
				W	5	2							
8										Estimated Measurements			
Sycamore <i>Acer pseudoplatanus</i>	14	1	580	N	6	2	M	A: 152.2 R: 6.96	Good	C: Good S: Fair B: Good	B.1.2 20 to 40 yrs Multi stemmed from 2; located at the edge of a 3m bank to river.		
				E	6	2							
				S	6	2							
				W	6	2							
9										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	15	2	674 (Eq)	N	7	0	M	A: 205.6 R: 8.08	Good	C: Good S: Fair B: Fair	B.1.2 20 to 40 yrs Located at edge of 3m bank to river; 2nd stem leans north 50°; occluded pruning wound to west at 2m; cavity to south from base to 1m.		
				E	8	0							
				S	6	0							
				W	6	1							
10										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	10	1	800	N	5	2	M	A: 289.6 R: 9.6	Decline	C: Fair S: Poor B: Good	C.1.2 10 to 20 yrs Major deadwood in crown; major cankers throughout stem and crown.		
				E	5	2							
				S	5	2							
				W	4	2							
Age Classifications:	N	Newly planted	EM	Early Mature				Condition:	C	Crown	Stems:	Ø	Diameter
	Y	Young	M	Mature					S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature					B	Basal area	ERC:		Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
11 Common Horse Chestnut <i>Aesculus hippocastanum</i>	19	1	1480	N	6	2	M	A: 707 R: 15	Fair	C: Good S: Fair B: Good	Multi stemmed from 2m; two major limb snapped out at 4m to the north.	B.1.2 20 to 40 yrs	
12 Common Horse Chestnut <i>Aesculus hippocastanum</i>	18	1	910	N	6	2	M	A: 374.7 R: 10.92	Good	C: Good S: Fair B: Good	Located at edge of river bank; pruning stubs to the west at 4m.	B.1.2 20 to 40 yrs	
13 Common Horse Chestnut <i>Aesculus hippocastanum</i>	18	1	1170	N	6	2	M	A: 619.4 R: 14.04	Decline	C: Fair S: Poor B: Good	Major limb snapped out to the south; evidence of <i>Pseudomonas syringae</i> pv. <i>aesculi</i>	U <10 yrs	
14 Common Horse Chestnut <i>Aesculus hippocastanum</i>	8	1	1250	N	1	1	M	A: 706.9 R: 15	Fair	C: Poor S: Poor B: Good	Veteran tree; major limbs removed in a reduction for veteranisation.	B.1.2.3 20 to 40 yrs	
15 Common or Black Elder <i>Sambucas nigra</i>	8	6	343 (Eq)	N	1	1	SM	A: 53.2 R: 4.11	Poor	C: Poor S: Poor B: Good	Multi stemmed from base; stems removed to south at 1m; crown dieback; <i>Auricularia auricula-judae</i> fruiting bodies throughout.	C.1 10 to 20 yrs	
16 Sycamore <i>Acer pseudoplatanus</i>	12	4	619 (Eq)	N	7	1	M	A: 173.3 R: 7.42	Good	C: Good S: Fair B: Good	Tight union with included bark at 1m; rope inclusion at 1m to north.	B.1 20 to 40 yrs	
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:			C	Crown	Stems:		Ø	Diameter
	Y	Young	M	Mature				S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:			Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC	
		No	Ø (mm)	Spread (m)	Clear (m)							
17 Common Ash <i>Fraxinus excelsior</i>	12	1	350	N	5	1	SM	A: 55.4 R: 4.19	Good	C: Fair S: Good B: Good	Located at edge of river bank.	B.1 20 to 40 yrs
18 Common Ash <i>Fraxinus excelsior</i>	12	1	420	N	2	2	SM	A: 79.8 R: 5.03	Good	C: Fair S: Good B: Good	Located at edge of river bank.	B.1 20 to 40 yrs
19 Common or Black Elder <i>Sambucas nigra</i>	4	10	316 (Eq)	N	2	0	SM	A: 45.2 R: 3.79	Good	C: Good S: Good B: Good	Multi stemmed from base; growing in old wall base.	C.1 10 to 20 yrs
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:	C	Crown	Stems:	Ø	Diameter		
	Y	Young	M	Mature		S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition		
	SM	Semi-mature	OM	Over Mature		B	Basal area	ERC:		Estimated Remaining Contributio		

Appendix 2: Tree Constraints Plan



Tree Categories

Trees are categorised in accordance with the cascade chart in Table 1 of the British Standard BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'

Category 'U' - Trees in such condition that they cannot realistically be retained as living trees in context of the current land use for longer than 10 years.

Category 'X' - Trees of high quality with an estimated remaining life expectancy of at least 40 years.

Category 'B' - Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.

Category 'C' - Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 100mm.

Root Protection Area

In order to avoid damage to the roots or rooting environment of retained trees, the Root Protection Areas (RPAs) should be plotted around each of the category 'U', 'B' and 'C' trees. This is a minimum area in which should be left undisturbed around each retained tree.

The RPA is calculated using the British Standard BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'.

The calculated RPA is capped to 707m², which is the equivalent to a circle with a radius of 15m. Where there appears to be restrictions to root growth the root protection area is reshaped to more accurately reflect the likely distribution of the roots.

Tree Survey Report

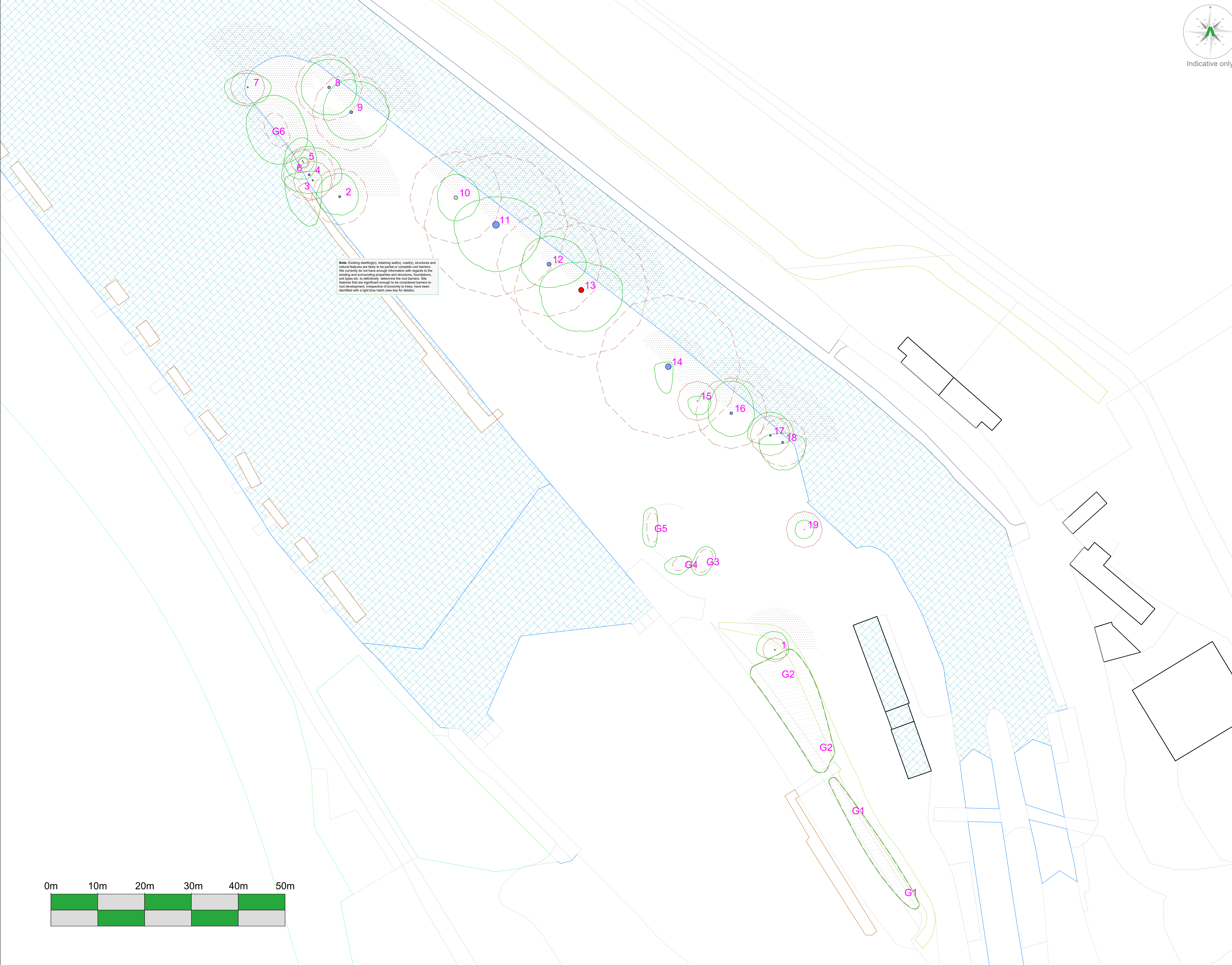
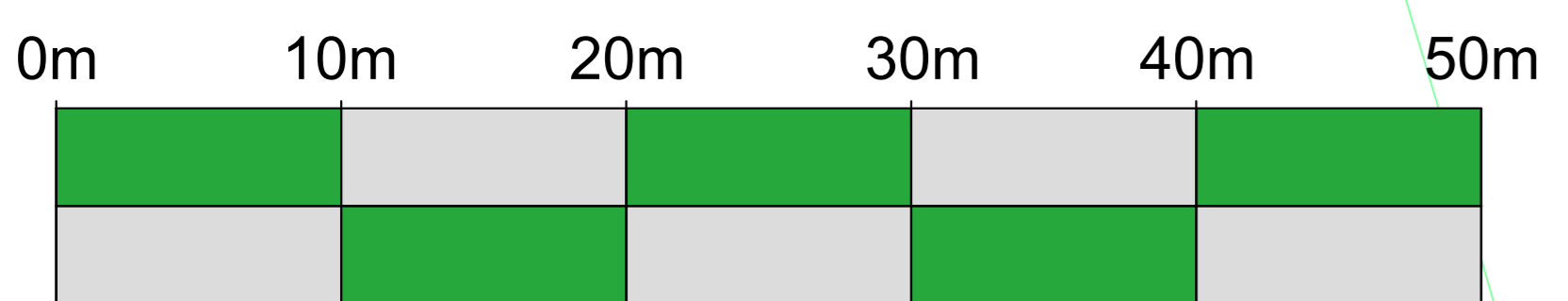
Please refer to Arbtch Consulting Ltd. Tree Survey Report and Tree Schedule for full details on all surveyed trees, hedgerows and major shrub groups.

All trees were surveyed and categorised in accordance with the guidance as set out in the British Standard BS5837:2012 'Trees in relation to design, demolition and construction - Recommendations'.

We make the following recommendation to ensure that no conditions relating to arboriculture are attached to any planning consent sought:

- a) An arboricultural impact assessment (AIA);
- b) An arboricultural method statement (AMS); and
- c) A tree protection plan (TPP).

Note: Existing dwelling(s), retaining wall(s), road(s), structures and natural barriers are likely to be partial or complete root barriers. We currently do not have enough information with regards to the existing and surrounding properties and structures, foundations, soil types etc, to definitively determine the root barriers. Site features that are significant enough to be considered barriers to root development, irrespective of proximity to trees, have been identified with a light blue hatch (see key for details).



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Project:
 3 The Weir,
 Naburn Hall,
 Naburn,
 YORK,
 YO19 4RU.

Client:
 Renewables First Ltd

Drawing:
 Tree Constraints Plan

Based on:
 OS Tile

Drawing No:
 Arbtch TCP 01

Date:
 July 2018

Scale:
 1:250 @ A0

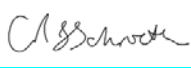
Drawn:
 CS

Key:

Tree No.:	1	Tree Canopies:		Trunks:	
RPAs:		Category 'U' trees:		Category 'B' trees:	
Category 'C' trees:		Category 'C' groups:		Generic retention planting area:	
Potential root barriers:					

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Document Production Record

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fauna forest ecology ltd

Preliminary Ecological Appraisal

Naburn Lock

September 2018



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1 INTRODUCTION

- 1.1 This report provides the results of a Preliminary Ecological Appraisal (PEA) for land at Naburn Lock in North Yorkshire. Development proposals are to install a hydroelectric turbine and associated infrastructure at the weir located on the River Ouse.

Survey Site

- 1.2 Located at a Central Ordnance Survey Grid Reference: SE 59357 44549, the site is situated in a rural setting around 7km south of central York (See Figure 1 for the site location). Either side of the lock, the silty river banks are immediately bounded by broad-leaved woodland coupled with a dense understory of vegetation and grass. The wider landscape comprises arable fields with associated hedgerows, ditches and mature trees. The village of Bishopthorpe lies approximately 2km north of the Site.

2 METHODOLOGY

Desk Study

- 2.1 Using freely-available resources, a desktop study was undertaken to acquire data in relation to local habitats (including designated statutory and non-statutory sites). Other habitats of ecological value were noted including Priority Habitat Inventory. A search was undertaken for the presence of protected species records in the area using the Multi-Agency Geographic Information for the Countryside¹ (MAGIC) resource. Biological records for a 2km buffer of the site were obtained from North and East Yorkshire Ecological Data Centre (NEYEDC).

Field Assessment

- 2.2 The PEA was carried out on by ecological consultant Andrew Chick ACIEEM on 11th July 2018 (Natural England bat licence no. 2015-15162-CLS-CLS, Natural England great crested newt licence no. 2015-8470-CLS-CLS).
- 2.3 On 12th August 2018 an additional assessment was carried out to inspect all trees within the impact zone for their potential to support roosting bats. Trees were assessed at ground-level by ecological consultant David Nixon (Natural England bat licence no. 2015-18322-CLS-CLS).
- 2.4 Weather conditions during both daytime field surveys are presented below in Table 1.

Table 1: Weather conditions during field assessments

Date	Start	Finish	Temp °C	Wind	Cloud	Rain	Notes
11/07/2018	08:00	13:30	19	Calm	50%	Dry	N/A
12/08/2018	12:00	17:00	14	Calm	40%	Dry	N/A

¹ Multi-Agency Geographical Information for the Countryside (MAGIC). Crown Copyright and database rights [2015]. Ordnance Survey 100022861. Available at: <http://www.magic.gov.uk/>

- 2.5 On site, the dominant vegetation structure was identified, allowing habitats to be broadly categorised according to standard Phase One methodology² and valued for their ecological importance. The survey also involved a walkover of the site in order to:
- Produce a list of flora species present on Site, including protected plant species³;
 - Identify the presence of invasive/non-native plant species⁴
 - Assess the suitability of habitats on site to support protected species;
 - Search for the presence or evidence of protected species; and
 - Note any other wildlife present within the site boundary.
- 2.6 Information gathered during the site walkover is for the purpose of identifying potential ecological constraints to the proposed development, the requirement for further Phase-2 survey effort, the requirement for any relevant protected species licensing, and an appropriate level of mitigation and compensation measures, should they be required, in order for development to lawfully proceed. To that end, the following assessments were made:
- Assessment of the potential of terrestrial and aquatic habitat to support amphibians⁵ including great crested newts (GCN) *Triturus cristatus*;
 - Evidence of the tansy beetle *Chrysolina graminis*
 - Assessment of the potential of bat roosting features in trees and structures, if present;
 - Identification of linear features and/or corridors which may support commuting bats;
 - Search for badger setts or evidence of badger *Meles meles* activity (e.g. foraging evidence, scratching posts, latrines, tracks, trails and fur);
 - Assessment of the suitability of the site to support common reptiles (e.g. presence of refugia, dense vegetation, basking spots and likely hibernacula);
 - Evidence of common nesting birds;
 - Potential for habitats to support otter and water vole
 - Potential of any waterbodies to support white-clawed crayfish *Austropotamobius pallipes*.
- 2.7 All wildlife species were recorded, including a detailed examination to ascertain if the site was suitable for ground-nesting birds.
- 2.8 All survey and assessment work was completed in line with official assessment guidelines⁶ and largely followed that recommended by the Chartered Institute for Ecology and

² JNCC 2010 Handbook for Phase 1 Habitat Survey: a technique for environmental audit. JNCC, Peterborough.

³ Those listed on Schedule 8 of the Wildlife and Countryside Act (1981) as amended

⁴ Those listed on Schedule 9 of the Wildlife and Countryside Act (1981) as amended

⁵ Oldham RS, Keeble J, Swan MJS, Jeffcote M (2000) Evaluating the suitability of habitat for the Great Crested Newts (*Triturus cristatus*). Herpetological Journal 10: 143-155.

⁶ Collins J (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edn. Bat Conservation Trust, London.

Environmental Management (CIEEM) ⁷ and British Standard Code of Practice⁸. The assessment followed the standard methodology

Bats – Ground Assessment of Trees

2.9 Trees within the impact zone and driveway leading to the site were assessed on 12th August 2018 for their value to support roosting bats. The surveyor used close-focusing binoculars and a powerful torch to inspect for Potential Roosting Features (PRFs), such as:

- Rot holes
- Woodpecker holes
- Horizontal and/or vertical cankers in the stems of branches
- Knot holes
- Scar crevices
- Loose/flaking bark
- Covering of dense ivy
- Bat or bird boxes
- Any other features deemed suitable for roosting bats

2.10 Trees were classified by their PRFs in order to establish their likelihood of supporting roosting bats. A scoring system was applied to the tree using the following criteria:

Low probability of bat interest

- Trees with low bat interest are usually trees without any deadwood or holes and are not covered by ivy and other vegetation.

Medium probability of bat interest

- Trees in this category will have holes, cracks and crevices and loose bark suitable for roosting bats but no obvious roost signs such as staining and droppings at entrances.

High probability of bat interest

- Trees within this category will contain all the obvious roost features such as holes, cracks and crevices and loose bark and will also contain staining and droppings at the roost entrance or have been identified as a roost via a visual sighting of an existing bat. (A licence may be required for removal/development).

⁷ CIEEM (2015) Guidelines for Ecological Report Writing. CIEEM, Winchester.

⁸ British Standards Institution (2013) BS 42020:2013. Biodiversity – Code of practice for planning and development. British Standards Institution, London.

Limitations

2.11 Limitations to survey effort are:

- Dense vegetation surrounding the driveway leading to the site restricted access to some areas considered potentially suitable for badgers and their setts.

3 RESULTS

Desk Study

- 3.1 Within a 2km radius of the survey area, there are no internationally designated statutory sites, no Local Nature Reserves (LNRs), two nationally-designated statutory sites and six non-statutory sites (Sites of Importance for Nature Conservation SINC). Designated sites are presented below in Table 2 and non-statutory sites are listed in Table 3.

Table 2: Designated sites within 2km radius

Designation	Name or Location of site	Grid Reference
Sites of Special Scientific Interest (SSSI)	Church lngs	SE594456
	Acaster South lngs	SE593437

Table 3: Non-statutory sites within 2km radius

Site Code	Site Name	Grid Reference	SINC Status
SE5425YK	Stub Wood	Acaster Malbis	SE588433
SE64-18YK	York-Selby Cycle Track	Deighton/Naburn	SE602459-SE616424
SE64-23YK	R. Ouse	N/A	SE589425-SE541565
SE54-24YK	Naburn Hall Meadow	Naburn	SE592453
SE64-17YK	Rush Wood	Naburn	SE602443
SE54-23YK	Church lngs	Acaster Malbis	SE597457

Habitats – Ancient Woodland Inventory

- 3.2 Within a 2km radius of the site there is a patch of Ancient and Semi-Natural Woodland known as Stub Wood. In addition, there are two blocks of Ancient Replanted Woodland within a 2km radius, known as Naburn Wood and Moreby Wood.

