Project No:	CRMCS061
Project Name:	Worsbrough Reservoir Stage 1 Veg clearance

BALFOUR BEATTY UK

APPENDIX C
SUSTAINABILITY PLAN

(PRM-TF-0001d)

Template Issue Date: 01/03/2021
Template Version No: 1.1
Template Authoriser: Sophie Stephens

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1. INTRODUCTION

1.1. Purpose of plan

The purpose of this document is to define the project specific approach to the management of sustainability, environmental compliance and delivery of social value outcomes of project activities.

The plan details the control measures applied to operational activities to ensure that risks are mitigated and opportunities realised.

1.2. Plan links to other sections of Project Management Plan

The overall Project Management Plan documents how all aspects of the ISO 14001 standard are addressed. Specific sections of note are:

Scope and Requirements	Section B
Project Objectives	Section C
Resources and Responsibilities	Section E
Induction, training and Briefing	Section F
Risk assessments	Section F
Compliance checks and Inspections	Section F
Communication and liaison with Interested Parties	Section F
Customer Satisfaction, Feedback and Improvement	Section E
Supply Chain Management	Section D
Documentation and Records	Section A

1.3. Relevant documents, records and plans

The table below lists existing records and plans, containing findings and recommendations, which must be considered in planning of operational activities e.g. contaminated land surveys, drainage surveys, ecology reports, noise assessments, planning conditions, green certification pre-assessment, customer targets, work winning commitments

Pre-Construction Surveys, Records and Plans	
1	Preliminary Ecological Appraisal, January 2022
2	Preliminary Ecological Appraisal, November 2022
3	Preliminary Ecological Appraisal Revision One Feb 2023
4	Natural England Assent, October 2022 Feb 2023
5	Arboricultural survey report, December 2021; North Bank
6	Tree Constraints plan, Northwest Bank
7	Tree shade plan, Northwest bank
8	Tree survey data, south bank, October 2022
9	Arboricultural survey south bank, October 2022
10	Tree constraints plan, South bank, November 2022
11	Arboricultural Impact Assessment – South side
12	Arboricultural Impact Assessment – South of Worsbrough
13	Tree Protection plan south side
14	Environmental risk assessment
15	Tree works Schedule – North Bank Worsbrough Reservoir Rev B

Pre-Construction Surveys, Records and Plans	
16	Tree Location Map North Bank Worsbrough Reservoir Rev B

2. MANAGEMENT OF THE WORK

This section sets out the project specific actions that will be taken to meet the customer sustainability requirements and deliver against the company's sustainability strategy Building New Futures.

Sustainability data for the project is recorded and monitored through the Sustainability Portal on a monthly basis. Details on how data is captured and reported can be found in SUS-PR-0001 Sustainability Reporting Procedure

2.1. Project Sustainability Objectives and Targets

The following table provides a summary of the projects sustainability objectives and measures. The targets and management of these objectives are detailed in the Involved Plan within the Sustainability Portal

*Project Lead to update and amend the table below with project specific objective in line with Business Unit Sustainability Action Plans and customer requirements This should then be used to complete the Involved plan (project sustainability action plan) on the Sustainability Portal. Projects should set their own targets based on customer and business unit objective and use the Sustainability Portal to track their performance.

Objective	What We Measure
Environment	
Reduce direct carbon emissions	Scope 1&2 CO_2e emissions
Increase bio diversity	Bio diversity net gain calculation for the scheme
Materials	
Reduce Waste Generated	Waste Produced (tonnes)
Reduce Waste to Landfill	Waste Sent to Landfill (tonnes)
Use locally sourced materials	Location of stone
Communities	
Local labour (local is to be within 40 miles of the scheme)	Number of local employees and subcontractors on the project
Local procurement (Local is to be within 40 miles of the scheme)	Number of local people on the project
Charitable Fundraising / Donations	Amount raised/ donated

Volunteering	Number of hours spent volunteering
Local community	Engagement with a non-profit

2.2. Sustainability and Environmental Roles and Responsibilities

Everyone in Balfour Beatty UK has a responsibility for implementing and adhering to the principles of the Sustainability, Environmental and Social Value Policies of the company in order to effectively carry out their role.

The project management structure and responsibilities are located in section E of the Project Management Plan. This section documents who the Project Sponsor / Lead has assigned responsibilities of the both the Sustainability Co-ordinator and Environmental Management Representative roles to within the project team.

The Project Lead is responsible for assigning appropriate roles and responsibilities within the project management team. They must adequately reflect the significant environmental risks and opportunities that have been identified to ensure that legal compliance obligations can be met and Balfour Beatty BMS requirements delivered.

Individual team members that sign up to project specific sustainability and environmental roles need to be made aware of the responsibilities detailed below. By signing up to one of these roles, they are confirming that they understand and accept the designated duties and responsibilities.