Biological Records

- 3.3 The following biological records (from within a 2km radius of the site, within the last 10 years) were returned from Local Records Centre (Tables 4).
- 3.4 Of particular note is the presence of tansy beetle *Chrysolina graminis*, for which there were 335 records returned, the most recent in 2012 and the closest is within the site boundaries.

- 3.5 A total of three bat records were returned comprising common pipistrelle *Pipistrellus pipistrellus* and Daubenton's *Myotis daubentonii*. The most recent of these was in 2016.
- 3.6 One invasive/non-native (Schedule 9) plant species was recorded: Himalayan balsam *Impatiens glandulifera*. This species is present within the survey area.
- 3.7 Other plant species returned within a 2km radius of the site include crosswort *Cruciata vesca*, wild strawberry *Fragaria vesca*, wood-sorrel, *Oxalis acetosella* and bluebell *Hyacinthoides non-scripta*, none of which are found within the survey area.

Table 4: Notable species records within 2km radius

Mammals	No. Records	Most Recent Record	Grid Ref./Location
Bats (All Species)	3	2016	SE6049043102
Invertebrates	No. Records	Most Recent Record	Grid Ref./Location
Tansy Beetle	1	2017	SE597457
Flora	No. Records	Most Recent Record	Grid Ref./Location
Himalayan Balsam	3	2018	On Site
Crosswort	1	2017	SE597457
Wild Strawberry	1	2009	SE586432
Bluebell	1	2009	SE586432
Wood-sorrel	1	2009	SE586432

Access Road

- 3.8 Access to site is via a private road leading off the B1222, initially passing through a caravan site before following a tarmac track for approximately 300 metres. At the end of the track there is an area of tarmac hardstanding used for vehicle parking. At the site entrance and around the caravan park there is ornamental planting including leylandii *Cupressus × leylandii* and laurel *Laurus spp.*. The remainder of the track is predominantly edged with hawthorn hedgerow *Crataegus monogyna* with occasional blackthorn *Prunus spinosa*, elder *Sambucus nigra*, bramble *Rubus fruticosus*, common oak *Quercus robur*, ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus*.



Photograph 1: Representative image of site entrance at NGR SE 59702 44622



Photograph 2: Representative image of caravan site at NGR SE 59653 44603



Photograph 3: Representative image of access track NGR SE 59549 44567



Photograph 4: Representative image of car park area at NGR SE 59459 44496

Survey Area

- 3.9 The survey site is located within an island dominated by amenity grassland. To enter the survey area there is a leading pathway across a lock allowing access to the island.



Photograph 5: Representative image of lock and buildings



Photograph 6: Representative image amenity grassland around impact site

- 3.10 The survey area is surrounded by amenity grassland which is short and regularly mown throughout the growing season and comprises grasses such as perennial rye-grass *Lolium perenne* and red fescue *Festuca rubra* with occasional broadleaved herbaceous species such as dandelion *Taraxacum officinale agg.*, ribwort plantain *Plantago lanceolata* and greater plantain *Plantago major*.

Impact Area [A]

- 3.11 The proposed impact area lies adjacent to the River Ouse and a large weir structure. The river bank at the point of impact is constructed of concrete hardstanding with pressed metal piles. The north and south regions of the impact area adjacent to the river are unmanaged and primarily consist of coarse grasses and rank perennial herbs that overhang the concrete edge.



Photograph 7: Representative image of lock and buildings [A]



Photograph 8: Representative image amenity grassland around impact site [A]

Impact Area [B]

- 3.12 This area comprises ornamental planting contained within a brick retaining wall. There are a small number of mature hawthorns surrounded by ornamental plantings with woodchipping around the base of the trees.



Photograph 9: Representative image of ornamental plantings [B]



Photograph 10: Representative image of ornamental plantings [B]

Impact Area [C]

- 3.13 Within this area of impact is a single semi-mature ash tree located on a top of a steep embankment. The area around the base of the tree is unmanaged, largely surrounded by coarse grasses and rank perennial herbs.



Photograph 11: Representative image of the ash tree at SE 59357 44549 [C]



Photograph 12: Representative image of the ash tree at SE 59357 44549 [C]

Impact Area [D]

- 3.14 Proposed works will impact on a row of c10 mature willow *Salix spp.* trees which have in the past been managed. The trees are approximately 5m tall and are located along an embankment. Habitats at the base of these trees are unmanaged, consisting mostly of coarse grasses and rank perennial herbs.



Photograph 13: Representative image of the willow trees [D]



Photograph 14: Representative image of the willow trees from the river [D]

Impact Area [F]

3.15 The location in which the turbine will be installed is dominated by amenity grassland with concrete hard standing. At the edge of the river there is occasional rough grassland with rank perennial herbs.



Photograph 15: Representative image of ornamental plantings [B]



Photograph 16: Representative image of ornamental plantings [B]

Willows and pontoon [G and H]

3.16 At the southern end of the impact area there are additional willows and a metal pontoon structure for pedestrian access to moorings.



Photograph 17: Representative image of ornamental plantings [B]



Photograph 18: Representative image of ornamental plantings [B]

Stone work [I], Weir [J], and concrete and metal pile bank [K]

3.17 The weir consists of stone boulder with the remain of stonework where it meets the riverbank.



Photograph 19: Representative image of the stone work [J]



Photograph 20: Representative image of stonework [I]



Photograph 21: Representative image of the bank impacted by the proposed works [K]

Flora

- 3.18 No notable Schedule 8 plants were recorded however Himalayan balsam was present within the survey area. A full list of plant species recorded is listed in Table 6, Appendix A.

Fauna

- 3.19 Animal species recorded on site are listed in Table 7, Appendix A. The following protected animal species have been considered regarding potential impacts of the proposed development:

Great Crested Newts

- 3.20 During both field visits no evidence of GCN was recorded and no suitable ponds exist within the site that are suitable for GCN. The access route into the site does contain terrestrial habitats which could support foraging, commuting and sheltering GCN.

Bats

- 3.21 On site, the waterways, mature trees and linear features provide excellent connectivity to the wider landscape and feeding opportunities for bats.

- 3.22 One mature oak tree was considered to hold low value to roosting bats. This tree is located outside of the site boundary along the driveway leading to the car park (see Table 5 for NGR). While it is thought that this tree will not need to be felled during construction, there are branches overhanging the access route which could be impacted.

Table 5: Notable trees with bat-roosting potential

Species	Location	Grid Reference	Bat Roosting Potential
Oak	Access Drive	NGR: SE 59573 44582	Low

White-clawed crayfish

- 3.23 No evidence of white-clawed crayfish was recorded during any of the filed assessments.

Otter

- 3.24 The site was inspected for typical field signs created by otter. The river itself offers excellent foraging and commuting opportunity for otter however the steep banks surrounding the lock and steel piling along the river's edge would restrict otter from accessing the impact zone. During both field assessments, no field signs of otter were discovered.

Water vole

- 3.25 The site was closely inspected for evidence typically associated with water vole presence, including burrows, lawns, nests, faeces, latrines, runways, feeding stations and footprints. Following both field visits, no evidence of water vole was discovered however the local waterways provide suitable foraging habitats for this species. The steep banks around the lock and steel piling along the riverside would restrict water vole access to the impact zone.

Badger

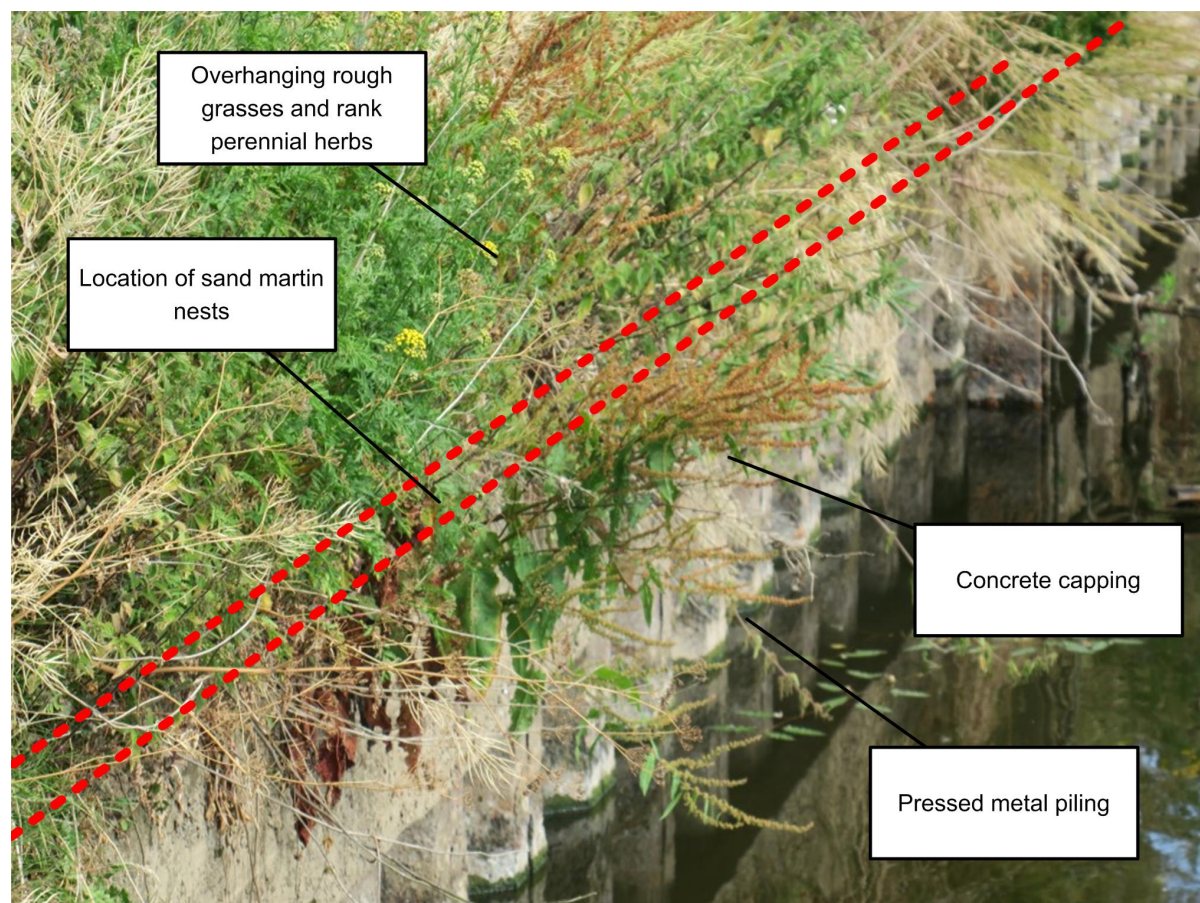
- 3.26 No badgers or signs of their activity such as fur, scratch posts, latrines/droppings, paw prints or setts were recorded during the site visit, and they are considered to not be present within the impact zone given its isolated location and lack of suitable habitat. Woodland adjacent to the access driveway has the potential to support foraging, commuting and sett-building badgers.

Reptiles

- 3.27 No evidence of reptiles was discovered during the survey. Along the access driveway, log piles and the dense understory of vegetation coupled with long grass, provide ideal refugia for common reptile species however the impact zone has little in the way of suitable habitat for reptiles and the steep banks and steel piling would restrict access.

Birds

- 3.28 Common waterfowl and an assemblage of common birds were identified during the site visit and furthermore, at the time of the survey, sand martins *Riparia riparia* were nesting in the bank that will be impacted by the development, with approximately 10-15 pairs present.



Photograph 22: Representative image of the bank impacted by the proposed works [K]

Tansy Beetle

- 3.29 During the appraisal tansy plants were noted. Also, there are records of the tansy beetle on site. The surveyor did not see any tansy beetles during the survey.

4 DISCUSSION AND RECOMMENDATIONS

- 4.1 The proposed scheme will involve the installation of a permanent hydroelectric turbine and associated infrastructure. As a consequence, a small section of habitat will be impacted during construction. The development is considered to be small-scale and provided that waste is appropriately disposed of, and antipollution management plans are designed and adhered to, there is no risk of any local designated sites, river systems or other habitats being impacted by the proposals.

- 4.2 With regards to mitigation hierarchy, the nature of the scheme (utilising the river system to generate electricity) restricts the development from being installed elsewhere.
- 4.3 Connectivity to the wider environment from the site is achievable via the very many woodland linear features, waterways, hedgerows and other associated habitats.
- 4.4 Negative impacts to habitats that hold ecological importance should be avoided. Measures of mitigation and compensation should be implemented if adverse effects are likely. The loss of habitat should be kept to a minimal, with tree losses and other native flora species being replaced.

Nationally Designated Sites

- 4.5 There are two nationally designated sites within 2km of the survey area.
- 4.6 While the site itself is not located within a designated site, Church Ings SSSI lies less than 970m over to the north. The site comprises two unimproved alluvial flood meadows, adjacent to the River Ouse at Acaster Malbis in the Vale of York. These meadows are of particular importance for their neutral grassland plant community which is an increasingly rare habitat type, threatened nationally as a result of drainage and agricultural improvement.
- 4.7 Closer to the survey site is Acaster South Ings SSSI, which is located less than 50m south. This site comprises two substantial alluvial flood meadows that lie adjacent to the River ouse, approximately 6km south of York. As with Church Ings, agricultural improvement is an increasing threat to these rare habitat types that include neutral grass and flora.
- 4.8 Tansy beetle and *Aphthona nigriceps*, another rare leaf-feeding beetle are both found at Acaster South Ings.
- 4.9 The presence of such unique local habitats highlights the importance of biodiversity offsetting. While the proposed scheme will not bare direct impact to designated sites it is likely that the environment within and outside the site boundaries is utilised by a rich diversity of wildlife and as such, it is good practice for developers to contribute to biodiversity enhancement, which may include the planting of wildflower meadows (in particular the replanting of tansy), native trees and the installation of bat and bird boxes.
- 4.10 Reasonable Avoidance Measures (RAMs) are listed in paragraph 4.25 of this report. To ensure the safeguard of wildlife during the construction phase, they should be strictly adhered to.
- 4.11 Although no records of GCN and reptile species exist within the last 10 years (within a 2km radius of the site), the presence of arable field drains in the wider landscape, coupled with ponds and excellent connectivity into the wider environment, represents prime GCN and reptile habitats. While the far north-eastern and south-western fields are suitable for both

reptiles and GCN species, the impact zone itself is an isolated island with no suitable access. Provided that all equipment associated with the scheme is transported using existing access routes, GCN and reptiles are not likely to be impacted by the works.

- 4.12 The rural setting of this site coupled with well-connected waterways, tree linear and hedgerows, provides connectivity into the wider landscape for bats. In addition, to this, bats are likely to utilise the adjacent river system for the purpose of foraging.
- 4.13 Trees within the impact zone are considered negligible for roosting bats, holding little ecological value to foraging bats given their small size. There are however trees adjacent to the area of impact within the island's confines (horse chestnuts) that are likely to offer ideal foraging opportunity to bats.
- 4.14 During the construction phase, all workers should be vigilant and mindful of bats and take extra care at all times. In the unlikely event that bats are discovered during any stage of the development, work should stop immediately and Fauna Forest Ecology Limited should be contacted on: 01782 326859 or 07917 765464. It should be noted that if bats are found during the development, further work cannot lawfully proceed without confirmation from Natural England. Do not handle bats for legal reasons. It should also be noted that if bats are discovered during works, Natural England will potentially restrict further development until further surveys have been completed and a full mitigation and compensation strategy has been designed. It is likely that if bats are discovered, a European protected Species Licence (EPSL) will be required from Natural England.
- 4.15 The oak tree located along the access route onto the site at approximate NGR: SE 59573 44582 is considered to hold low potential to support roosting bats. This tree belongs to the adjacent camping site. During the construction phase, it is considered unlikely that this tree will need to be removed or trimmed in order to transport equipment to site. However, should any branches require cutting, there is potential risk of impacting roosting bats and as such, a suitably qualified and licensed bat worker should be present to ensure no aspects of the tree that contain PRFs are disturbed or removed. If branches, limbs or other components are to be removed or trimmed, the tree should be climbed by a bat-licensed and qualified tree climber who must inspect such features for field signs or the presence of bats.
- 4.16 There are no records for white-clawed crayfish within the 2km search area and no signs of their presence were recorded on site. Provided that equipment associated with the construction phase or development scheme does not directly impact the river bed, the works are not likely to impact white-clawed crayfish.
- 4.17 The river banks each side of the lock/island represent prime habitat for otter and water vole, with suitable overhanging trees to support an otter couch orholt. There are also areas of grass that would make ideal burrow sites for water vole with plenty of opportunity for

foraging along the waterways for both species. However, the steep nature of the isolated impact zone would restrict access to all riparian mammals. Further to this, there is little in the way of suitable habitat in the area of impact to support either otter or water vole.

- 4.18 Badger may utilise the surrounding environment for the purpose of commuting, foraging and/or sett-building however the area of impact would not be accessible for this species.
- 4.19 During the bird-nesting season, waterfowl are likely to nest along the banks of the river and may utilise areas within the impact zone. Typical common nesting bird species are found within the site boundary and are likely to nest in the trees and vegetation. Without nesting bird inspections prior to habitat clearance, birds, their nests and/or eggs and young may be disturbed, injured or killed.
- 4.20 Careful consideration should be given to nesting sand martins that make use of the south-west facing banks above the concrete capping and pressed metal piling. This species of bird will return annually to reuse its nesting site. Ideally, works will avoid the bird nesting season which generally runs from late February to late August. If works are to be undertaken during the bird nesting season, existing nests within the area of impact would need to be mapped (via use of boat), inspected for the presence of birds, then subsequently covered with professional hedge and tree netting to prevent birds from re-entering these nests.
- 4.21 We recommend that any sand martin nest losses should be compensated for by means of artificial nest creation. The following recommendations are given with regards to compensation for lost sand martin nests:
- When creating a bank (if required) the face must be vertical and rise at least 1.5m above normal water level. It should be as long as possible, ideally over 5m. Wooden stakes, boulders or gabions may be used to protect the toe of the cliff but, if erosion is prevented, the bank may become unsuitable.
 - If banks are less than 1.5m above water, or the substrate is stony or liable to slumping, then stoneless spoil can be brought in and packed behind shuttering (available from builders' merchants), finished with turf or reseeded, trees or shrubs planted, and the area stock-fenced if necessary. It should be left at least one year to settle, and the shuttering removed in early May before the birds start prospecting for a nest site.
 - Banks have been made for sand martins using a weak or dry concrete mix around clay or polythene pipes. If this option is chosen, the bank must be vertical with water at its foot.
 - Pipes should be of at least 60mm internal diameter set in rows 300mm apart with the pipes at 200mm spacing, and the bottom row at least 1m above summer water level. The pipes should be no more than 1m long, sloping very slightly up into the bank (to prevent rainwater flooding the nest chamber) with the opening flush to the cliff face.