Sustainability Co-ordinator	
Name(s)	Chris South
Deputy Name(s)	Craig Chapman
Contact Number	07815702525
Assigned Responsibilities	
• Communicate sustainability good practice, case studies, innovation and targets to the project team, supply chain, and wider HSES and communication teams • Ensure an 'Involved' (project sustainability action plan) is in place on the Sustainability Portal, and being followed and updated at least every six months • Ensure Sustainability KPIs are reported, submitted and signed off on a monthly basis in the Sustainability Portal and are reported to the project team and customer (as required) • Ensure customers' sustainability (including social value) requirements are being met • Act as the main point of contact for sustainability between the project team and the wider HSES Team	
I confirm that I understand and accept the designated duties and responsibilities Designated Signature:	
I confirm that I understand and accept the designated duties and responsibilities Deputy(s) Signature(s):	

Environmental Management Representative	
Name(s)	Chris South
Deputy Name(s)	Craig Chapman
Contact Number	07815702525
Assigned Responsibilities	
• Ensure that identified operational controls for the management of environmental risks and opportunities are implemented and have the intended outcome • Ensure that operational controls implemented for the management of environmental risks and opportunities are assessed, monitored and their performance reported to site / project leader • Approval to assign responsibilities to a Deputy and / or Assistant Environmental Management Representative to meet Contract, Site or Project specific environmental risk and opportunities requirements • Ensure that all responsibilities set out in the contract / project management plan and delegated duties letter are met	

I confirm that I understand and accept the designated duties and responsibilities Designated Signature:
I confirm that I understand and accept the designated duties and responsibilities Deputy(s) Signature(s):

3. ENVIRONMENTAL MANAGEMENT PLAN - ARRANGEMENTS FOR MANAGEMENT OF SIGNIFICANT ENVIRONMENTAL RISKS AND OPPORTUNITIES

3.1. Significant Project Environmental Risk and Opportunities

An Environmental Risk and Opportunities Assessment of site activities has been conducted and is fully documented in the Environmental and Sustainability Risk and Opportunity Register which is located in folder L of the contracts document filing system.

The significant environmental aspects identified for this project are as follows and will be communicated in the Site Induction:

Environmental Aspect	Environmental Category	Environmental Impact and Risk	Control Measure to Mitigate Risk and Realise Opportunity for Improvement	Who is Responsible for the Control Measure
Vegetation Clearance	Ecology & Biodiversity	Impact: Loss of biodiversity/ loss of habitat/disturbances and damage to protected species and their habitats Risks: insufficient measures taken to dissuade nesting bird species an terrestrial species e.g. reptiles, negative publicity, reputational damage, failure to fulfil compliance obligations, work stop, programme delays	Normal / Abnormal: vegetation clearance and stripping to be kept to a minimum / potential for ecology to be assessed prior to works / vegetation clearance to take place before end of February and after end of September (start of nesting season) / any clearance undertaken during months of March to September to be dine with guidance on an ecologist / ecology survey may be required / fingertip searches / consult ecologist	C.South

Environmental Aspect	Environmental Category	Environmental Impact and Risk	Control Measure to Mitigate Risk and Realise Opportunity for Improvement	Who is Responsible for the Control Measure
			/ consent for working in protected sites to be obtained prior to work / use only approved pesticides adjacent to watercourses / invasive species management plan / section 61 consents in place for night time works / replant trees where possible / install silt mitigation measures Emergency: Stop works	
Working within or close to protected sites e.g. SSSI	Ecological & Biodiversity	Impact: Damage to protected areas / loss of biodiversity / disturbance to protected species / visual impact on protected area / potential pollution to protected areas from litter and releases to water Risks: reputational damage, negative publicity, prosecution, fine, delay to works	Normal / Abnormal: Contact Natural England / Scottish Natural Heritage / Natural Resources Wales or equivalents to obtain consent/assent for work and to agree working methods / consult ecologist / re-route works / site specific method statement / brief control measures to site teams / method statements / seek advice and guidance from local fisheries trust or specialist	C.South

Environmental Aspect	Environmental Category	Environmental Impact and Risk	Control Measure to Mitigate Risk and Realise Opportunity for Improvement	Who is Responsible for the Control Measure
			fisheries contractor if work may have potential impact on fisheries Emergency: Stop work Opportunities: build good working relationship with regulator through liaison during planning phase	
Working near protected species	Ecology and Biodiversity	Impact: Disturbance or damage to protected species and their habitats / loss of biodiversity Risks: possible fine, prosecution, reputational damage, delay to works	Normal / Abnormal: Consult with Client to establish whether ecology survey has been carried out / preconstruction ecology survey is carried out / species specific surveys carried out / fingertip searches / apply for protected species licence and follow conditions / controls such as translocation, watching brief or other suitable mitigation measures to be included in method statements / teams to be briefed on controls / mitigation measures to be implemented /	C. South

Environmental Aspect	Environmental Category	Environmental Impact and Risk	Control Measure to Mitigate Risk and Realise Opportunity for Improvement	Who is Responsible for the Control Measure
			support to be provided by environmental advisor or specialist ecological resource where required Emergency: Stop work and inform team leader / site manager. Consult environmental advisor / specialist.	