- It is best to fill the pipes with sand for the birds to excavate, with the entrance hole half blocked with cement. The birds should be able to tunnel farther into loose sandy material at the other end of the pipe. It is essential that the pipes are dry inside, not acting as drains. Ideally, pipes should be scraped out and refilled each winter.
- A high-pressure water jet can be inserted into each hole with the objective of creating a cavity at the end of each hole to achieve sufficient space for the birds to turn.

4.22 While no evidence of the tansy beetle was discovered during the appraisal, the presence of tansy plants near the water's edge increases the risk of the beetle utilising habitats directly within the impact zone. It is important that Reasonable Avoidance Measures (RAMs) are followed to reduce the risk of this rare invertebrate from being impacted by the scheme. It is recommended that the construction phase is avoided between April and September when the tansy beetle is most active and attracted to tansy plants. As the tansy beetle burrows from September until April, careful consideration should also be given to the level of underground disturbance. If works must be carried out during the summer months, a suitably qualified ecologist must be on site to carry out thorough inspections of all impacted habitats to ensure the safeguard of this species.

4.23 Himalayan balsam is listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and is extremely invasive with a high regeneration capacity. The legislation aims to prevent the planting of Schedule 9 listed plant material in the wild where it poses a threat to the native habitats and species. Prior to works commencing, it is recommended that Himalayan balsam is removed from the areas of impact.

4.24 A low-level lighting scheme should be implemented during and after construction to avoid indirect disturbance to bats, otter, water vole, badger and other mammal species that may utilise local habitats. We recommend that:

- During the construction phase, works are not carried out after dusk and do not commence until after dawn. It is strongly recommended that generators and machinery that emit significant noise levels are not left to run through the night.
- Light spill is controlled and if lighting is required at night, hooded shields are fitted to prevent spill onto nearby habitats that likely to support wildlife.

Reasonable Avoidance Measures

4.25 The following RAMs should be adhered to during the construction phase. We recommend that:

- Prior to construction starting on site, all personnel will receive a 'tool-box talk' from a licensed ecologist regarding protected and notable species (nesting birds, bats, otter, water vole, badger, GCN, reptiles and the tansy beetle) and their awarded level of protection.

- A suitably qualified and licensed ecologist is present during site scraping/excavation and throughout the construction period. The ecologist will carry out a morning/daily inspection to ensure no animals have entered the site during the night. Refugia will be thoroughly inspected for the presence of animals. Trees and other vegetation will be checked for nesting birds and the presence of tansy beetle.
- Vehicles will use existing tracks onto and within the construction zone.
- It is advisable that only building products to be used on the day are brought and stored on the site. If building products need to be stored onsite (e.g. overnight or for more than one day) these products will be stored on palettes or retained in bags on palettes to ensure that refuges are not created that will attract animals. Building products should be placed on existing hard standing if possible.
- All holes created during the construction period (e.g. to lay a concrete pad) will be filled in and finalised on the same day so as not to leave any pitfall traps. If this is unavoidable, they should be left with a sloping end or ramp to allow animals that may fall in to escape. Holes should be covered over at night. Also, any pipes over 200mm in diameter should be capped off at night to prevent animals entering.
- Any spoil resulting from excavations will either be spread and compacted within the area on the same day or be removed from the construction area on the same day. It will not be left in loose heaps overnight.
- A copy of this method statement will be available at all times onsite.
- The ecologist will supervise while habitat is cleared/scraped/removed.
- Following the completion of all 'tool-box talks' and site supervision, Fauna Forest Ecology Limited will prepare a letter to the planning department with a summary of the outcome.

Biohazard Security

4.26 We recommend the below biohazard precautionary measures are followed:

- Prior to works commencing, all site workers should receive a tool-box talk regarding the level of potential threat Schedule 9 plants pose to the environment
- All workers should be able to identify Himalayan balsam
- Ahead of works commencing, Himalayan balsam will be removed by personal whom have previously worked with this species of invasive plant
- Workers must avoid interaction with plants on site (namely tansy and Himalayan balsam)
- All workers wear wellington boots or tall protective boots that cover bare skin, socks and the lower regions of trousers and clothing
- All workers to wear overalls
- Workers disinfect boots and use hand sanitiser prior to entering the site and before leaving the site

Additional Notes

- 4.27 It should be noted that if any protected species are found to be present on site and they are susceptible to any form of disturbance as a consequence of the proposed development, specific licences (i.e. EPSLs) may be required from Natural England.

APPENDIX A: PLANT AND ANIMAL SPECIES RECORDED DURING THE FIELD SURVEY⁹

Table 6: Plants recorded within survey area

<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Rorippa sylvestris</i>	Creeping Yellow-cress
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rubus idaeus</i>	Raspberry
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Salix</i>	Willow
<i>Sambucus nigra</i>	Elder
<i>Scorzoneroideis autumnalis</i>	Autumn Hawkbit
<i>Senecio jacobaea</i>	Common Ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sonchus asper</i>	Prickly Sow-thistle
<i>Sorbus aucuparia</i>	Rowan
<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Symphoricarpos albus</i>	Snowberry
<i>Symphytum officinale</i> x <i>asperum</i> = <i>S. x uplandicum</i>	Russian Comfrey
<i>Tanacetum vulgare</i>	Tansy
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Torilis japonica</i>	Upright Hedge-parsley
<i>Trifolium repens</i>	White Clover
<i>Urtica dioica</i>	Common Nettle

Table 7: Birds species onsite: 07/05/2018

Scientific Name	Common Name
Mallard	<i>Anas platyrhynchos</i>
Sand Martin	<i>Riparia riparia</i>
Grey Heron	<i>Ardea cinerea</i>
Buzzard	<i>Buteo buteo</i>
Black-headed Gull	<i>Chroicocephalus ridibundus</i>
Common Gull	<i>Larus canus</i>
Woodpigeon	<i>Columba palumbus</i>

⁹ Plant names according to Rose F, O'Reilly C (2006) The Wild Flower Key, Revised Edition. Penguin Books, London.

Magpie	<i>Pica pica</i>
Jackdaw	<i>Corvus monedula</i>
Carrion Crow	<i>Corvus corone</i>
Great Tit	<i>Parus major</i>
Long-tailed Tit	<i>Aegithalos caudatus</i>
Blackbird	<i>Turdus merula</i>
Robin	<i>Erithacus rubecula</i>

APPENDIX B: LEGISLATION SUMMARY

Great Crested Newt

Great crested newts are a European Protected Species, listed on Annex II and IV of the EEC Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, receiving protection under The Conservation of Habitats and Species Regulations 2010. This species is also afforded full protection under the Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (WCA 1981) and Schedule 2 of the Conservation (Natural Habitats etc.) Regulations 1994 (Regulation 38). Under such legislation it is an offence to:

- Intentionally or recklessly kill, injure or capture a great crested newt;
- Possess or control any live or dead specimen or anything derived from a great crested newt;
- Intentionally or recklessly* damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt; and
- Intentionally or recklessly* disturb a great crested newt while it is occupying a structure or place which it uses for that purpose.
- Damage or destroy a breeding site or resting place.
- Sell, barter, exchange or transport or offer for sale great crested newts or parts of them.

*Reckless offences were added by the Countryside and Rights of Way Act 2000, which applies only to England and Wales.

Bats

In England and Wales, bats and their roosts are protected under the Conservation of Species and Habitats Regulations 2017 (as amended), and the Wildlife & Countryside Act 1981 (as amended). Taken together, this legislation makes it an offence to:

- Deliberately capture (or take), injure or kill a bat
- Intentionally or recklessly disturb a group of bats where the disturbance is likely to significantly affect the ability of the animals to survive, breed, or nurture their young or likely to significantly affect the local distribution or abundance of the species whether in a roost or not

- Damage or destroy the breeding or resting place of a bat
- Possess a bat (alive or dead) or any part of a bat
- Intentionally or recklessly obstruct access to a bat roost
- Sell (or offer for sale) or exchange bats (alive or dead) or parts of bats

A roost is defined as being 'any structure or place that is used for shelter or protection', and since bats regularly move roost site throughout the year, a roost retains such designation whether or not bats are present at the time.

Reptiles

All native British species of reptile (of which there are 6) are listed in Schedule Five of the Wildlife and Countryside Act (1981) and as such are protected from deliberate killing, injury or trade. Therefore, where development is permitted and there will be a significant change in land use, a reasonable effort must be undertaken to remove reptiles off site to avoid committing an offence. The same act makes the trading of native reptile species a criminal offence without an appropriate licence.

Otter

The European otter is the only native UK otter species. It's a European protected species (EPS) and is also fully protected under Schedule 5 of the Wildlife and Countryside Act 1981.

You're breaking the law if you:

- Capture, kill, disturb or injure otters (on purpose or by not taking enough care)
- Damage or destroy a breeding or resting place (deliberately or by not taking enough care)
- Obstruct access to their resting or sheltering places (deliberately or by not taking enough care)
- Possess, sell, control or transport live or dead otters, or parts of otters

Water Vole

The water vole is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 and is a priority conservation species. You're breaking the law if you:

- Intentionally capture, kill or injure water voles
- Damage, destroy or block access to their places of shelter or protection (on purpose or by not taking enough care)
- Disturb them in a place of shelter or protection (on purpose or by not taking enough care)
- Possess, sell, control or transport live or dead water voles or parts of them (not water voles bred in captivity)

Birds

All common wild birds are protected under The Wildlife and Countryside Act 1981 (and as amended). Under this legislation it is an offence to:

- Kill, injure or take any wild bird
- Take, damage or destroy the nest of any wild bird while it is in use or being built
- Take or destroy the egg of any wild bird

Certain rare breeding birds are listed on Schedule 1 of The Wildlife and Countryside Act 1981 (and as amended). Under this legislation they are afforded the same protection as common wild birds and are also protected against disturbance whilst building a nest or on or near a nest containing eggs/unfledged young.

APPENDIX C: SITE MAPS

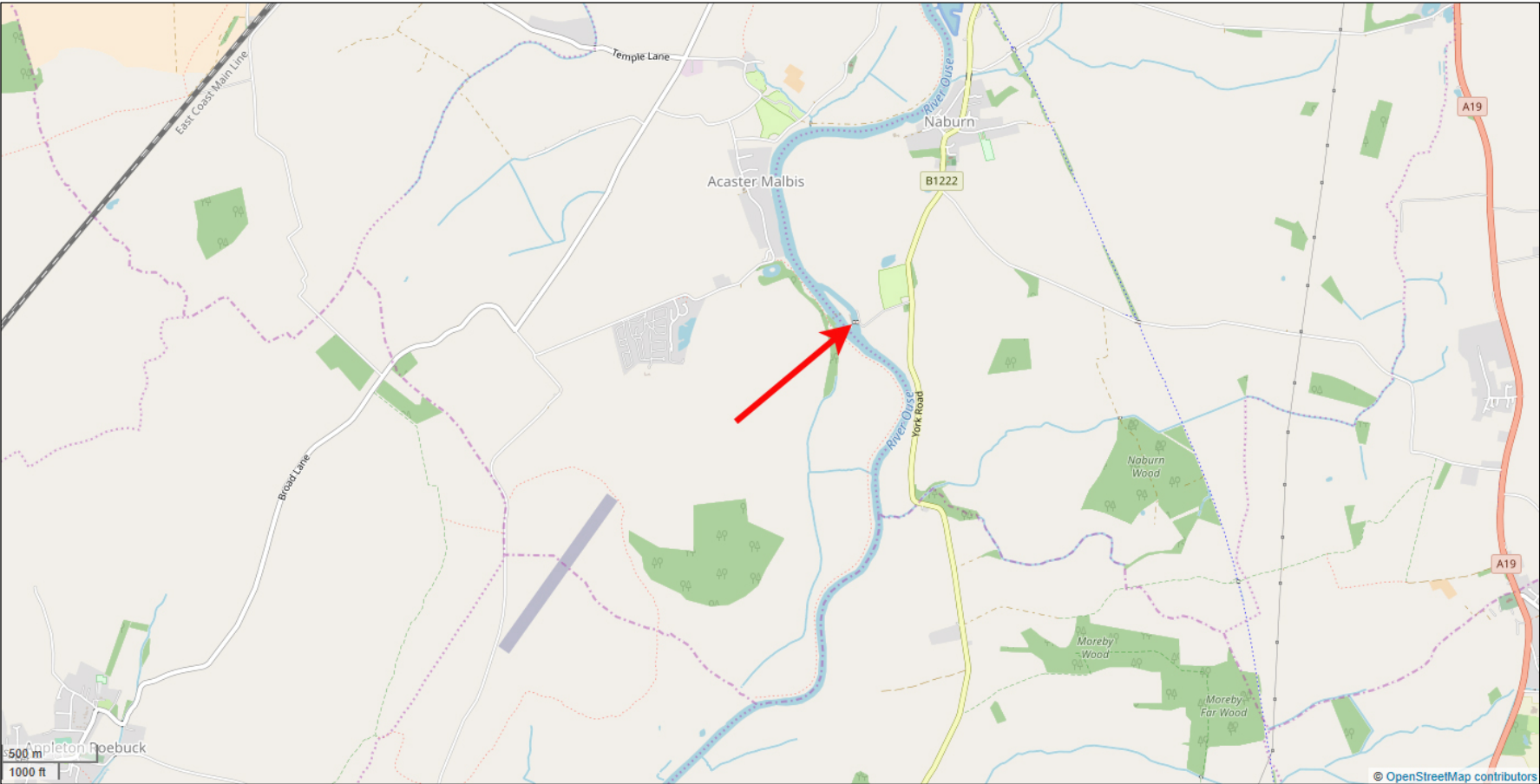


Figure 1: Site location map

© Openstreetmaps.org

Red arrow points to approximate site location



Figure 2: Images representative of habitats highlighted by black arrows

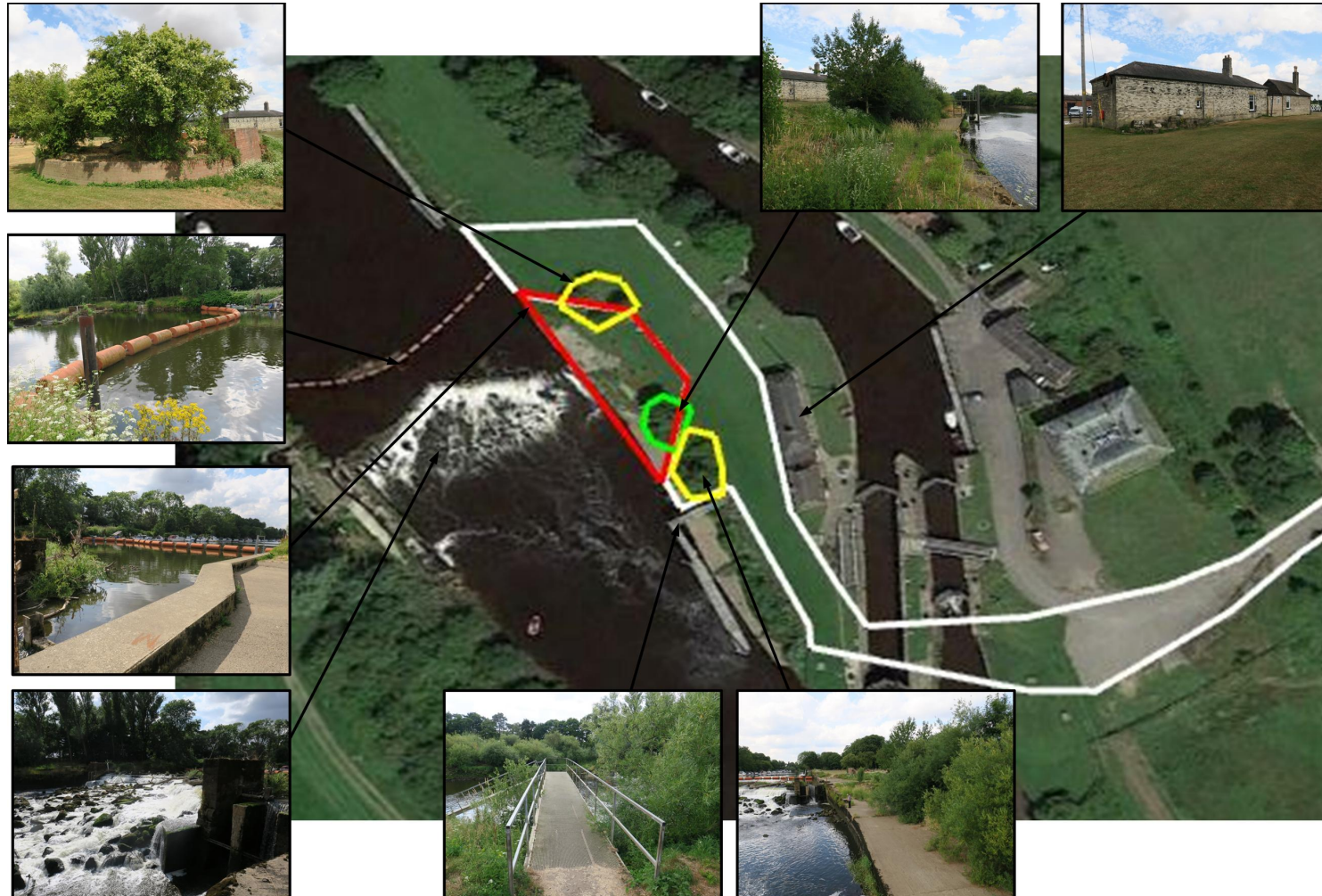


Figure 3: Images representative of habitats highlighted by black arrows

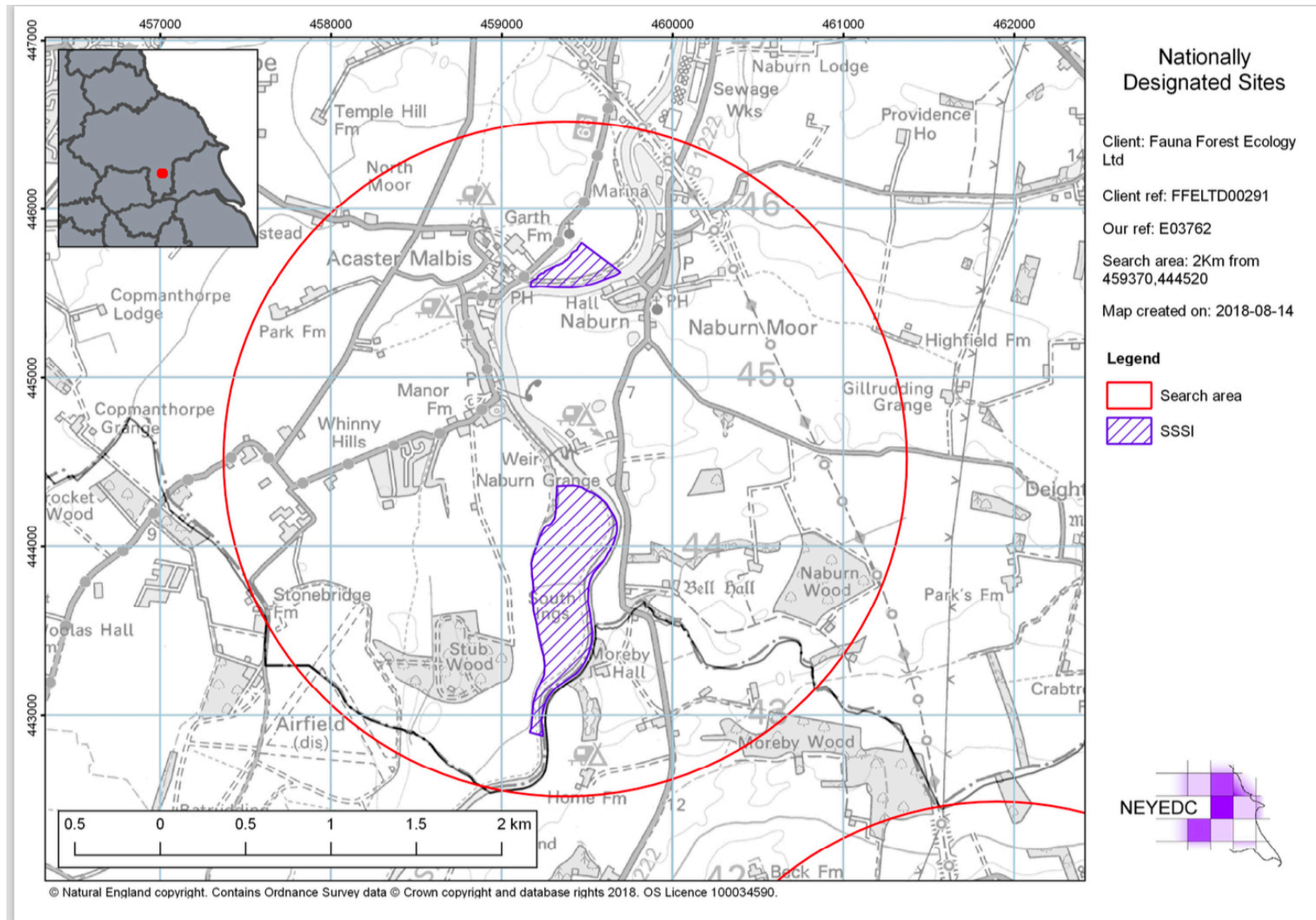


Figure 4: Nationally designated site map (2km radius from site)

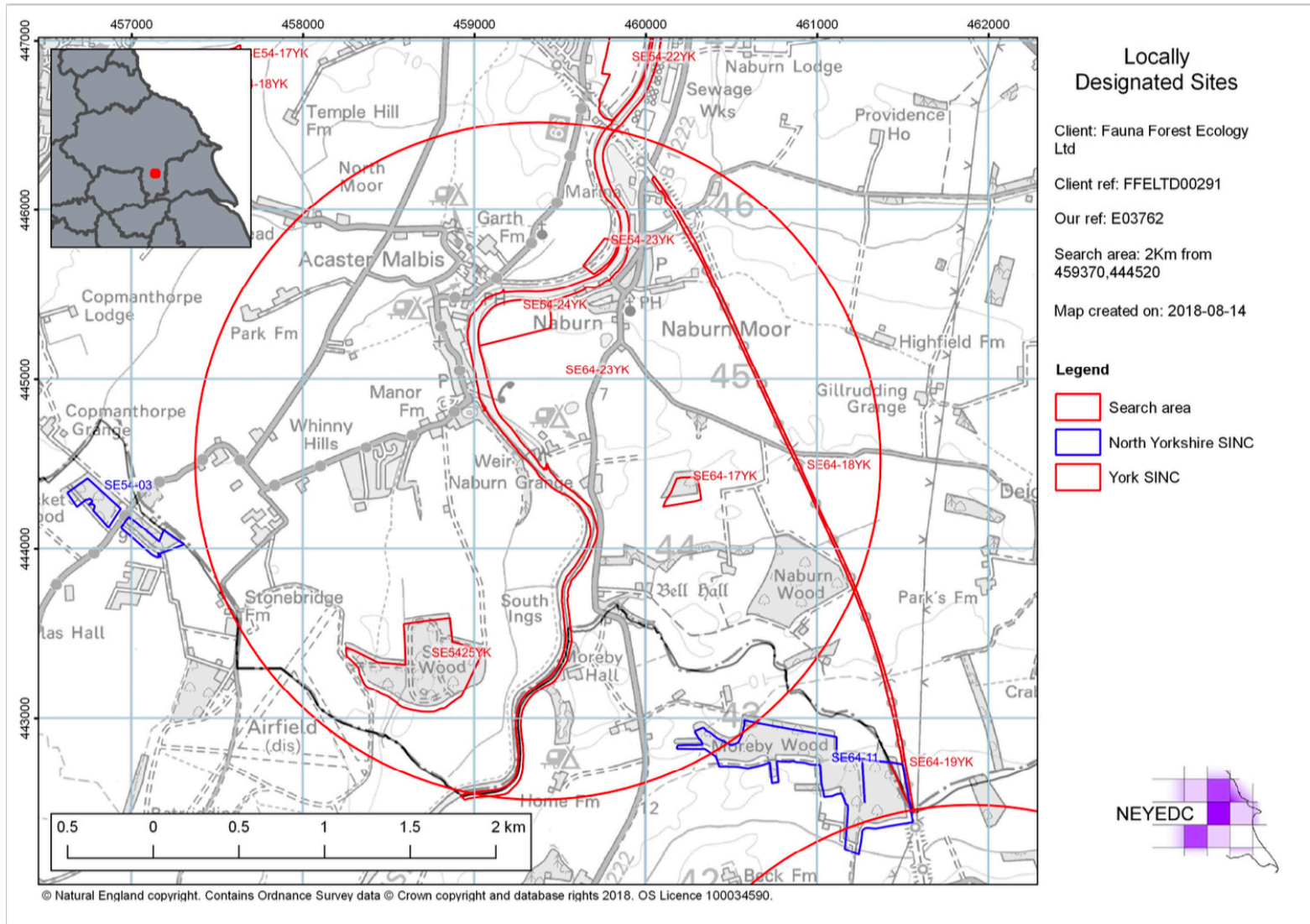


Figure 5: Locally designated site map (2km radius from site)

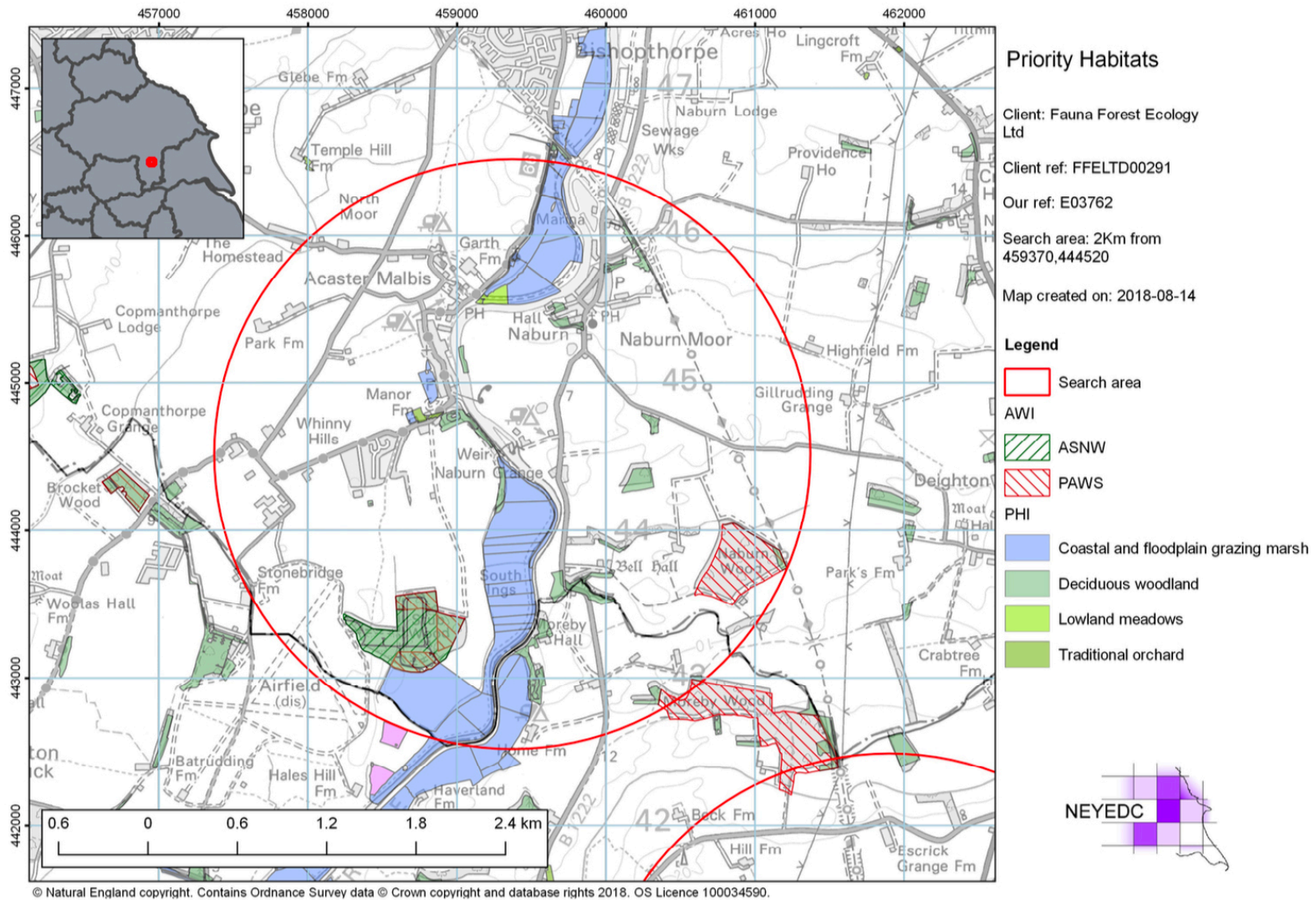


Figure 6: Priority habitat site map (2km radius from site)

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Naburn Weir Hydroelectric Project

Water Framework Directive Assessment

Renewables First – Company

Renewables First is one of the UK’s leading hydro and wind power specialists and has been delivering hydro and wind projects for over ten years. We provide all of the services from in-house resources to take a project from initial feasibility stage, through all of the consenting and engineering design stages and on to construction and commissioning. We use our experience of the installation and operational phases to provide feedback into the design stages of the next projects, ensuring that our customers benefit from our whole-project exposure.

We are independent of hardware suppliers, so we only recommend the most appropriate hardware to maximise energy production and return on investment, and to ensure a long and reliable operational life. We only recommend the best quality hardware from established manufacturers, and design good quality systems that will be reliable in the long-term. Our designs focus on maximising renewable energy production whilst applying best practice in regard to ecological protection or enhancement.

Document Control

Version	Date of Issue	Author(s)	Reviewed by
01	Sep 2018	Kelly Clutterbuck	Will Houghton

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1. Introduction

Introduction to assessment

- 1.1. This document has been produced in connection with an abstraction and impoundment licence applications for a hydropower scheme at Naburn Weir on the River Ouse.
- 1.2. The Environment Agency's 'Guidance for run-of-river hydropower: the Water Framework Directive, nature conservation and heritage' dated December 2013 has been followed as part of this assessment.
- 1.3. The assessment will review the potential effects arising from the proposed scheme in relation to:
 - flow patterns
 - sediment availability
- 1.4. The Water Framework Directive (2000/60/EC) (WFD) was passed by the European Union in 2000. It became part of UK law in 2003 with the issue of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.
- 1.5. The WFD is implemented regionally by river basins. Each river basin has a River Basin Management Plan (RBMP) which is updated every six years. The RBMP documents the current status of the water bodies and the pressures affecting them. It outlines the improvements that can be made within the current management period and the programme of investigations to be carried out.
- 1.6. The fundamental objectives of the WFD that apply to surface water bodies are:
 - Prevent deterioration of the status of water bodies
 - Achieve at least good ecological status and good surface water chemical status by a set date
 - Reduce pollution from priority substances and eliminate priority hazardous substances as defined by the European Commission
- 1.7. In addition to the objectives above there are further standards and measures to be met in areas defined as protected areas. These areas are listed in the RBMPs.
- 1.8. Artificial or Heavily Modified Water Bodies (AWB, HMWB) cannot achieve good ecological status as they are unable to get close enough to the required natural conditions. Instead the aim is to achieve good ecological *potential*.
- 1.9. The RBMPs detail the Environment Agency (EA) objectives specific to each water body that are designed to meet the WFD objectives. The proposed measures to meet the objectives are also given.

Purpose of assessment

- 1.10. This assessment has been undertaken to fulfil the requirements under the Water Framework Directive.
- 1.11. The EU Water Framework Directive requires environmental objectives be set for all surface and ground waters to enable them to achieve good status or potential for heavily modified water bodies by a defined date. One objective is to prevent further deterioration which can include changes to flow pattern, width and depth of channel, sediment availability/transport and ecology and biology.
- 1.12. This assessment looks at the current status of the water bodies that may be affected by the proposed hydropower system and discusses whether or not the proposal will deteriorate the ecological quality of the water bodies or prevent the water bodies from achieving good ecological status.
- 1.13. Any EA defined objectives and measures that are specific to the water body will be considered to determine if the proposed hydropower system will prevent these objectives and measures from being realised.
- 1.14. The assessment includes any cumulative or in-combination effects.

Scheme location & description

- 1.15. Naburn Weir is a notched, V-shaped weir that spans the main river channel and is the typical tidal limit on the Ouse. The weir was constructed in the 1770s to maintain water levels for navigation.
- 1.16. Approximately 135 m upstream of the weir, the channel splits to create a navigational channel along the left-hand side leading to two operational locks. The two channels are separated by small island, which extends approximately 105 m downstream of the weir.
- 1.17. A pool and weir fish pass is located on the right bank adjacent to the weir, alongside a newer eel and lamprey pass constructed in 2014.
- 1.18. The proposal comprises 3 no. Archimedes screw turbines and associated plant infrastructure located within the bank of the island, immediately adjacent to the weir as per the attached drawing 2350001 – Site Location Plan.

Other schemes

- 1.19. There are no known hydropower schemes within 5 km of the proposed development.

Current WFD status

Water body name	Ouse from River Nidd to Stillingfleet Beck
Water body ID	GB104027069593
Management Catchment	Swale Ure Nidd and Ouse upper
Operational Catchment	Ouse Upper Yorkshire
River Basin District	Humber
Hydromorphological Designation	Heavily Modified
Overall Classification for 2016	Moderate
2013 Ecological Quality	Moderate
2013 Chemical Quality	Fail
2016 Ecological Quality	Moderate
2016 Chemical Quality	Good

Classification Item	2013	2014	2015	2016
▼ Overall Water Body	Moderate	Moderate	Moderate	Moderate
▶ Ecological	Moderate	Moderate	Moderate	Moderate
▶ Chemical	Fail	Fail	Good	Good

Fig. 1: Cycle 2 Classification

- 1.20. The upstream waterbodies are: Ouse from River Ure to River Nidd, Nidd from Crimple Beck to River Ouse, Holgate Beck to Ouse, Hurns Gutter from Source to River Ouse, Foss from the Syke to the River Ouse, The Foss.
- 1.21. The downstream waterbody is Ouse Still/fleet bk - Kelfield and Wharfe d/s Ryther.

2. Impact on WFD objectives

2.1. The following table reviews the RBMP plan for the 'Ouse from River Nidd to Stillingfleet Beck' water body.

Receptor	Current status (2016 C2)	Objective	Potential impact	Assessment	WFD compliance	Further assessment
Element – Biological Quality						
Overall	Good	Good 2015	No impact	The scheme will provide significant fish passage improvements, with no adverse impact on macrophytes, phytobenthos or invertebrates.	Yes	No
Element – Hydromorphological Supporting Elements						
Hydrological Regime	Supports Good	Supports good 2015	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD.	Yes	No
Element – Physico-chemical quality elements						
Overall	Moderate	Moderate 2015	No impact	The scheme will not change any of these parameters significantly. No change – neutral impact on delivery of WFD.	Yes	No
Dissolved Oxygen	High	Good 2015	No impact	DO at the site is consistently high. Any minor reduction in average DO due to the screw turbines is outweighed by oxygenation within the new baffle fish pass plus the benefit of new high-DO refugia created by	Yes	No

Receptor	Current status (2016 C2)	Objective	Potential impact	Assessment	WFD compliance	Further assessment
				focused HEP and fish pass discharges. No change – neutral impact on delivery of WFD.		
Element – Specific pollutants						
Overall	High	High 2015	No impact	No change – neutral impact on delivery of WFD.	Yes	No
Element – Supporting elements						
Overall	Moderate	Good 2027	No impact	No change – neutral impact on delivery of WFD.	Yes	No
Element – Chemical – Overall						
Overall	Fail		No impact	No change – neutral impact on delivery of WFD.	Yes	No
Element – Chemical – Other Pollutants – Does not require assessment						
Element – Chemical – Priority hazardous substances						
Overall	Good		No impact	No change – neutral impact on delivery of WFD.	Yes	No
Element – Chemical – Priority substances						
Priority substances	Good		No impact	No change – neutral impact on delivery of WFD.	Yes	No

2.2. All conditions assessed above are shown to have either no impact or a positive impact on each individual WFD element.

3. Detailed review

Catchment status

- 3.1. Naburn Weir is located within the ‘Ouse from River Nidd to Stillingfleet Beck section of the Ouse Upper Yorkshire Operational Catchment Area. The Management catchment area is Swale Ure Nidd and Upper Ouse (SUNO) within the Humber River Basin District.
- 3.2. Swale Ure Nidd and Upper Ouse catchment covers an area of approximately 83 km² extending from the heights of the North Pennine Moors and the Yorkshire Dales extending down to the low-lying Vale of York in the south. There are 114 rivers, 14 lakes and 4 groundwater bodies in the catchment. Of these, 41 are artificial or heavily modified.
- 3.3. The Swale Ure Nidd and Ouse upper Management Catchment Plan shows that the main reason for not achieving ‘good’ status is due to the catchment are due to physical modification, pollution from waste water, pollution from rural areas. The water industry, land drainage practices and pollution from towns, cities & transport are responsible for most of the changes in the physical modification.

Ecological and chemical classification for surface waters | 2016 Cycle 2

2016 Cycle 2 ▼

Number of water bodies	Ecological status or potential					Chemical status	
	Bad	Poor	Moderate	Good	High	Fail	Good
16	1	5	10	0	0	0	16

Summary of ecological status or potential and chemical status and objectives for surface water bodies (number of water bodies) including those with less stringent objectives and extended deadlines (blue shaded cells)

	Ecological status or potential						Chemical status		
	Bad	Poor	Moderate	Good	High	Total	Fail	Good	Total
By 2016	0	0	3	1	0	4	0	16	16
By 2021	0	0	0	0	0	0	0	0	0
By 2027	0	0	4	8	0	12	0	0	0
Beyond 2027	0	0	0	0	0	0	0	0	0
Total	0	0	7	9	0	16	0	16	16
	Less Stringent						Less Stringent		

Fig 2: The Ouse Upper Yorkshire catchment summary

- 3.4. The Environment Agency catchment planning website states that the reasons the waterbody has not achieved a good status RNAG) is due to ‘Sewage discharge (continuous)’ under the classification phosphate.
- 3.5. There are areas in the catchment where the water environment is recognised as being of particular importance because of the benefits they provide to society. These benefits include rare wildlife habitats, bathing waters or areas around drinking water sources. The proposed development does not fall within a ‘Protected Area’.
- 3.6. The Yorkshire Dales Rivers Trust is developing a plan to enhance the catchment. Their visions are:

Improved water quality and biodiversity, a healthy functioning ecosystem and reduced flood risk through realistic and more integrated objectives, sustainable agricultural businesses, better coordination and effective partnerships between the public, private sector and civil society and a wider knowledge and appreciation of our watercourses and catchments.