3.2. Legal Permits, Consents and Licenses

The project has the following permits, consents, licences and exemptions in place. They hold legal compliance requirements that are met within the project operational activities. Copies can be located in Folder L of the contracts document filing system.

Permits, Consents, Licences and Exemptions	Requirements	Monitoring and Inspection Arrangements for Compliance	Responsibility
Natural England Assent	No work in or around mature trees in the area	Trees are all numbered. Work only on trees to be removed or pruned	C. South

3.3. Identification of Environmentally Sensitive Receptors

The projects sensitive receptors have been assessed and are listed below.

*The table needs to be made location specific to reflect the assessment findings. Delete/Add as appropriate this list as required.

Feature/Issue	Details
Protected Sites e.g. SSSI	SSSI area to the north west of the scheme.
Water course (please name)	Worsbrough reservoir, River Dove
Land/field drains	N/A
Private water supply	N/A
Ground water / aquifer	N/A
Cultural Heritage	N/A
Archaeology	N/A
Protected Species e.g. Bats, Badgers	Bats Nesting Birds
Industrial / retail / business units	N/A
Residential properties	Properties on the north bank facing the reservoir works (potential noise management)
Educational establishment	N/A
Hospitals / medical facilities	N/A
Public buildings (not otherwise mentioned)	N/A
Woodland / Trees	Trees and hedges protected as part of the works
Tree Protection Orders (TPO)	As above
Hedgerows	As above
Injurious & Invasive Species e.g. Giant Hogweed/Japanese Knotweed	N/A
Public footpaths	N/A
Farm Land / Crops	N/A
Farm animals	N/A
Derelict Land	N/A
Parks/recreation areas	Whole area is a country park
Other (Please Detail)	

3.4. Site Plan

A copy of the site plan can be found in Appendix A of this document and includes the following: See also Master Pollution incident Plan (ENV-TF-0005a)

Surface water drains	Combined drains/sewers	Drainage interceptor

Drainage ditches	Land/field drains	Water environment e.g. rivers, streams, brooks, pond, canal, reservoir
Sustainable drainage system area	Water abstraction points/borehole/private water supply	Site services and shut off valves/points
Material storage/bays	Spill kits/emergency response equipment	Waste collection points/skips
Fuel & chemical storage	Sensitive areas (as identified in the previous table)	Other (please detail)

4. ANNEXES

Documentation to deal with activity and location specific Environmental Risks and Opportunities:

1. Existing environmental contents, permits and licences
2. Previous environmental assessments
3. Site plan
4. Project Environmental Risks and Opportunities Tool ENV-SF-0001a
5. Specific Method Statements to address environmental risks
6. Ecology reports

ANNEXE 1

Natural England Assent for SSSI

Our ref: HDS/BMBC / 2022/2023
Your ref: Dearne Valley Wetlands SSSI
Worsbrough Mill - Replacement of waterside banking

Nicola Staniforth
Programme Management Service Manager
Property Services
Growth and Sustainability
Barnsley MBC
PO Box 634
Barnsley
S70 9GG

Yorkshire & North
Lincolnshire Area
Natural England
Lateral
8 City Walk
Leeds
LS11 9AT

Dear Nicola

ASSENT OF NATURAL ENGLAND UNDER SECTION 28H OF THE WILDLIFE AND COUNTRYSIDE ACT 1981 (AS AMENDED) Dearne Valley Wetland Site of Special Scientific Interest South Yorkshire

Natural England assent to the proposals made in your notice of 23/09/2022, 3/10/2022 email dated13/10/22 and email dated 15/02/23 under S28H of the Wildlife and Countryside Act 1981 (as amended), specifically operation as detailed below. Worsbrough Mill - Replacement of waterside banking

If you wish to change the proposed operation or carry out additional operations for which assent has not yet been given, or if a time period given in your letter of date has expired, you are required to give further written notice to Natural England.

I draw your attention to your duty, under section 28G of the Wildlife and Countryside Act 1981, as inserted by the Countryside and Rights of Way Act 2000, to take reasonable steps, consistent with the proper exercise of your functions, to further the conservation and enhancement of the SSSI.

Signed for Natural England:

Helen Smith

.....