- 3.7. The Ouse Upper Yorkshire Operational Catchment contains 16 water bodies, all with good chemical status. Out of the 16, 10 waterbodies have moderate ecological status, 5 poor and 1 bad (2016 cycle 2). The long terms objectives for 2027 are to work towards all 16 waterbodies achieving moderate to good objectives.
- 3.8. There is a need for the Environment Agency to tackle point source pollution from non-mains drainage in this catchment. Protected area measures are proposed to protect drinking water from Metaldehyde. Fish passage through sluices and flap valves will also benefit the catchment.¹
- 3.9. The Groundwater Operational catchment at Naburn Weir is Wharfe and Ouse Lower Sherwood Sandstone which is part of the Humber Groundwater Management Catchment. It comprises a single failing waterbody and has a quantitative and chemical status objective as good by 2021. The Reason for Not Achieving Good Status (RNAGS) is Industry. The measure the future objective is based upon is 'Embargo on future abstraction in this aquifer to prevent further saline intrusion'.
- 3.10. Immediately upstream of Naburn Weir is the SUNO Sherwood Sandstone Ground Water Operational Catchment which is part of the Humber Groundwater Management Catchment. The overall classification for 2016 is Poor. The RNAGs primarily fall under agriculture and rural land management, domestic general public and natural conditions.
- 3.11. The proposed development at Naburn Weir is not expected to have an adverse impact on the Ground Water waterbodies as the project will not introduce any chemicals or pollutants into the waterbody and will abstract from surface water only, so will not contribute towards further saline intrusion.

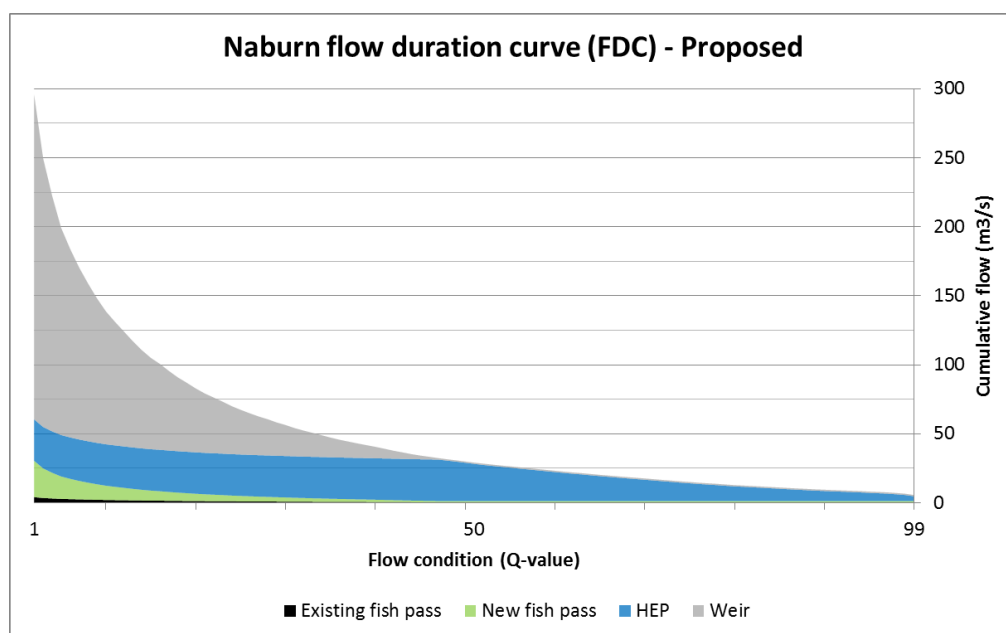
Mitigation measures

- 3.12. When a failure is identified, a range of measures are assessed that would be needed to improve the status of water bodies. Mitigation measures proposed for the Swale Ure Nidd and Upper Ouse (SUNO) management catchment are shown below:

Improve modified physical habitats
<ul style="list-style-type: none"> • Removal or easement of barriers to fish migration • Removal or modification of engineering structure • Improvement to condition of channel/bed and/or banks/shoreline • Improvement to condition of riparian zone and /or wetland habitats • Changes to operation and maintenance • Vegetation management
Managing pollution from waste water
<ul style="list-style-type: none"> • Reduce point source pollution pathways (i.e. control entry to the water environment) • Mitigate/remediate point source impacts on receptor
Manage pollution from towns, cities and transport
<ul style="list-style-type: none"> • Reduce diffuse pollution pathways (i.e. control entry to the water environment) • Mitigate/remediate diffuse pollution impacts on the receptor
Improve the natural flow and level of water
<ul style="list-style-type: none"> • Control pattern/timing of abstraction
Manage pollution from rural areas
<ul style="list-style-type: none"> • Reduce diffuse pollution at source • Mitigate/remediate diffuse pollution impacts on the receptor
Manage pollution from mines
<ul style="list-style-type: none"> • Mitigate/Remediate point source impacts on receptor

Geomorphology assessment

- 3.13. The flow duration curve for the site and hydropower scheme is shown below. During low flow conditions, the majority of flow currently passing over the weir will be diverted through the hydropower scheme. Once the hydropower scheme satiates at Q46, the weir flow quickly returns to being the dominant flow at the site.
- 3.14. Short sections of bank will be removed to create the new hydraulic channels, which will have an invert that is slightly raised above the bed level of the main channel.



- 3.15. At present during low to moderate flow conditions, the majority of flow passes over the weir, with a small proportion passing through the existing pool and weir fish pass. The average flow speed within the river is likely to be in the region of up to 5-30 cm/s, reducing to zero at the bed and bank edge. Immediately downstream of the weir is a sloped bank of rock protection, where the flow is faster and more turbulent.
- 3.16. In the proposed scenario, the majority of flow would pass through the hydropower scheme; flow through the existing fish pass would be slightly reduced and a flow of around 1 m³/s would pass through the new fish pass. The flow speed upstream of the intake will increase marginally due to the slightly lower water level, however this effect will not be significant. At the hydropower intake and outfall locations, the flow speed will be in the region of 10-40 cm/s. Immediately upstream of the weir and immediately downstream of the rock protection, and particularly near the right bank, average flow speeds may reduce to 1-5 cm/s.
- 3.17. Therefore during low to moderate flow conditions the flow speeds in the main channel will not change significantly, except for close to weir and at the bank edge near the intake and outfall locations.
- 3.18. With reference to the Hjulstrom curve, shown below, the change from 5-30 cm/s to 1-5 cm/s in areas close to the weir and right bank may result in some increased deposition of sands and fine gravels, along with reduced erosion of sands. There may also be a slight increase in deposition of coarse silts.
- 3.19. At the intake and outfall locations, the change will be approximately from 0-10 cm/s to 10-40 cm/s. This may result in reduced deposition of silts and sands along with increased erosion of sands. However the physical extent of this effect will be very limited.

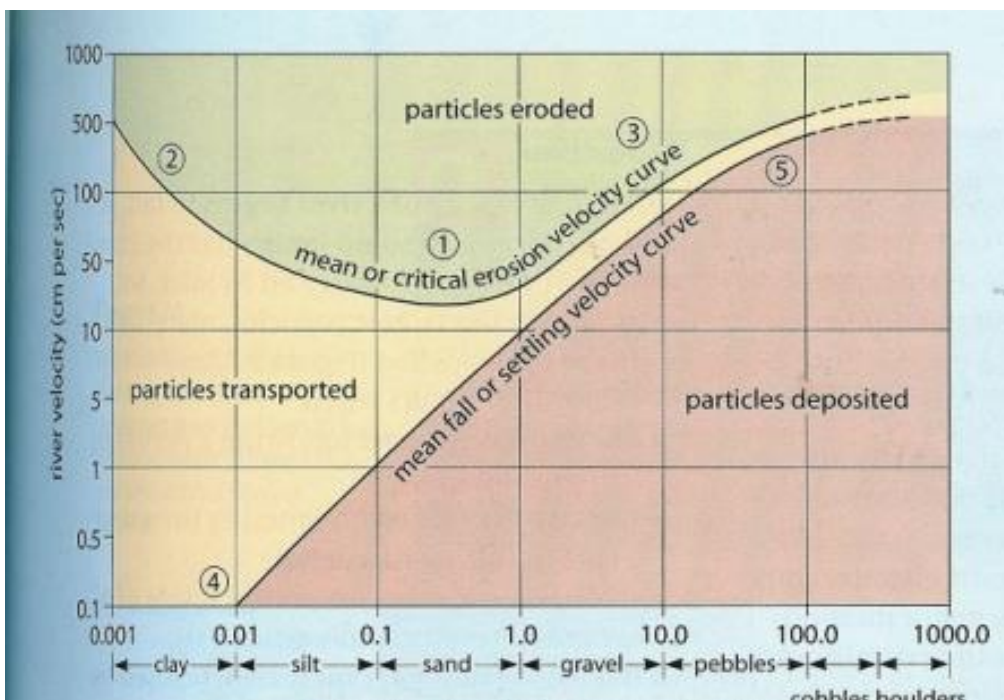


Fig. 3: Hjulstrom curve

- 3.20. At present during high flow conditions, the vast majority of flow passes over the weir. The flow speed within the river will typically be in the region of 30-80 cm/s, reducing to zero at the bed and bank edge.
- 3.21. In the proposed scenario, the majority of flow would continue to pass over the weir, however this is reduced slightly by some flow passing through the hydropower scheme and new fish pass. The flow speed upstream of the intake will increase marginally due to the slightly lower water level, however this effect will not be significant. The flow speed in the hydropower intake and outfall channels will be approximately 50 cm/s. Immediately upstream of the weir and immediately downstream of the rock protection, and particularly near the right bank, average flow speeds may reduce slightly to 15-70 cm/s.
- 3.22. Therefore during high flow conditions, the flow speeds in the main channel will not change significantly, except for at the bank edge near the intake and outfall locations.
- 3.23. The change from 30-80 cm/s to 15-70 cm/s in areas close to the weir and right bank may result in a marginal increase in deposition of fine gravels and a marginal reduction in erosion of coarse clays, silts, sands and fine gravels.
- 3.24. The 15-70 cm/s flow speeds remain sufficiently high to erode most sands and fine gravels, including those that have been deposited as a result of reduced flow speeds during low flow conditions.
- 3.25. At the intake and outfall locations, the change will be approximately from 0-40 cm/s to 50 cm/s. This may result in reduced deposition of silts and sands along with increased erosion of sands. As above, the physical extent of this effect will be very limited.
- 3.26. Most geomorphological change occurs during very high flow conditions, when flow speeds are sufficient to erode and transport a wide range of sediment including clays, coarse gravels, cobbles and boulders. During these conditions, the hydropower scheme will not be abstracting and will not have any impact on geomorphology.
- 3.27. In summary, the proposal may result in some deposition of sands and fine gravels close to the weir and right bank during low flow conditions, however this will be a short-term impact as flow speeds during high flow conditions remain sufficiently high to remove the material. During very high flow conditions, when most geomorphological change occurs, the site hydraulics will be unchanged.

Biodiversity and fish passage

- 3.28. The immediate area is not subject to any environmental designations. There are two SSSIs within 1 km of the proposed development; Acaster South Ings Site of Special Scientific Interest (SSSI) lies 160 m south and Church Ings SSSI lies approximately 1 km upstream. Both SSSIs are large alluvial flood meadows adjacent to the River Ouse with rich plant species grassland. The proposed scheme is not expected to have an adverse impact on the nearby SSSIs.

- 3.29. The proposed development aims to generate renewable electricity whilst also providing direct fish passage improvements.
- 3.30. An existing pool and weir fish pass and a separate eel and lamprey pass are located on the right bank of the main channel, adjacent to the weir.
- 3.31. The existing pool and weir fish pass was constructed in the 1930s and comprises 7 pools plus steps at the inlet and outlet. The large drop between each pool makes the pass unsuitable for coarse fish, whilst the energy densities are in excess of current EA guidance for salmonids for all flows above Q95.
- 3.32. At Naburn the weir length is relatively short for the flow rate of the river, so the upstream water level varies considerably. As the flow increases, this quickly results in extremely high energy densities within the existing fish pass.
- 3.33. The hydropower abstraction will stabilise upstream water levels by increasing the overall flow capacity at the site. As a result the hydropower scheme is expected to significantly improve the operation of the existing pool and weir pass to become suitable for salmonids up to around Q40.
- 3.34. In addition to this improvement, the proposal includes a new multi-species Larinier fish pass co-located with the hydropower scheme, with hydraulic width 3.6m. A Larinier pass has been chosen because it is not prone to blockage and is suitable for a wide range of species.
- 3.35. Optimising the new fish pass for a wide range of flow conditions is challenging given the highly variable upstream water levels. The use of two sections with different crest levels allows passage at optimal or near-optimal conditions for all flows up to around Q20 for coarse fish, Q15 for salmonids.
- 3.36. Finally, the fish-friendly Archimedes screws offer a significant improvement to downstream fish passage for all species by providing a low-energy alternative route to passing directly over the weir crest. The screws will comply with EA guidance on compressible bumpers and maximum tip speed. The new fish pass also provides an additional route for downstream passage.
- 3.37. The existing eel and lamprey pass situated on the far bank, constructed in 2014, will also not be adversely affected by the hydropower scheme. Access to the eel pass entrance will remain the same as downstream water levels will be unaffected; in addition the hydropower scheme will be shut down during very high tides due to loss of head. The hydropower intake approach velocity will be limited to a maximum of 0.5 m/s only, so any impact on flow velocities at the eel pass exit will be negligible.
- 3.38. Dissolved oxygen (DO) upstream of the weir has been measured as being consistently above 60% saturation for the last 13 years and is typically in the 90-95% range. This will increase further as water passes over the weir. The site is therefore not considered to be at risk of unacceptably low DO levels. Nevertheless, the hydropower scheme may in principle have an impact on DO downstream of the weir.

- 3.39. At present DO levels downstream of the weir are dictated by DO levels upstream of the weir, mixing occurring as water passes over the weir and through the existing fish pass, and combination with tidal inflow.
- 3.40. The lowest DO levels occur during low flow conditions, when mixing is low and the water temperature is high. During these flow conditions, the most important feature for fish and aquatic species is the availability of refugia of relatively high DO levels within the weir pool.
- 3.41. As proposed, during low flow conditions, water that currently passes over the weir would instead pass through the hydropower scheme and new Larinier fish pass. Flow through the screw turbines may provide less mixing than passing over the weir, resulting in a slightly lower average DO. This will be partly compensated for by the Larinier fish pass flow, as the turbulent flow across the fish pass baffles will result in a high level of mixing.
- 3.42. Although the overall impact on average DO downstream of the weir may be a marginal reduction, the focused flow of the hydropower outfall and new fish pass will provide new refugia of relatively high DO. This provides an additional benefit that outweighs the marginal average DO reduction.
- 3.43. The geomorphology assessment indicates that the proposal may result in some short-term deposition of sands and fine gravels close to the weir and right bank during low flow conditions. However, since no significant silt deposition or gravel erosion was anticipated, any impact on fish spawning habitats is considered negligible.
- 3.44. Terrestrial ecology surveys have been carried out as appropriate, with full details provided in the main supporting statement.
- 3.45. In summary, the proposed scheme provides significant fish passage improvements with no significant adverse impact on fish or biodiversity. The introduction of effective fish passage at this site will have a wide-reaching positive impact throughout the Ouse catchment. The hydropower scheme is therefore in line with WFD mitigation measures and will help to improve the biological status of the water body.

4. Conclusions

- 4.1. The proposed development will not impact negatively on the current status of the water body and will not have an adverse impact on meeting future WFD objectives.
- 4.2. The development will provide a significant improvement to fish passage at the site, which will help to improve the biological status of the water body.
- 4.3. Overall, the proposed development will have no impact or a positive impact on each individual element of the relevant WFD classifications.



Naburn Weir Hydropower Scheme

Initial Method Statement

Prepared By: Renewables First

Summary

This document outlines the proposed activities required for the installation of a hydropower scheme, adjustable weir crest and associated infrastructure at Naburn Weir.

The detailed design process will ensure that all risks of flooding are mitigated during installation and construction. However, an initial overview of the works is provided in this document.

The final method statement will be subject to sign-off by the Canal and River Trust, as landowner and navigation authority, and by the local planning authority. Construction methods will also be agreed with the Environment Agency via the Environmental Permit process.

General description of works

The works consist of the following:

- Enabling works to establish access from the existing track, compound/storage areas, crane pad
- Temporary sheet piling at the proposed intake and outfall areas to create a dry working area
- Groundworks within the dry working area on the island to reduce levels for construction of the hydropower scheme
- Civil works to construct the hydropower channels, turbine house and fish pass channel
- Installation of three Archimedes screw turbines within the new channels
- Installation of steelwork for fish pass and intake trash rack
- Installation of all cabling and electro-mechanical equipment within the turbine house
- Construction of an electrical substation on the left bank and associated electrical installation works

Location and access

Please see the relevant drawings that accompany this application for full details of the site location, layout and access arrangements.

The site will be accessed via existing tracks leading from the B1222 towards the site. No significant modifications are required along this route.

Duration of Works

It is estimated that the work will take up to approximately six months to complete, depending on weather conditions. Severe weather conditions could delay construction considerably. However, where possible the works will be carried out during the summer months.

Method Statement

1	Site preparation
1.1	A Construction Management Plan will be completed in conjunction with the Principal Contractor and Principal Designer which will include a site access / traffic management section and submitted to the Local Authority.
1.2	Local residents will be engaged and notified as to construction details prior to works beginning.
1.3	Site compounds will be set up, incorporating storage areas for materials delivered to site and sufficient space for construction vehicles to turn.
1.4	The required safety signs, fencing and signals will be installed as and when required.
1.5	The existing entrance gate to site will be modified where required to allow access.
1.6	Existing tracks on-site will be upgraded where required.
1.7	If works expose any drainage lines, temporary channels or clay barriers may need to be utilized to prevent the channels from becoming the drainage route.
2	Hydraulic channels and fish pass
2.1	28 calendar days' notice will be given to the EA before construction commences. The works involve creation of a new channel and the installation of a steel trash rack within the existing bank.
2.2	Sheet piling will be utilized as temporary flow diversion works in order to create a dry working area. The flow will be diverted away from the working area so it passes by towards the navigational channels or sluices. Any water in the dry area will be pumped out and discharged over to the nearest bank through a silt trap to allow any contaminated material or silt to be settled out before water re-enters the watercourse.
2.3	Any material or spoil will be transported and disposed of off-site.
2.4	Excavation of the existing bank and potentially the channel bed will occur until a firm and stable surface is found to ensure the bearing pressure will comply with the proposed structure.
2.5	A blinding layer will be poured to ensure flat surface is achieved for installation of apron.
2.6	Rebar will be set into bedrock or existing structure
2.7	Formwork will be aligned accordingly to the detailed design of the superstructure. This will be formed around the mesh installed.
2.8	Concrete pour should occur into the formwork depending on the weather forecast. Concrete pour can occur with weather forecasts showing three consecutive clear days after the pour of concrete to avoid washout.
2.9	Formwork will be removed.
2.10	Concrete will be left to cure for a minimum of 3 days.
3	Powerhouse
3.1	A new powerhouse will be constructed to house the turbine and associated equipment.
3.2	Excavation within the dry working area will be required to reduce levels.
3.3	Where required blinding concrete will be laid to ensure a smooth flat surface for construction of the powerhouse and to form a secure bond with the foundation.
3.4	Formwork will be placed for the wall footings and floor sump.
3.5	Reinforcement will be placed and tied where appropriate.
3.6	Concrete will be poured into formwork when the rebar is in place. This should be left to cure for at least 3 days where the weather forecast shows that heavy rain is not forecast to prevent washout occurring and the consequent contamination of the river.
3.7	Blockwork should be built up to the appropriate design drawings and specifications.

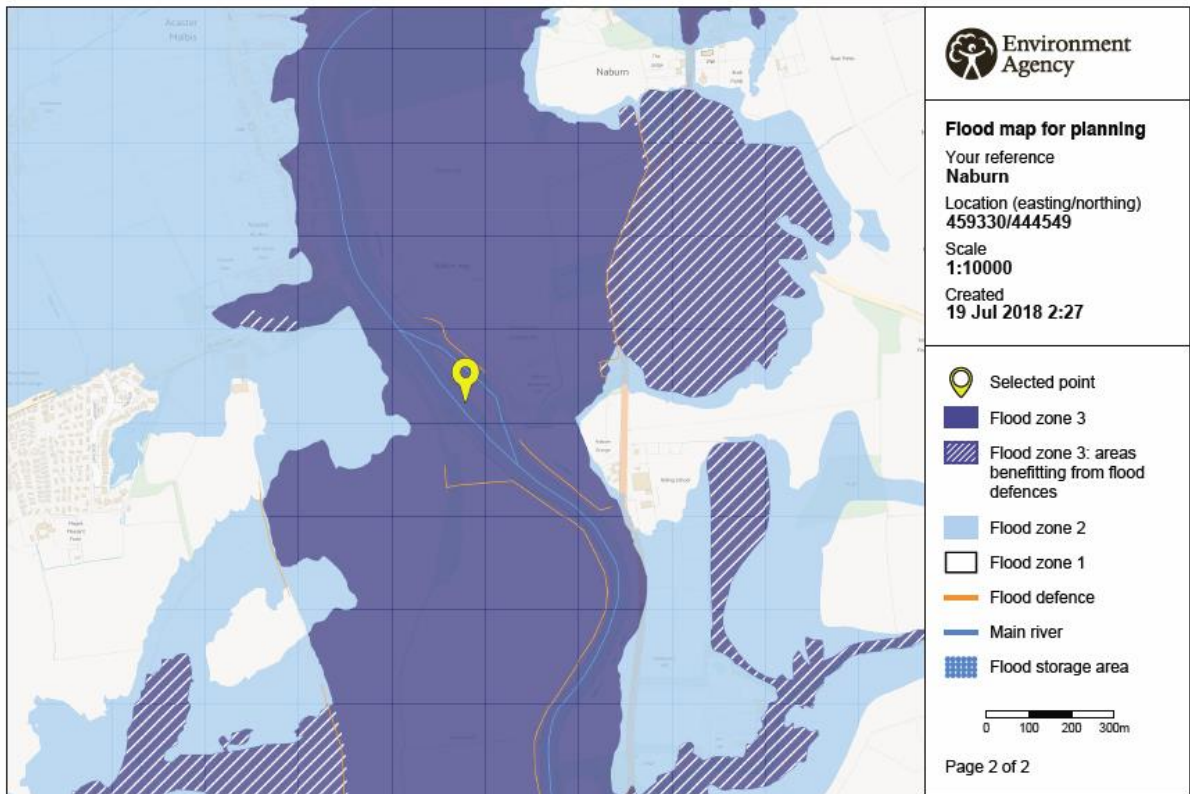
	Blocks will be built up to incorporate ventilations notches.
3.8	Impermeable waterproof membrane should be installed to avoid leakage throughout the structure.
3.9	Noise attenuating baffle boxes will be fitted to provide ventilation whilst retaining noise.
3.10	Fit doors and external fittings as appropriate.

Naburn Weir Hydroelectric Project

Flood Risk Assessment

Introduction

- 1.1 This assessment is associated with planning and Environment Agency consent applications for a hydropower scheme and associated infrastructure at Naburn Weir. Please see the relevant supporting statement for general background information on the site and proposed development.
- 1.2 The applicant for this project is the Canal and River Trust, they are also the landowner and navigation authority at the site.
- 1.3 This site specific assessment follows guidance set out the Communities and Local Government Guidance on Flood Risk Assessment for Developments Planning Policy Strategy 25 (2010) [\[link\]](#). It also makes reference to EA Product 7 Flood Data, the City of York Council Strategic Flood Risk Assessment (SFRA) [\[link\]](#), the Ouse Catchment Flood Management Plan [\[link\]](#), York 5 year Flood Plan [\[link\]](#), York - slowing the flow [\[link\]](#), Naburn Weir Annex 2 [\[link\]](#) and Slowing the Flow in the Rivers Ouse and Foss [\[link\]](#).
- 1.4 The development is water compatible, with reference to the vulnerability classification (table D.2, annex D, PPS25).
- 1.5 Figure 1 below shows that the development is located in Flood Zone 3, which is appropriate for its function (table D.1, annex D, PPS25) therefore a sequential test has not been completed and the exemption test has been applied.
- 1.6 In addition National Planning Policy Framework (NPPF) 2018 para 159 – 160 states:
- For the exception test to be passed it must be demonstrated that:
- a) The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - b) The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 1.7 As this proposal is a water compatible engineering project, which has wider sustainability benefits that outweigh flood risk and is safe during its lifetime, it passes the exemption test.
- 1.8 The latest relevant flood data for the site were obtained from the Environment Agency.



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Figure 1 – Environment Agency Flood Map

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Key: ✓ Development is appropriate.
✗ Development should not be permitted.

Definition of the flood hazard

1.9 Appraising the sources of possible flood water, the SFRA signals surface water, sewers, and groundwater and reservoirs/canal sources. The River Ouse has a residual flood risk in a 1 in 100 year flood event.

Proposal description

1.10 Naburn Weir is located on the River Ouse approximately 8km downstream of York, just downstream of the villages of Naburn and Acaster Malbis. The River Ouse is the largest river in York. The river Ouse downstream of Naburn Weir is tidal and the river Wharfe joins the Ouse at Kelfield just south of the York boundary.

1.11 Naburn Weir is a notched, V-shaped weir that spans the main river channel and is the typical tidal limit on the Ouse. The weir was constructed in the 1770s to maintain water levels for navigation.

1.12 Approximately 135 m upstream of the weir, the channel splits to create a navigational channel along the left-hand side leading to two operational locks. The two channels are separated by small island, where there is a visitor centre and several mooring points, which extends approximately 105 m downstream of the weir.

1.13 The existing weir is a concrete structure with a breadth of approximately 55 m and crest level 4.91 mAOD. The crest has been raised over time to enable larger vessels to navigate the river.

1.14 The proposal comprises three Archimedes screw turbines, a turbine house building, hydraulic channels, trash screening, access improvements and an electrical substation.

1.15 The hydropower channel, screw turbines and trash screening will be situated within the bank of the lock island, adjacent to Naburn Weir.

1.16 The development does not include any significant changes to the bank level.

Summary of Flood Levels from EA data at node point reference 2213_MODEL_Ouse114	
Bank level	7.30 mAOD
Weir crest level	4.91 mAOD
Flood levels (without defences)	
100 year flood 1% AEP	8.43 mAOD
100 year flood (+ climate change @10%)	9.27 mAOD
1000 year flood 0.1% AEP	9.07 mAOD
Flood levels (with defences)	
100 year flood 1% AEP	8.84 mAOD
100 year flood (+ climate change @10%)	9.72 mAOD
1000 year flood 0.1% AEP	9.37 mAOD

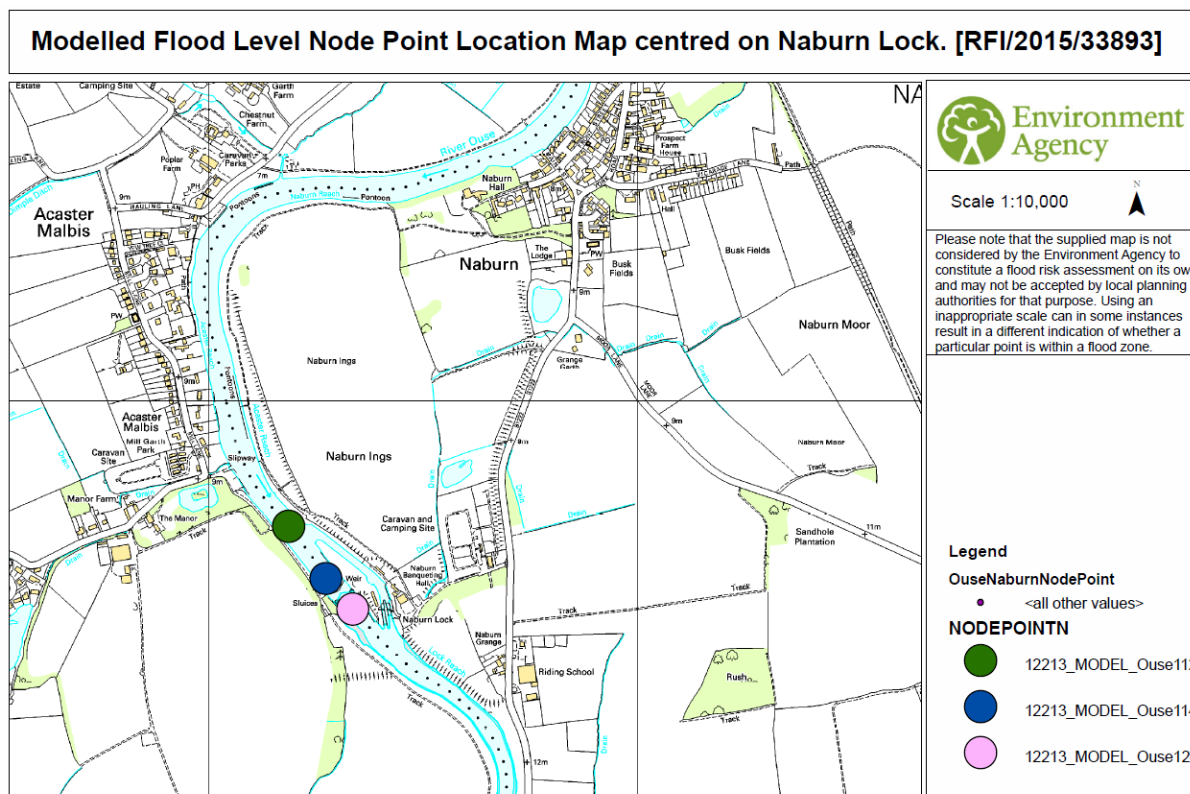


Figure 2 – Environment Agency Nodes Map

Historic flood events

1.17 The River Ouse Catchment Management Plan (CFMP) covers approximately 4,847 square kilometres. There are four major river systems that come together to form the River Ouse CFMP study area. The lower catchment is influenced by the tides as the River Ouse is tidal to Naburn and the River Wharfe is tidal to Tadcaster. The headwaters of the main river systems are characterised by steeper river gradients which flow through generally rural areas which are scattered with small settlements. In contrast, downstream of Ripon on the River Ouse, the area is generally low lying with wide floodplains.

Currently the main sources of flood risk within the catchment are:

- From rivers, which takes place throughout the CMMP
- The tidal influence which is present downstream of Naburn
- Surface water drainage and sewers

1.18 Within the Ouse catchment there are over 31,000 properties at risk from a one per cent flood from rivers, without taking into account flood defences. There are over 372 kilometres of flood defences and over 400 other structures, such as the Foss Barrier, that reduce the probability of flooding in some communities.

1.19 The River Ouse has a long history of significant flooding dating back to the 13th century. Before Naburn Lock was constructed there was some tidal flooding seen in the city, however the predominant flood risk has always come from high flows coming down the river Ouse.

1.20 During the autumn 2000 flood event the measured flow in the Ouse was 583 m³/s, which is over 11 times the average summer flow of 50 m³/s. This level of flow in the river resulted in a rise of 5.4 m above normal summer level¹.

1.21 A flood event on Boxing Day in 2015 saw the second highest peak of the River Ouse and the highest flow of the River Foss in recent record. It was one of the most significant flooding events since records began. The Environment agency have responded with immediate recovery, a short term 5 year plan and a long term plan to manage flooding over the next 100 years. The

¹ City of York Strategic Flood Risk Assessment

long term plan, Slowing the Flow in the Rivers Ouse and Foss (2017), reports on managing flood alleviate measures upstream of York.

1.22 In York the Foss Barrier was constructed in 1987 to prevent water from the River Ouse raising water levels on the River Foss. This was part of an extensive flood management programme following flooding in 1982. During the 2015 floods the Foss Barrier failed and over 600 households and businesses were flooded. In response to this the government allocated £17 million of funding towards upgrades and improvements, with work starting in 2016. An additional £45m has been allocated to the wider flood defences across the city.

1.23 A major programme of flood defence upgrades is ongoing and part of the Environment Agency's York Flood Alleviation Scheme (FAS). In addition to the Foss Barrier upgrades the York FAS focussed on 10 'communities' within York administrative boundary that are at risk of flooding from the River Ouse, The River Foss and their tributaries. These alleviation methods form part of the 5 year plan.

1.24 Possible solutions for the Naburn and Acaster Malbis community under the 5 year plan include:

- Raise land at Moor Lane;
- Build a new defence along the river bank adjacent to Front Street and Maypole Grove;
- Install a new pumping station in the low spot on the B1222 road;
- Create storage area in the field that's west of the railway line on Howden Dyke; and
- Consider modifying Naburn Weir if it is seen to reduce river levels.

1.25 In addition, the Environment Agency work closely with the Naburn Flood Group discussing the likely scale and scope of flood intervention options, these discussions are currently ongoing. A potential solution of lowering or removing Naburn Weir to reduce flooding has been reviewed several times by the Environment Agency and predecessor organisations. Annex 2: Naburn Weir Briefing July 2017 concludes that the benefit gained from lowering Naburn Weir is unlikely to justify the cost of the work². The report 'Slowing the Flow in the Rivers Ouse and Foss' (2017) also concludes that engineering measures to modify Naburn Weir do not offer significant

² Annex 2 Naburn Weir Briefing July 2017.

benefit to properties at risk of flooding throughout York and further modelling is require to understand the benefits to the communities of Naburn and Acaster Malbis.

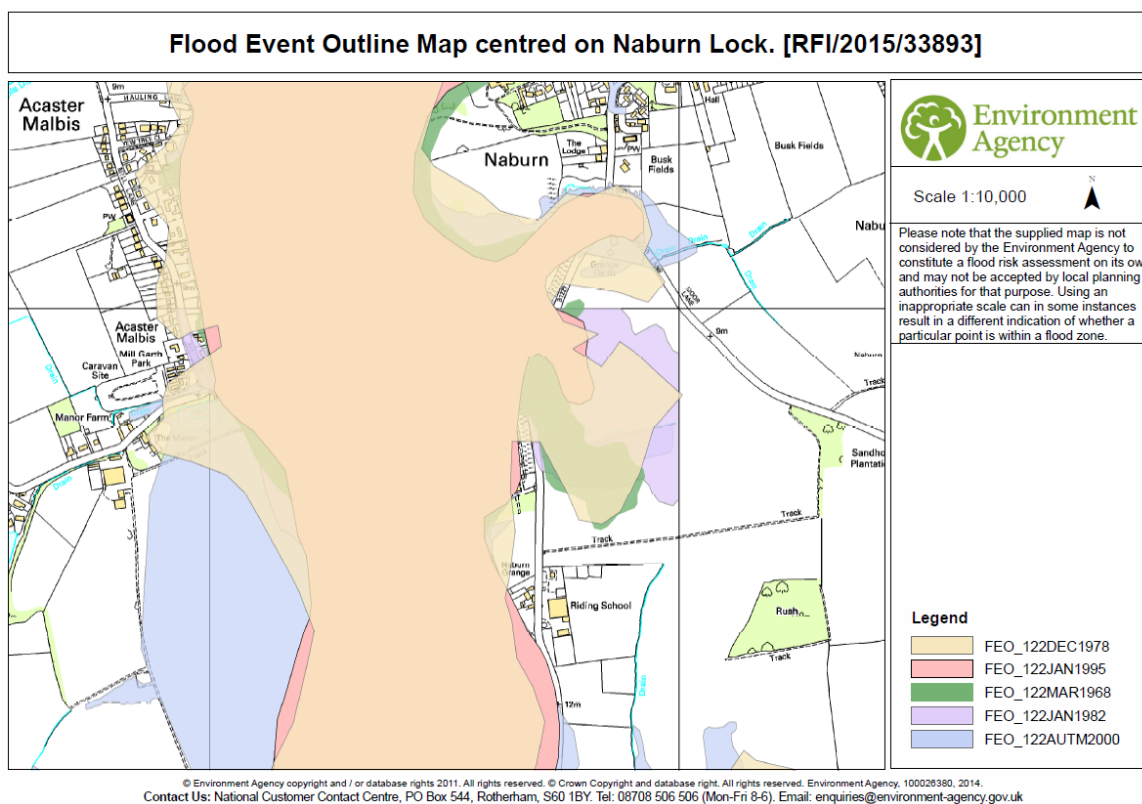


Figure 3 – Flood event outline map from 1978-2000

Probability

1.26 From the Environment Agency’s Product 7 data, the flood height behind the weir (without defences) during the 1 % Annual Exceedance Probability (AEP) is modelled to be 8.43 mAOD, with 0.1% Annual Exceedance Probability (AEP) is modelled at 9.07 mAOD. Both these levels are well above the current bank level at 7.30 mAOD.

1.27 From the Environment Agency’s Product 7 data, the flood height behind the weir (with defences) during the 1 % Annual Exceedance Probability (AEP) is modelled to be 8.84 mAOD, with 0.1% Annual Exceedance Probability (AEP) is modelled at 9.97 mAOD. Both these levels are also above bank level.

Climate change

1.28 A climate change allowance of 10% has been applied, which is the peak flow allowance for the Humber river basin district, total potential change anticipated from 2015 – 2039. The central allowance category has been used as the development is water compatible.

1.29 This increases the 1 in 100 year levels (without defences) from 8.43 m AOD to 8.73 m AOD. The 1 in 100 year levels (with defences) increases from 8.84 to 8.95 m AOD.

Flood risk management measures

1.30 The hydropower scheme will not be operational during times of extreme flood. No maintenance of the hydropower scheme will be carried out during high flow conditions.

1.31 Therefore, providing access to and from the building in times of flood has not been considered necessary.

1.32 All electrical equipment will be protected against flood damage to at least the 1 in 100 year (+ climate change) flood level, which is 8.95 mAOD.