Print name: …Helen Smith…. **Date 21/02/2023**

Notice of proposal to carry out an operation affecting a site of special scientific interest (SSSI)

Name of site of special scientific interest (SSSI):
Dearne Valley Wetlands SSSI

Name and address of public body or statutory undertaker:
Barnsley MBC
PO Box 634
Barnsley
S70 9GG

Email address:
Nicolastaniforth@barnsley.gov.uk

Phone number:
07827962007

We give notice to Natural England under Section 28H(1) of the Wildlife and Countryside Act 1981 (as amended and inserted by section 75 and Schedule 9 of the Countryside and Rights of Way Act 2000) of our proposal to carry out the operations specified below in the exercise of our functions and on the land as specified below.

Operation and land details

Continue on separate sheet if necessary or attach additional information or documents.

Specified operations (summary of proposal):
Replacement of waterside banking to the north-west of Worsbrough reservoir in the interest of health and safety for site users.

Details of proposed operations:
The existing low level retaining wall has collapsed into the water creating a significant hazard for site users.

The proposal is to demolish what remains of that wall and replace the low level banking with either rock armour or sheet piling backfilled with earth, then reestablish a level top surface to provide a platform for access to the area.

The extent of the works will take into consideration the presence of mature native tree species.

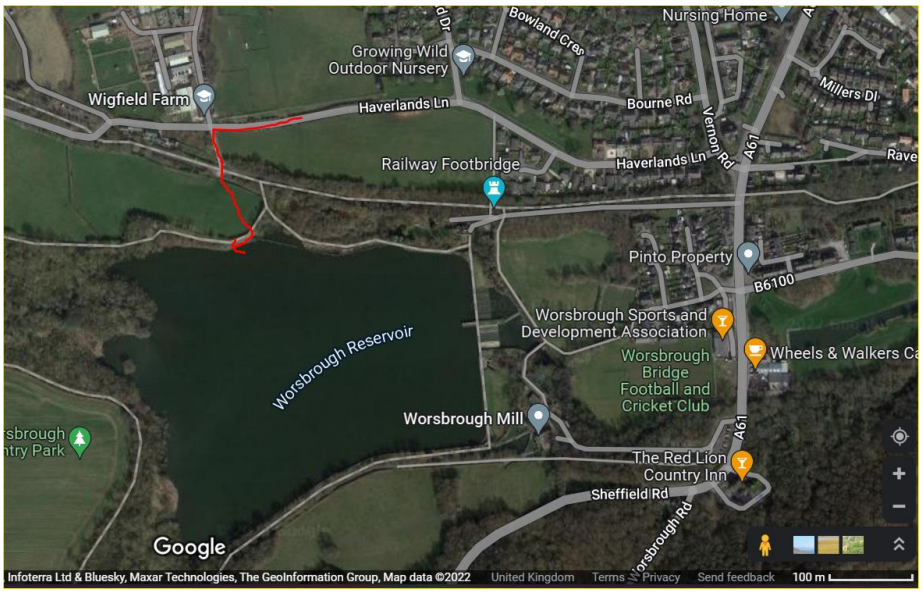
The standard reference numbers for the types of operation which will be undertaken are:
13c, 14, 15, 20, 21, 23, 26,

Timing of proposed operations (including avoidance of certain weather conditions):
It is proposed to undertake the works during autumn/winter 2022/23. Given that we have already entered that period, there is a possibility that works will be underway but not concluded before April 2023. Were this to be the case, we would require NE support to continue working in the area with completion expedited to minimise impact on nesting and spawning seasons.

Land on which operations are to be carried out (include map):
The accompanying appendix 1 shows a map of the affected site and images of the types of vegetation and wildlife currently present.

Storage and disposal of materials:
Materials will be stored in access the field adjacent the north bank (as indicated in appendix 1).
Wherever possible, existing materials will be re-utilised to reduce waste. Where materials have to be disposed of this will be undertaken in compliance with UK legislation.

Precise routing of operations and vehicles:
Materials and equipment will be delivered to site along Haverlands Lane then cross into the field site compound. A temporary road surface will be installed to minimise damage to the grassland.
It will be necessary to take down a section of hedgerow between the field and the waterside to enable access. (This will be replanted upon completion of the works.) Operations and vehicles will then turn right along the footpath to reach the waters' edge.



Frequency of access:
The scope of banking replacement works extends beyond the SSSI area so it will be necessary to keep this access route open for several months. Traffic is expected in this area for 5-6 days per week during the construction phase.

The provenance and chemical nature of imported materials:
Options for the final design solution are based on use of limestone rock armour or steel sheet piles to create a cavity which will be lined with a geotextile membrane and backfilled with existing materials plus any additional type 1 or 2 aggregate and topped with topsoil or type one material to create a porous but firm surface.
Natural materials will be sourced from local quarries wherever possible.