Off-site impacts

1.33 Building on the floodplain may increase the risk of flooding to upstream property as well as the proposed development. However the proposed turbine house, at only 15.5m (w) x 6.25m (h), represents a small fraction of overall floodplain and in addition the new fish pass will provide a 3.6m-wide additional flow channel with invert well below the existing weir crest. As such the overall contribution to off-site flood risk is negligible.

1.34 The run-off from the proposed development will not change significantly, due to the small footprint area of impermeable surfaces.

Residual risks & mitigation measures

1.35 During construction, all material scraped back will be moved off-site away from the canal bank. The appointed contractor will be required to provide appropriate method statements, risk assessments and mitigation measures under the EA environmental permitting process. Appropriate cofferdam structures will be used.

- 1.36 The hydropower scheme includes a coarse trash rack to prevent damage from debris by keeping it within the main river channel. This will be cleaned very regularly, to avoid loss of energy generation due to head losses.
- 1.37 All ancillary equipment will be stored inside the turbine house or off-site to prevent it being lost during a flood event.
- 1.38 There is potential during the construction phase to temporarily dewater very small sections of the river channel. The construction method statement will include site-specific requirements to ensure no drainage of existing wet areas, or diversion of existing drainage channels, occurs.
- 1.39 Operatives will be able to monitor operating conditions, including upstream water levels remotely. The associated risks and compliance enforcement will be managed by the applicant.
- 1.40 Frequent routine inspections of the hydropower scheme will be carried out. Planned maintenance is dependent upon the specific requirements of the individual items of equipment but maintenance will be in line with manufacturer's recommendations to ensure smooth and reliable operation.

Environmental Permit

- 1.41 An application for a new bespoke environmental permit (flood risk activities) will be submitted to the Environment Agency. It will include a risk assessment and management measures system.

Conclusions

- 1.42 All electrical equipment will be protected to the 1 in 100 year (+ climate change) flood level, which is 8.95 mAOD.
- 1.43 During significant flood events, the development presents a negligible additional flood risk due to its small size within the floodplain.
- 1.44 Construction and maintenance works will only be carried out during relatively low flow conditions.
- 1.45 Environmental Permits will be obtained for both temporary and permanent works.
- 1.46 Overall the proposal is considered to be adequately protected against flood damage and will not present any significant additional flood risk to others.



BS5837:2012

**Trees in relation to design, demolition and construction –
Recommendations**

Arboricultural Method Statement

Renewables First

Naburn Weir,
The Walles Garden,
Naburn,
York,
YO19 4RU.

27 August 2018

Author: Alan Thompson FdSc. (Arb.), M.Arbor.A.

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If this report has been released electronically the appendices referred to herein can be found in the annexed zip folder/s as .pdf files. If this report has been released in hard copy the appendices will be bound into the back of this report. Plans are annexed separately as A0, A1, A2 or A3 as appropriate.

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Introduction

Arbtech Consulting Limited (Arbtech) received written instruction on 20th July 2018 from Renewables First to attend Naburn Weir, The Walles Garden, Naburn Hall, Naburn, York, YO19 4RU (site) to undertake an arboricultural survey a to BS5837:2012 guidance to assess trees, hedges and major shrub groups growing on and within influencing distance of the site and to produce a Schedule of trees, Tree Constraints Plan, Arboricultural Impact Assessment , Arboricultural Method Statement and Tree Protection Plan.

Executive Summary

This report describes the extent and effect of the proposed development at the site on individual trees and groups of trees within and adjacent to the site.



Trees within the site were surveyed; using a methodology guided by British Standard 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' ("BS5837").

Subsequently, this report has been produced, balancing the layout of the proposed development against the competing needs of trees. This report comprises all of the requisite elements of an arboricultural implications assessment, method statement and supporting plans.

Checklist for Submission to Local Planning Authority

Tree survey	<input checked="" type="checkbox"/>
Tree constraints plan	<input checked="" type="checkbox"/>
Arboricultural impact assessment	<input checked="" type="checkbox"/>
Arboricultural method statement	<input checked="" type="checkbox"/>
Tree protection plan	<input checked="" type="checkbox"/>

This report and its appendices follow precisely the strategy for arboricultural appraisal intended to provide local planning authorities with evidence that trees have been properly considered throughout the development process.

It is the conclusion of this report that the overall quality and longevity of the amenity contribution provided for by the trees and groups of trees within and adjacent to the site will not be adversely affected as a result of the local planning authority consenting to the proposed development. It is considered that any issues raised in this report, or beyond the scope of it can be dealt with by planning conditions.

General Information

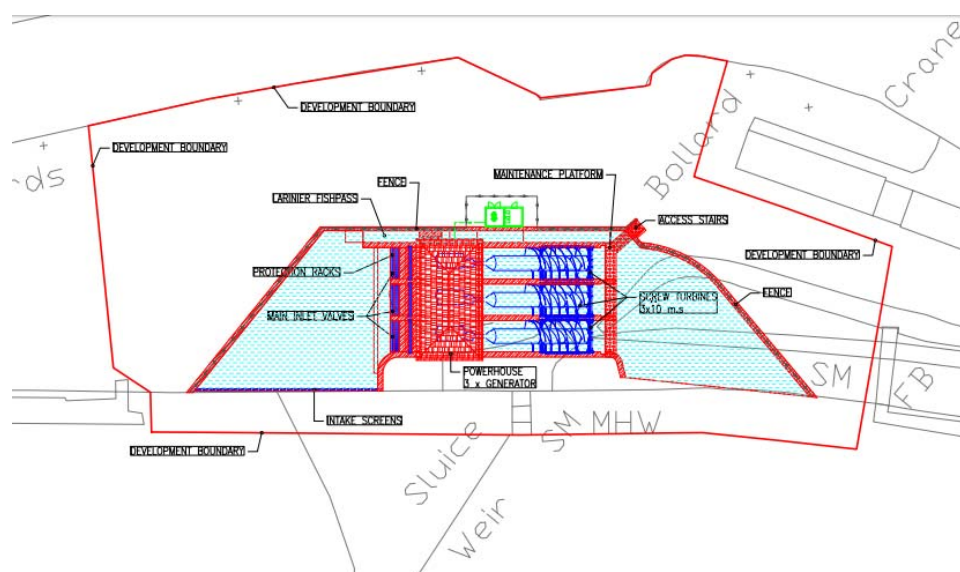
Client: Renewables First

Site: Naburn Weir, The Walles Garden, Naburn Hall, Naburn, York, YO19 4RU.

Brief proposal description: Construction of hydroelectric scheme.

Table 1: Documents referred to.

Document	Reference No.
Ordnance Survey Tile	490021 – 649859
Proposed layout drawing	2350002 – General Layout
Landscape master plan drawing	N/A
LPA pre-app comments	N/A
British Standard 5837:2012	“BS5837”
Arboricultural Impact Assessment	Arbtech AIA 01
Tree Protection Plan	Arbtech TPP 01



Tree Survey

Survey: An arboricultural survey to BS5837 of all trees within impacting distance of the site was undertaken by Chris Schroeter of Arbtech Consulting on 20th July 2018.

A total of 19 individual trees and six grouped areas of trees were surveyed. Details for each of the trees surveyed are provided in the Schedule of Trees (see Appendix 1)

Table 2: Documents upon which this tree survey has been based.

Document	Originator	Reference Number	Title
OS Tile	Malcolm Hughes Land Surveyors	490021 - 649859	Site

Limitations: The survey was made at ground level using visual observation only. Detailed examinations, such as climbing inspections and decay detection equipment were not employed, though may form part of the survey’s management recommendations. Measurements were taken using specialist tapes, laser and GPS devices. Where this was not possible, measurements are estimated.

Scope: Pre-development tree surveys make arboricultural management recommendations based exclusively upon the individual tree or group of trees condition relative to their present context (*i.e. not in relation to the proposed development*).

Legal Status: No statutory protection check has been performed. BS5837 does not draw any distinction between trees subject to statutory protection, such as a Tree Preservation Order (“TPO”), and those trees without. This is principally because a detailed planning consent overrides any TPO protection. Consequently, we do not seek to offer any comparison between or infer any difference in the quality or importance of TPO trees and other trees.

* For more information on the surveyed trees please see Arbtech Consulting Ltd, Tree Survey Schedule (Appendix 1), Tree Survey Report and Tree Constraints Plan.

Arboricultural Impact Assessment

Table 3: Documents upon which this assessment has been based

Document	Originator	Reference Number	Title
OS Tile	Malcolm Hughes Land Surveyors	490021 - 649859	Site
Site Plan	Hydropol	2350002	General Layout

There are a number of issues that may need to be addressed in an arboricultural impact assessment between the trees and the proposed development, these are as follows:

- The effect and extent of the proposed development within the root protection areas (RPAs) of retained trees;
- The potential conflicts of the proposed development with canopies of retained trees; and
- The likelihood of any future remedial works to retained trees beyond which would have been scheduled as a part of usual management.

These impacts can be seen on the Arboricultural Impact Assessment drawing number Arbtech AIA 01.

Trees to be removed

The proposal requires the removal of one individual category B tree and four grouped areas of category C trees/shrubs.

A breakdown of all tree removals and pruning works can be seen in Table 7: Summary of Tree Works

Table 4: Number of individual trees to be removed.

U	A	B	C
0	0	1	0

Table 5: Number of groups to be removed.

U	A	B	C
0	0	0	4

Arboricultural Method Statement

The purpose of this method statement is to demonstrate how any aspect of the development that has potential to result in loss or damage to a tree may be implemented and provide an adequate level of protection for those trees that are to be retained during the proposed works.

Details of key site personnel, including site / project manager will be submitted to the Council's Tree Officer prior to the commencement of site works.

This method statement is to be approved and agreed to in writing by all key personnel prior to the commencement of site works.

No site personnel are to be present and no demolition, site clearance, building work or delivery of materials is to occur until the protective measures are in accordance with this method statement and the Tree Protection Plan drawing number Arbtech TPP 01.

Protective measures should be in accordance with this method statement and the Tree Protection Plan; drawing number Arbtech TPP 01 will remain unaltered and in situ, unless otherwise specified, for the entire duration of the construction.

Table 6: Documents upon which this assessment has been based

Document	Originator	Reference Number	Title
OS Tile	Malcolm Hughes Land Surveyors	490021 - 649859	Site
Site Plan	Hydropol	2350002	General Layout

Tree Works

For reasons of public safety, all tree works referred to herein must be carried out prior to any site personnel commencing works or any building materials being delivered.

Table 7: Summary of Tree Works

No.	Species	Works	Category
1	Common ash	Fell to ground level; remove stump.	B ₁
G2	Crack willow	Fell to ground level; remove stumps.	C ₁₂
G3	Hawthorn	Fell to ground level; remove stumps.	C ₁₂
G4	Hawthorn	Fell to ground level; remove stumps.	C ₁₂
G5	Privet	Fell to ground level; remove stumps.	C ₁₂

Notes

All tree work is to be undertaken in accordance with British Standard BS 3998:2010, Recommendations for tree work. All arising's are to be removed and the site is to be left as found. Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of tree surgery operations. No equipment or vehicles such as timber Lorries, tractors, excavators or cranes shall be parked or driven beneath the crowns of any retained trees, to prevent subsequent compaction and root death.

Tree removal

A tree should be felled in one piece only when there is no significant risk of damage to people, property or protected species (see Annex A).

Where restrictions (e.g. lack of space, buildings, other features, land ownership or use, or other trees which are to be retained) cannot be overcome, trees should be dismantled in sections.

This also applies where a tall stump is being retained but where branches are to be removed/pruned.

Extensively decayed trees can be unpredictable when they are being felled, and special precautions should therefore be taken, such as the use of a winch to guide the direction of fall.

Stump removal – stump grinding

Stump grinding should be to a minimum of 300mm deep or to extend through the base of the stump leaving the major roots disconnected if the intention is to reduce the potential for the spread of Honey fungus.

The grinding residue should be treated as arising's and removed from site.

NOTE Mechanical destruction of a stump by stump grinding is less disruptive to the site than digging out.

The hole left by stump removal, should be filled with soil or other material. The filling should be appropriate for future site usage, and for any surface treatment that is to be installed.

Where future plant growth is desired, the backfill material should be firmed in 150 mm layers by treading, avoiding excessive compaction and destruction of the soil structure.

Stump removal - digging

Stump removal by digging out should include disposal/utilisation of woody material (see Clause 13).

NOTE Whether done by hand or machine, digging out can cause severe disturbance of the site.

Where possible, when winching out a stump, a ground or other type of anchor should be used rather than a tree to be retained. If there is no alternative to using such a tree as an anchor, appropriate protective measures should be adopted.

After stump removal

The hole left by stump removal, whether by digging out or grinding, should be filled with soil or other material. The filling should be appropriate for future site usage and for any surface treatment that is to be installed.

Where future plant growth is desired, the back fill material should be firmed in 150mm layers by treading, avoiding excessive compaction and destruction of the soil structure.

Protected Species

Conservation Status of British Bats

The general consensus in Britain and Europe is that virtually all bat species are declining and vulnerable. Our understanding of population status is poor as there is very little historical data for most bat species. Certain species, such as the horseshoe bats, are better understood and have well documented contractions in range and population size.

Given this general picture of decline in UK Government within the UK Biodiversity Action Plan has designated five species of bats as priority species (greater and lesser horseshoe bats, barbastelle, Bechstein's and pipistrelle). These plans provide an action pathway whereby the maintenance and restoration of the former populations levels are investigated.

Legal Status of British Bats

Given the above position all British bats as well as their breeding sites and resting places enjoy national and international protection.

All bat species in the UK are fully protected under the Wildlife and Countryside Act 1981 (as amended) through inclusion in Schedule 5. All bats are also listed on Annex IV (and some on Annex II) of the EC Habitats Directive giving further, European protection. Taken together the act and Conservation of Habitats and Species Regulations 2012 (as amended)* make it an offence to; intentionally or deliberately kill, injure or capture (take) bats;

- Deliberately disturb bats (whether in a roost or not);
- Damage, destroy or obstruct access to bat roosts;
- Possess or transport a bat or any part of a bat, unless acquired legally;
- Sell, barter or exchange bats, or parts of bats

The legislation although not strictly affording protection to foraging grounds does protect roost sites. Bat roosts are protected at all times of the year whether or not bats are present. Any disturbance of a roost due to development must be licenced.

**the regulations that delivered by the UK's commitments to the Habitats Directive.*

Breeding birds

All nesting birds are protected under the Wildlife and Countryside Act (as amended) 1981, which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. Furthermore a number of birds enjoy further protection under that Act and are listed on Schedule 1 of the Act. These further protected birds are also protected from disturbance and it may be necessary to operate “no-go” buffer zones around such nests – typically out to 100m.

Planning policy guidance on the treatment of species identified as priorities under the biodiversity action programme suggests that local authorities should take measures to protect the habitats of these species from further decline through policies in local development documents and should ensure that they are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. The conservation of these species should be promoted through the incorporation of beneficial biodiversity designs within developments.

Site Management

The site manager will be responsible for briefing and inducting all personnel who will be working on any stage of this development and especially those who will be working within or adjacent to the canopies or RPAs of retained trees; and will make them aware of, and provide a copy of this method statement and tree protection plan drawing number Arbtech TPP 01; this is to include but not exclusively of the movement and or operation of plant, excavations, unloading deliveries, mixing and or pouring of cement and concrete.

The site manager will be responsible for the day to day running and protection of all retained trees and for liaising with the project arborist about any tree related matters and prior to any works that may or will affect the RPAs or canopies of retained trees; this is to include but not exclusively the movement and or operation of plant, excavations, unloading deliveries, mixing, pouring and storage of all caustic materials that may cause harm to retained trees.

Any incidents of damage to retained trees or of tree protection measures will be documented by the site manager who will then report these incidents to the project arboriculturist immediately and make sure that works within this area cease until the project arborist has had an opportunity to inspect the damage and where appropriate, agree a mitigation plan with the local planning authority tree officer.

The site manager may designate another person to take charge of briefing and inducting process of new site personnel or visitors in his absence.

If the site manager is replaced or is absent from site for more than three consecutive working days the project arborist will be informed and a pre start meeting will be held with the new or acting site manager.

It is the responsibility of the site manager to ensure that the planning conditions attached to the planning consent are adhered to at all times and that a monitoring regime and supervision of any works within or adjacent to the RPAs are adopted.

If at any time pruning works are required other than those previously approved, permission must be sought from the LPA tree officer and once permission is granted they are to be carried out by a suitably qualified person in accordance with BS3998:2010 Tree work – Recommendations.

Prohibition

- Mechanical digging or scraping is not permitted within a defined root protection area or within areas cordoned off by protective barrier fencing.
- No access will be permitted within the protected areas;
- No materials, equipment or debris will be stored within any of the fenced areas, or against the fencing;
- Fires are not permitted within 10m of any vegetation.
- Leaning objects against or attaching of objects to a tree is not permitted.
- Machinery, plant and vehicles are not permitted to be washed down within 10m of vegetation.
- Chemicals and materials are not to be transported, stored, used or mixed within a root protection area or within areas cordoned off by protective barrier fencing.
- Cement silos, mixing site to be situated within a bunded area to prevent spillage/leaking of chemicals harmful to trees. These areas are to be sited well clear of protected trees.
- Refuelling of plant or machinery is prohibited within 10m of the construction exclusion zones.
- It is essential that allowance should be made for the slope of the ground so that damaging materials such as concrete washings, mortar or diesel oil cannot run towards trees.
- Where machinery is to be used within 5m of retained tree canopies a banks man will be required at all times whilst setting up, moving or operating within this distance of retained trees canopies.
- Storage of all caustic material and chemicals are to be situated well clear of protected areas and preferably on lower ground if slopes are present, or to be situated within a bonded area to prevent any spills or leaks entering the ground.

Sequencing of works

A logical sequence of events is to be observed and shall be phased as follows.

Table 9: Sequence of Events

Stage	Event
Stage 1	Pre-commencement site meeting
Stage 2	Carry out tree works as specified within the summary of tree works
Stage 3	Installation of protective measures in accordance with the approved tree protection plan/s
Stage 4	Site set up
Stage 5	Undertake demolition works
Stage 6	Undertake and complete construction works
Stage 7	Undertake external landscaping works outside of the construction exclusion zones
Stage 8	Removal of all machinery and materials form site
Stage 9	Dismantle and removal of protective measures
Stage 10	Undertake external landscaping works within the construction exclusion zones
Stage 11	Sign off from project arboriculturist

Protective Measures

Protective measures are to be installed immediately following the completion of the tree works, and are to be sited and aligned in accordance with the tree protection plan (Arbtech TPP 01) prior to the commencement of any works or the introduction of any machinery or material to site.

Upon installation of the protective measures around the retained trees the project arboriculturist will visit the site to inspect and document the position and specifications of the protective measures.

In the event that the protective measures and their positions do not comply with this arboricultural method statement document number Arbtech AMS 01 (27-08-18) and tree protection plan drawing number Arbtech TPP 01, the project arboriculturist shall inform the client and fencing contractor so adjustments can be made.

When the protective measures comply with document number Arbtech AMS 01 (27-08-18) and tree protection plan drawing number Arbtech TPP 01, the project arboriculturist will sign off the protective measures in writing to the client and will send a copy to the fencing contractor, site agent and local authority tree officer.

If the protective measures become damaged or there is any accident or emergencies involving trees, these areas are to be cordoned off immediately with high visibility plastic mesh fencing. The site agent is to photograph and document the damage and inform the project arboriculturist immediately after the incident and all work within in this area is to cease until the project arboriculturist has made a visit to the site. Any and all damaged sections of protective measures shall be replaced within 48 hours of the initial incident.

The protected area is sacrosanct and will not be invaded by the storage of materials, mixing of concrete or other products, accessed by machinery, equipment or pedestrians or in any other way disturbed by construction activity.

The protective measures will remain in place until the completion of stage 9 (see Sequencing of Works), thereafter they will be carefully dismantled only with the agreement of the project arboriculturist and or the local authority tree officer.

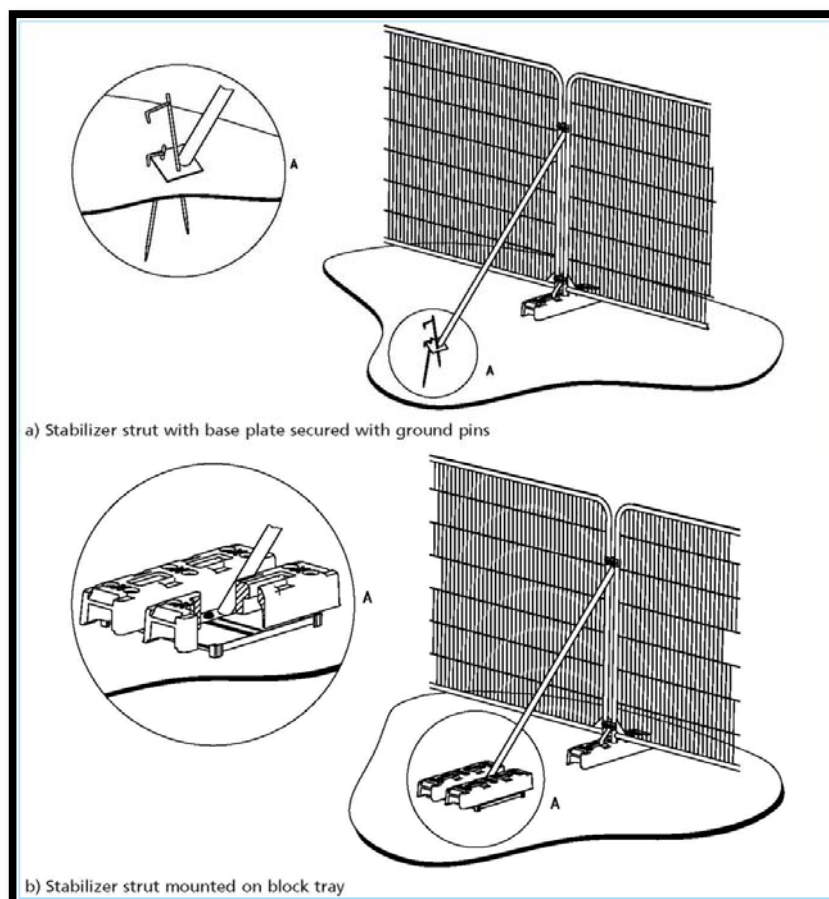
The existing site boundary measures are to be retained for the duration of the development. If for any reason the existing boundary measures are not to be used protective barrier fencing is to be installed along the line of the boundaries and is only to be removed upon the written permission of the project arboriculturist or LPA tree officer upon the completion of the development or immediately prior to the installation of the permanent boundary measures.

No equipment, vehicles or plant shall operate beyond the tree protection fencing. Booms, hoists and rigs should be kept as far away from the canopies of retained trees at all times. Where it is necessary to operate within 5m of a tree canopy, it will be done with the utmost caution and under the control of a banks man. Damage to trees will be considered a breach of this tree protection plan, which in turn could be a breach of planning permission.

Protective Barrier Fencing

Protective barrier fencing should be appropriate for the intensity and proximity of the development to protect trees where development activity is in close proximity.

Specification: To comprise of 2m tall welded mesh panels on rubber or concrete feet. Panels are to be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabiliser struts, which should be attached to a base plate and secured with ground pins.



Signage denoting the words “*tree protection area*” at 5.0m intervals should be fixed to the protective barrier fencing (See Appended file).

Protective fencing is to be removed only with the written permission of the arboricultural consultant and approval of the local planning authority (LPA).

Demolition

Prior to any demolition of existing site features, all tree works are to have been completed, tree protection measures are to be in place as per Arbtech Consulting Ltd. tree protection plan document number Arbtech TPP 01 and have been signed off and a copy of the demolition method statement has been submitted and approved by the project arboriculturist and LPA tree officer, to ensure that there is no conflict with this method statement.

All demolition work within or immediately adjacent to RPAs or canopies of retained trees is to be undertaken under the direct on-site supervision of an arboriculturist.

Construction

Prior to the construction of the proposal, a copy of the construction method statement should have been submitted and approved by the project arboriculturist and LPA tree officer, to ensure that there is no conflict with this method statement.

All excavations and construction work within or immediately adjacent to RPAs or canopies of retained trees is to be undertaken under the direct on-site supervision of an arboriculturist.

Concrete foundations

Prior to concrete being poured to form the foundations within or immediately adjacent to the RPAs of retained trees the excavation is to be lined and sealed to prevent any leaching of the concrete into the soil and causing desiccation of retained roots by concrete run off.

Services

Detailed drawings of proposed underground services are not available at this time; hence it is not possible to identify any specific potential impacts associated with the scheme at this stage.

Existing services within the site should be retained where ever possible. Where existing services within RPAs require upgrading, the upmost care must be taken to minimise disturbance, and where feasible trenchless techniques are to be employed, and only where necessary should open excavations be considered.

Where new services are to be introduced into the site they should be located outside of RPAs, where they will not interfere with tree roots. If any excavations are required within the RPAs all trenches are to be excavated by hand and radially to the tree trunks under direct on-site arboricultural supervision and are to be carried out under NJUG guidelines.

Final positions of any proposed services should be verified and approved by the arboricultural consultant and local authority tree officer before implementation.

New Underground services

Trenching for installation of underground services and drainage routes could sever any roots that may be present and as such adversely affects the health of the tree. For this reason particular care should be taken in routing and methods of installation of all underground services. All underground services and drainage routes should be located so that no excavations are required within RPAs.

Where it has been impossible to keep underground services from passing through RPAs or within close proximity to trees, these sections are to be installed in one of three ways in accordance with the guidance set out in National Joint Utilities Group guidelines (NJUG 4), under on site arboricultural supervision.

Landscaping

Any tree planting should take into consideration the available space for tree growth and development in order to ensure the trees are physically suited to the site at maturity. A specification for and notation relating to the precise alignment of replacement trees will be contained in the landscape proposals.

Landscaping around retained trees may only be carried out once all tree protection measures have been removed (planting, turfing, fencing etc.).

All excavations within the Root Protection Areas shall be undertaken by hand and without reducing current ground levels unless it is agreed in writing with the LPA. At no time is the use of a rotavator permitted within the RPAs of retained tree.

Any tree roots discovered will be left in-situ and shall not be cut or otherwise damaged. Where possible, the soil structure within the Root Protection area shall be preserved.

No works will be carried out within the RPAs of any trees if the soil moisture is of such a level that soil compaction may be likely. Should the soil become compacted or has poor structure which would hinder the development of the existing trees and plants or any new plantings the arboriculturist should be consulted about soil decompaction techniques.

Monitoring and Supervision

Where trees have been identified within this method statement and tree protection plan drawing number Arbtech TPP 01 for retention, there should be an auditable system of arboricultural monitoring. This is to extend to arboricultural supervision whenever demolition or construction activity is to take place within or adjacent to any canopy or RPA.

The development's tree protection measures are to be monitored and all demolition and construction works to be undertaken within or adjacent to the RPAs of retained trees are to be supervised by project arboriculturist, who should be retained to record and report observations to the council at appropriate intervals.

Pre-commencement site meeting

Prior to the commencement of any works or machinery and materials arriving on site a pre-commencement site meeting involving the project arborist, land owner or agent, site manager, contractors and engineer (as appropriate) and the relevant LPA officers will be held to ensure that all aspects of the arboricultural method statement and tree protection are understood and for all parties to swap contact details (see Appendix 2).

Monitoring and supervision schedule

The initial monitoring visit will be to check that the tree protective measures are in the correct location and as specified within the approved method statement; if so to sign off their installation.

There after monitoring visits are to take place at regular intervals, to ensure that tree protection measures are in place and are functioning as designed or whenever necessary to undertake works to be carried out under arboricultural supervision. The frequency of the monitoring visits is to be determined with the LPA tree officer at the pre-commencement site meeting.

A record of all arboricultural monitoring and supervision visits will be kept and any faults will be logged, this will then be copied to the site agent, developer and local planning authority in a digital format.

If during the course of the development it is necessary for areas to be re-designed so that they would require changes to the approved arboricultural method statement or tree protection plan and so affecting retained trees the project arborist and LPA tree officer will be invited to attend a site meeting with all relevant parties. Prior to any changes being implemented these must have been approved in writing by the LPA tree officer.

Supervision

The arboricultural consultant will be required to attend site to directly supervise all demolition and construction works that are to be undertaken within or adjacent to the RPAs of all retained trees and will be advised a minimum of 72 hours prior to the commencement of any works that require his attendance, these will include:

1. Pre-commencement site meeting & location of protective measures.
2. Any excavations within or adjacent to RPAs, including foundations, hard surfacing or underground services.

Completion meeting

Once all construction works have been completed all materials and machinery has been removed from site the project arborist shall be informed and will invite the LPA tree officer to meet on site to discuss the process and discuss any final remedial works that may be required and to sign the development off so that the protective measures may be removed.

Appendix 1: Tree Survey Schedule

BS5837:2012 Tree Survey

Arbtech Consulting Ltd.

Client: Matt Lomax
 Project: Naburn weir
 Survey Date: 20/07/2018
 Surveyor: Christopher Schroeter



Unit 3
 Well House Barns
 Chester
 CD4 0DH
 Phone: 01244 661 170

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
Estimated Measurements													
G1 A Group <i>See comments</i>	5	1	75	N	1	0	Y	A: 2.5 R: 0.89	Good	C: Good S: Good B: Good	Group of approximately 20 crack willow at the bottom of 3m incline.	C.1.2 10 to 20 yrs	
Estimated Measurements													
G2 A Group <i>See comments</i>	6	1	150	N	2	0	SM	A: 10.2 R: 1.8	Good	C: Good S: Good B: Good	Group of approximately 20 crack willow in the middle of a 3m incline.	C.1.2 10 to 20 yrs	
Estimated Measurements													
G3 A Group <i>See comments</i>	6	1	120	N	2	3	SM	A: 6.5 R: 1.43	Fair	C: Fair S: Fair B: Good	Group of five hawthorn; apical dieback in crown to the north; basal area mulched with woodchip.	C.1.2 20 to 40 yrs	
Estimated Measurements													
G4 A Group <i>See comments</i>	6	1	100	N	1	3	SM	A: 4.5 R: 1.19	Good	C: Good S: Fair B: Good	Group of two hawthorn; basal area mulched with woodchip.	C.1.2 20 to 40 yrs	
Estimated Measurements													
Age Classifications:	N	Newly planted	EM	Early Mature				Condition:	C	Crown	Stems:	Ø	Diameter
	Y	Young	M	Mature					S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature					B	Basal area	ERC:		Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC	
		No	Ø (mm)	Spread (m)	Clear (m)							
G5												
A Group <i>See comments</i>	4	1	75	N	2	0	SM	A: 2.5 R: 0.89	Fair	C: Fair S: Fair B: Fair	C.1.2 10 to 20 yrs	
				E	1	0						
				S	2	0						
				W	2	0						
G6											Estimated Measurements	
A Group <i>See comments</i>	12	1	170	N	6	3	M	A: 13.1 R: 2.04	Fair	C: Fair S: Fair B: Fair	C.1.2 10 to 20 yrs	
				E	6	2						
				S	6	3						
				W	6	0						
1												
Common Ash <i>Fraxinus excelsior</i>	9	1	210	N	4	0	SM	A: 20 R: 2.52	Good	C: Good S: Good B: Fair	B.1 20 to 40 yrs	
				E	3	0						
				S	2	0						
				W	4	0						
2												
Sycamore <i>Acer pseudoplatanus</i>	13	1	490	N	5	2	M	A: 108.6 R: 5.87	Good	C: Good S: Fair B: Good	B.1 20 to 40 yrs	
				E	4	2						
				S	4	1						
				W	5	2						
3											Estimated Measurements	
Crack Willow <i>Salix fragilis</i>	15	2	335 (Eq)	N	2	10	M	A: 50.9 R: 4.02	Fair	C: Fair S: Fair B: Fair	B.1 20 to 40 yrs	
				E	2	10						
				S	10	0						
				W	6	4						
4											Estimated Measurements	
Crack Willow <i>Salix fragilis</i>	15	1	450	N	6	1	M	A: 91.6 R: 5.39	Fair	C: Fair S: Good B: Fair	B.1 20 to 40 yrs	
				E	7	0						
				S	4	5						
				W	6	3						
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:		C	Crown	Stems:		Ø	Diameter
	Y	Young	M	Mature			S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature			B	Basal area	ERC:			Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
5										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	12	3	206 (Eq)	N	5	0	SM	A: 19.2 R: 2.47	Fair	C: Fair S: Fair B: Fair	C.1 10 to 20 yrs Located on river bank; evidence of Cameraria ohridella infection; estimated due to health and safety		
				E	3	0							
				S	4	0							
				W	4	0							
6										Estimated Measurements			
Crack Willow <i>Salix fragilis</i>	10	1	100	N	1	8	SM	A: 4.5 R: 1.19	Fair	C: Poor S: Fair B: Fair	C.1 10 to 20 yrs Located on river bank; suppressed by neighbouring trees; estimated due to health and safety.		
				E	1	8							
				S	1	8							
				W	1	8							
7										Estimated Measurements			
Common Ash <i>Fraxinus excelsior</i>	14	5	297 (Eq)	N	3	0	SM	A: 39.9 R: 3.56	Fair	C: Fair S: Fair B: Fair	C.1 10 to 20 yrs Growing on river bank at waters edge; deadwood in lower crown; estimated due to health and safety.		
				E	5	2							
				S	4	2							
				W	5	2							
8										Estimated Measurements			
Sycamore <i>Acer pseudoplatanus</i>	14	1	580	N	6	2	M	A: 152.2 R: 6.96	Good	C: Good S: Fair B: Good	B.1.2 20 to 40 yrs Multi stemmed from 2; located at the edge of a 3m bank to river.		
				E	6	2							
				S	6	2							
				W	6	2							
9										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	15	2	674 (Eq)	N	7	0	M	A: 205.6 R: 8.08	Good	C: Good S: Fair B: Fair	B.1.2 20 to 40 yrs Located at edge of 3m bank to river; 2nd stem leans north 50°; occluded pruning wound to west at 2m; cavity to south from base to 1m.		
				E	8	0							
				S	6	0							
				W	6	1							
10										Estimated Measurements			
Common Horse Chestnut <i>Aesculus hippocastanum</i>	10	1	800	N	5	2	M	A: 289.6 R: 9.6	Decline	C: Fair S: Poor B: Good	C.1.2 10 to 20 yrs Major deadwood in crown; major cankers throughout stem and crown.		
				E	5	2							
				S	5	2							
				W	4	2							
Age Classifications:	N	Newly planted	EM	Early Mature				Condition:	C	Crown	Stems:	Ø	Diameter
	Y	Young	M	Mature					S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature					B	Basal area	ERC:		Estimated Remaining Contributio


Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC		
		No	Ø (mm)	Spread (m)	Clear (m)								
11 Common Horse Chestnut <i>Aesculus hippocastanum</i>	19	1	1480	N	6	2	M	A: 707 R: 15	Fair	C: Good S: Fair B: Good	Multi stemmed from 2m; two major limb snapped out at 4m to the north.	B.1.2 20 to 40 yrs	
12 Common Horse Chestnut <i>Aesculus hippocastanum</i>	18	1	910	N	6	2	M	A: 374.7 R: 10.92	Good	C: Good S: Fair B: Good	Located at edge of river bank; pruning stubs to the west at 4m.	B.1.2 20 to 40 yrs	
13 Common Horse Chestnut <i>Aesculus hippocastanum</i>	18	1	1170	N	6	2	M	A: 619.4 R: 14.04	Decline	C: Fair S: Poor B: Good	Major limb snapped out to the south; evidence of <i>Pseudomonas syringae</i> pv. <i>aesculi</i>	U <10 yrs	
14 Common Horse Chestnut <i>Aesculus hippocastanum</i>	8	1	1250	N	1	1	M	A: 706.9 R: 15	Fair	C: Poor S: Poor B: Good	Veteran tree; major limbs removed in a reduction for veteranisation.	B.1.2.3 20 to 40 yrs	
15 Common or Black Elder <i>Sambucas nigra</i>	8	6	343 (Eq)	N	1	1	SM	A: 53.2 R: 4.11	Poor	C: Poor S: Poor B: Good	Multi stemmed from base; stems removed to south at 1m; crown dieback; <i>Auricularia auricula-judae</i> fruiting bodies throughout.	C.1 10 to 20 yrs	
16 Sycamore <i>Acer pseudoplatanus</i>	12	4	619 (Eq)	N	7	1	M	A: 173.3 R: 7.42	Good	C: Good S: Fair B: Good	Tight union with included bark at 1m; rope inclusion at 1m to north.	B.1 20 to 40 yrs	
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:			C	Crown	Stems:		Ø	Diameter
	Y	Young	M	Mature				S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
	SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:			Estimated Remaining Contributio

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC	
		No	Ø (mm)	Spread (m)	Clear (m)							
17 Common Ash <i>Fraxinus excelsior</i>	12	1	350	N	5	1	SM	A: 55.4 R: 4.19	Good	C: Fair S: Good B: Good	Located at edge of river bank.	B.1 20 to 40 yrs
18 Common Ash <i>Fraxinus excelsior</i>	12	1	420	N	2	2	SM	A: 79.8 R: 5.03	Good	C: Fair S: Good B: Good	Located at edge of river bank.	B.1 20 to 40 yrs
19 Common or Black Elder <i>Sambucas nigra</i>	4	10	316 (Eq)	N	2	0	SM	A: 45.2 R: 3.79	Good	C: Good S: Good B: Good	Multi stemmed from base; growing in old wall base.	C.1 10 to 20 yrs
Age Classifications:	N	Newly planted	EM	Early Mature	Condition:	C	Crown	Stems:	Ø	Diameter		
	Y	Young	M	Mature		S	Stem		(Eq)	Equivalent stem diameter using BS5837:2012 definition		
	SM	Semi-mature	OM	Over Mature		B	Basal area	ERC:		Estimated Remaining Contributio		

Appendix 2: Contact Details

Name	Position	Company	Contact
Matthew Lomax	Client	Renewables First	https://www.renewablesfirst.co.uk/
	Tree Officer		
Alan Thompson	Arboricultural Consultant	Arbtech Consulting Ltd.	01244 661170 07703 676216 at@arbtech.co.uk
	Site Manager		
	Main contractor		

Document Production Record

Document number	Editor	Signature	Position	Issue number	Date
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