Type and ground-pressure of vehicles to be deployed:
It is anticipated that much of the work will be carried out from the waterside using a barge/boat to carry materials.
Restricted path widths in the area mean only vehicles of a long wheel-based Transit-type van can get to the water's edge. Once their load is deposited they will return to the field site compound.

Mitigation measures:
The full extent of the collapsed wall will not be replaced. Works will cease ahead of the area where established trees are present to minimise long term impact on habitats (This is indicated in appendix 1).
Any damaged grassland and hedgerows will be replaced upon completion of the project.
Additional native low growing shrubs and trees will be incorporated on the upper banking area to increase opportunities for habitat creation.

Further information:
An ecology survey and a tree study have been carried out at this site. The reports are included as appendix 2 and 3(a-d) respectively.

Signed by on behalf of public body / statutory undertaker:



Date:
23rd September 2022

Using and sharing your information

The Data Controller is Natural England. For further information on how we process your personal information please see the sites of special scientific interest (SSSI) privacy notice at www.gov.uk/government/publications/natural-england-privacy-notices.

Email 13th October 2022

Good afternoon Helen

Thank you for looking at this for me. Please see attached re-attempt on annex 1.

In terms of timeline, an indicative programme (based on finishing detailed designs and obtaining planning permission) suggests works commence on the banks in April 2023 and conclude in August 2023 – the overall works cover a wider area than that in the SSSI so it may be that the time spent here is reduced. I'm working with the local angling society and the EA about wider ecological impact.
Pre-construction works to clear vegetation and reduce the water level will take place Jan/Feb to ensure we avoid nesting and spawning seasons. Reinstatement of hedgerows etc will form part of the remediation works under the scheme.

I'm actually on leave next week so if you need any further information I'll be around tomorrow (14th) then back on 25th.

Best wishes

Nicola Staniforth (Mrs)
Programme Management Service Manager
Property Services
Growth and Sustainability
Barnsley Council
Mob: 07827962007
Email: NicolaStaniforth@barnsley.gov.uk
Mail: Property Services, PO Box 634, Barnsley, S70 9GG

Email 15th February 2023

Good morning Helen

I hope you're keeping well.

I'm writing to request an extension to the timeline for completion of works at Worsbrough. We've experienced delays in obtaining planning permission and now expect the actual works may run on into October 2023 then there'll be the requirement to reinstate trees, hedges, grasses which will be carried out during the autumn/early winter. So, the extension I'm looking for is to 31st December 2023.

Please can you advise if this is acceptable or, if not, what further activities I need to

undertake to obtain assent.

Many thanks

Nicola Staniforth (Mrs)

Programme Management Service Manager

Property Services
Growth and Sustainability

Barnsley Council

Mob: 07827962007

Email: NicolaStaniforth@barnsley.gov.uk

Mail: Property Services, PO Box 634, Barnsley, S70 9GG

ANNEXE 2

TPP Areasouth of worsbrough reservoir Rev D
Selwyn Trees arboricultural impact assessment for site south of worsbrough reservoir Rev D
Selwyn Trees Arboricultural Method Statement South of Worsbrough Reservoir Rev D
Selwyn Trees Arboricultural survey BS5837 Worsbrough North
Tree works Schedule – North Bank Worsbrough Reservoir Rev B
Tree Location Map North Bank Worsbrough Reservoir Rev B
Environmental RA
Extracts from BMBC tree preservation order map

RPAs (Root Protection Areas) are illustrated by grey hatched polygon areas.

For groups the illustrated RPAs were approximated.

Crown spreads are illustrated by green, blue, grey or red outlines depending on the retention category of the tree.

Hedges are illustrated by green hatched areas.

Trees are referenced as T(n)

Groups and hedges are referenced as G(n) and H(n)

Tree measurements were estimated

The default position as outlined in BS5837:2012 is that all new development should be located outside of RPAs, and crown spreads of trees to be retained.

All new utilities and service runs need to be located outside of RPAs of retained trees.

Within RPAs there must be no excavation, no soil piling, no storage of materials, no spillage of construction waste and no spoil thrown out on or near RPAs. The soil within RPAs must not be compacted.

Trees to be removed to facilitate development:

T341- Hawthorn, Category C2
T361- Willow, Category C2
G10- A group of Hawthorn trees- Category B2
T373- Willow, Category C2
T393- Hawthorn, Category B2
Around 8m of hedge H4 (Category B2), opposite T361
Around 8m of hedge H4 (Category B2) opposite T373
T339- hawthorn- dead tree- Category U- remove tree
T400- Willow, Category C2

T362- Willow- Category U- Remove tree due to its poor structure which will create conflict with the path as it continues to grow in the medium to long term.

Trees to be pruned to facilitate development:

T308, T309, T315 T337, T340, T342 T343, T346, T350 T360, T364, T365, T394, T397, T398, T399

Rigid Heras tree protection fencing to be used:



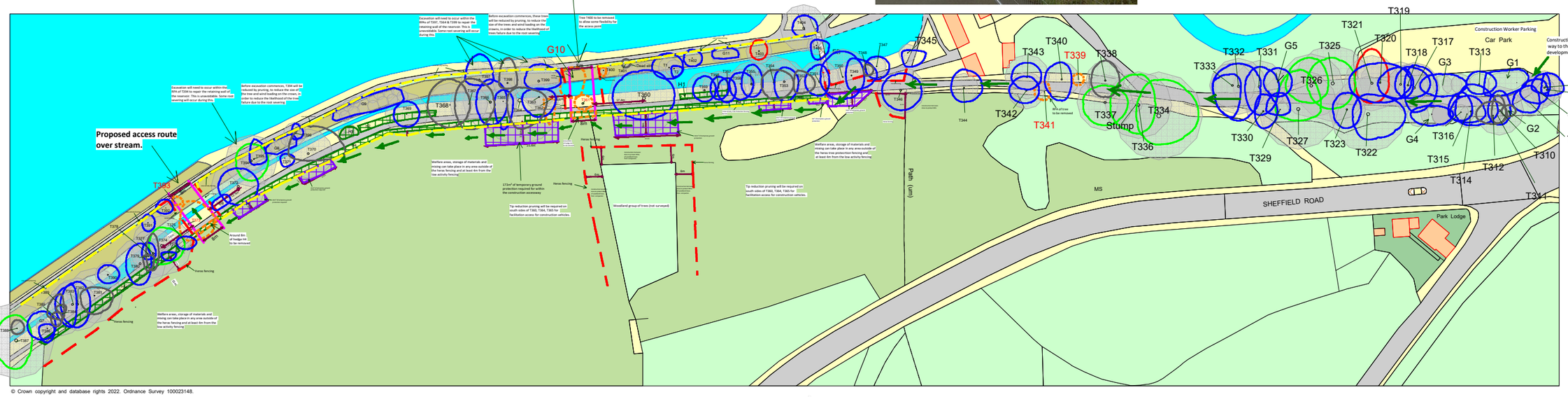


Temporary Ground Protection To minmise compaction of soil within RPAs:

The type of temporary ground protection used will consist of a Ground Protection Board system such as Lion Panel, or Hybrid Panel. A geotextile membrane will be laid, then a 150mm depth of woodchip, and then the protection board system will be laid on top. LION PANELS and other similar systems are profiled aluminium panels which are used to reinforce assembly areas, access roads and event venues. They have low weight and can distribute concentrated loads

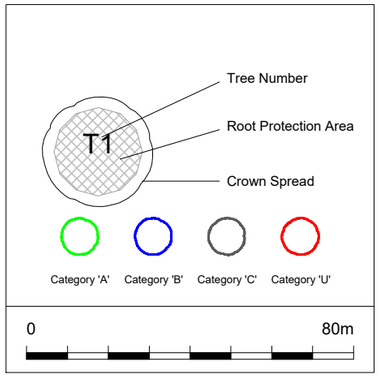
Photograph (below): An example of a ground protection boards system on top of a compressible mulch chip layer and membrane, to spread the load and lessen compaction onto the soil below: Photo credit to: https://www.ground-guards.co.uk/product/multitrack-2-44m-x-1-22m-8x4/





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= Hedges/ Groups



= Trees to be removed for development

= Proposed access route over stream.

= Heras Tree protection fencing

= Temporary ground protection

= Low activity Tree Protection fencing barrier

= Designated Construction access way

No other access way will be used by construction machinery or vehicles

Example of Low Activity barrier - Plastic Barrier Fencing/mesh:

Barrier fencing mesh is an extruded polypropylene plastic mesh fencing, stabilised with standard steel fencing pins inserted into the ground (minimum 1m height).





Trees were plotted with a GPS receiver and manual measurements were taken to nearby features, where available. However, there may be error margins with GPS receivers, and in dense vegetation the signal can be interrupted. Therefore, the tree positions on this map are APPROXIMATE ONLY. If accurate tree positioning is required a topographical survey will be needed.

Do not scale from these drawings. All measurements should be checked on site.

SELWYN TREES
TRAINED. QUALIFIED. TRUSTED.
30 Tickhill Road Doncaster
South Yorkshire DN4 8QE
01302 816850
info@selwyntrees.co.uk

Tree Protection Plan Area at Worsbrough Country Park, South of Reservoir, Worsbrough, Barnsley, S70 5LJ, Rev. D

SCALE : 1 : 1500 @ A3
DATE : 09/03/2023
N
MAP FILENAME : TPP Area South of Worsbrough Reservoir, Rev. D

Map data shown may contain Ordnance Survey ® products supplied by Pear Technology Services Ltd; Email: info@peartechnology.co.uk
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SELWYNTREES

ARBORICULTURAL CONSULTANTS

Arboricultural Impact Assessment Rev. D

Survey for trees at the site:	Area South of Worsbrough Reservoir, Worsbrough, Barnsley, S70 5LJ
Prepared for:	Barnsley Metropolitan Borough Council
Arboricultural Survey Reference	TreeSurvey **0321**
Date(s)	9th March 2023
Surveyor (s)	R D Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA / S Selwyn, Dip Arb L4 (ABC)

Selwyn Trees
30 Tickhill Road
Doncaster
South Yorkshire
DN4 8QE
01302 816850
Email: info@selwyntrees.co.uk

Arboricultural ASSOCIATION Professional Member

CERTIFIED ARBORIST ISA

S Selwyn UI-1272A

QTRA Registered User

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This report should be read in accordance with the following documents and maps:

Documents:

- 'Introduction to Arboricultural Survey BS5837'
- 'BS5837 Tree Survey Table'
- 'Arboricultural Method Statement'

Maps:

- 'Tree Constraints Plan'
- 'Tree Shade Map'
- 'Tree Protection Plan'

1.0 INTRODUCTION

1.1 Nicola Staniforth on behalf of Barnsley Metropolitan Borough Council engaged Selwyn Trees to carry out an Arboricultural Survey and an Arboricultural Impact Assessment for an area of land south of Worsbrough Reservoir, Worsbrough, Barnsley, S70 5LJ.

1.2 The purpose of this impact assessment report was to advise on any Arboricultural issues which relate to a proposed development. An initial Arboricultural Survey site visit was carried out on the 21st, 24th & 25th of October 2022.

1.3 The survey was carried out following BS5837: 2012- 'Trees in relation to Design, Demolition and Construction - Recommendations'.

1.4 We were not provided with any documents:

2.0 SUMMARY OF FINDINGS

2.1 This proposal, referenced in this impact assessment, is for works to repair sections of the south side of the reservoir wall at Worsborough Reservoir.

2.2 5 x trees, 1 x dead tree, 1 x group of trees and 2 x sections of hedging are proposed to be removed to facilitate construction access to the development area. Access routes are to be constructed over the stream to reach the south side of the reservoir. The positions of the two access routes have been chosen to minimise the number of tree removals required.

2.3 Some minor facilitation access pruning will be required.

2.4 Rigid protective fencing shall be used to restrict all construction access to trees on the site, to prevent physical damage occurring to trees from construction machinery and to minimise compaction damage within RPAs (Root Protection Areas).

2.5 Where construction access is required throughout RPAs of trees, temporary ground protections shall be used.

2.6 Excavation is unavoidable within the RPAs T394, T397, T364 and T399 in order to repair the retaining wall. These trees are proposed to be pruned and reduced in height to reduce the wind loading on them, to reduce the likelihood of failure after excavation has occurred. Site supervision and monitoring by an arboriculturist is essential at key stages throughout this project to minimise damage and detrimental effects of the development on existing trees.

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees have been plotted on Tree Protection Plan attached. Please see the attached document '*Introduction to Arboricultural Survey BS5837*' for photographs of the site and the attached document **'BS5837 Survey Table'** for measurements and comments on the trees surveyed.

3.2 The RPAs (Root Protection Areas) are illustrated with grey hatched polygon areas on the attached Tree Constraints Plan and Tree Protection Plan. The crown spreads are illustrated by either green, blue, grey or red lines, depending on the retention category of the tree.

General construction site hazards:

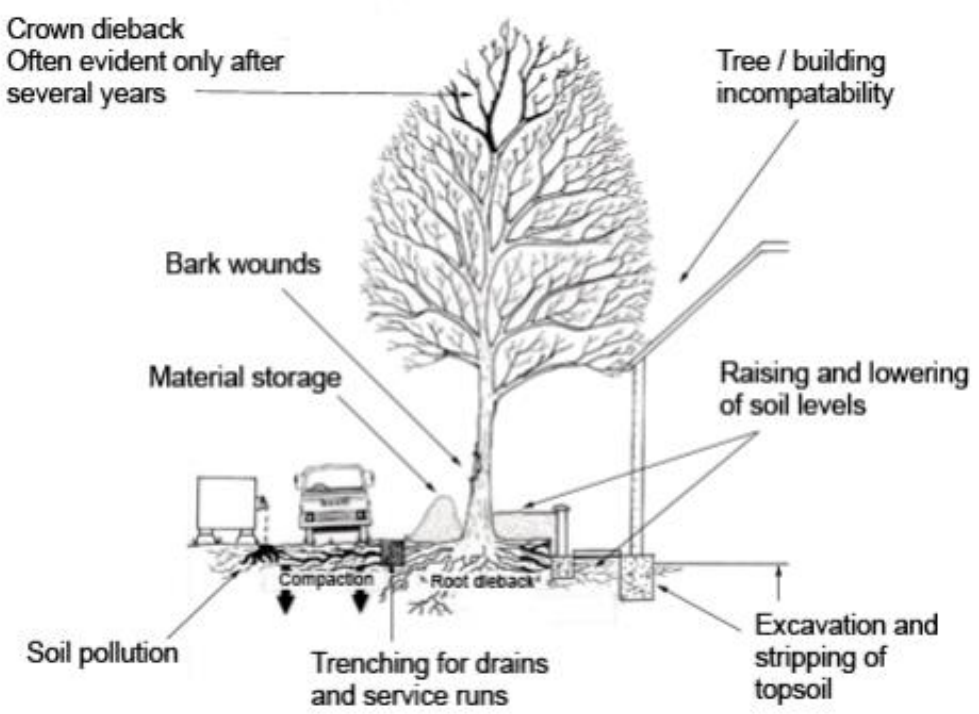


Image 1: Credit to District Department of Transportation Urban Forestry Administration https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/guidelines_tree_protection_during_construction.pdf

Snapshot Excerpts from the Tree Protection Plan are shown below:

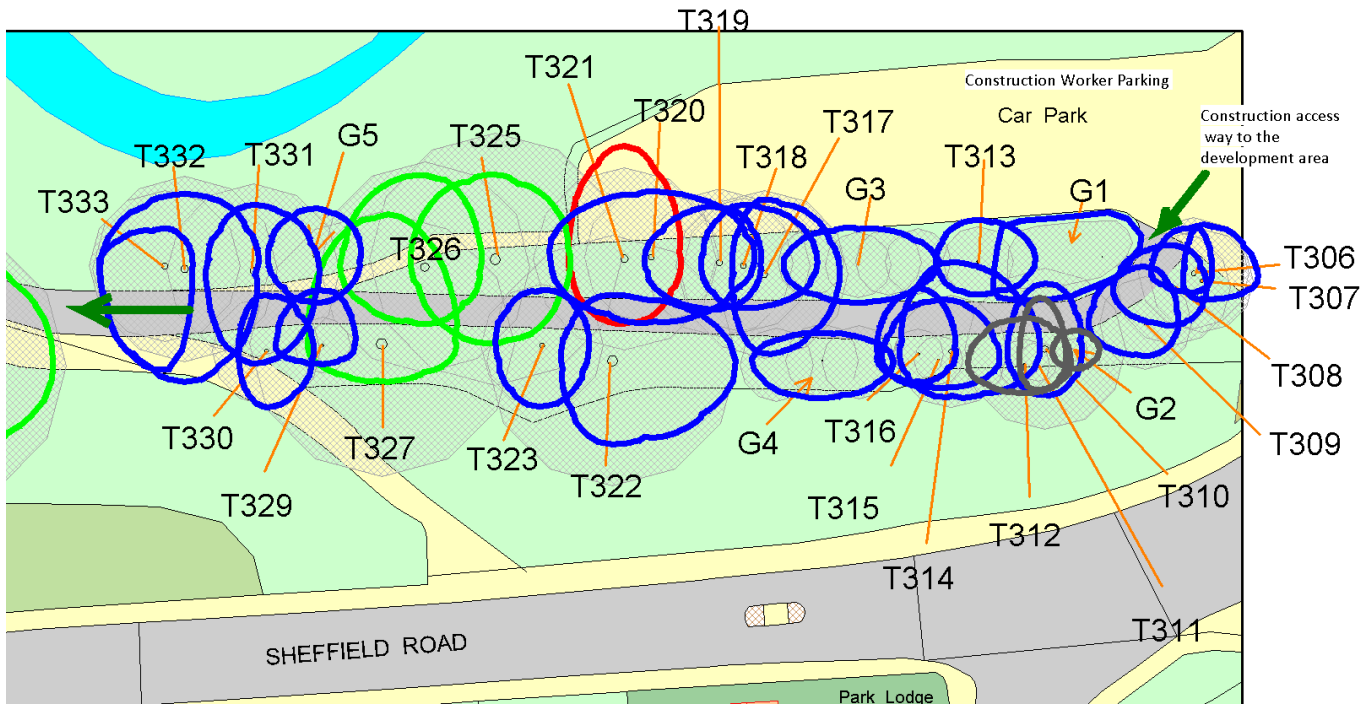


Figure 1: Green arrow shows the proposed construction route to the development area

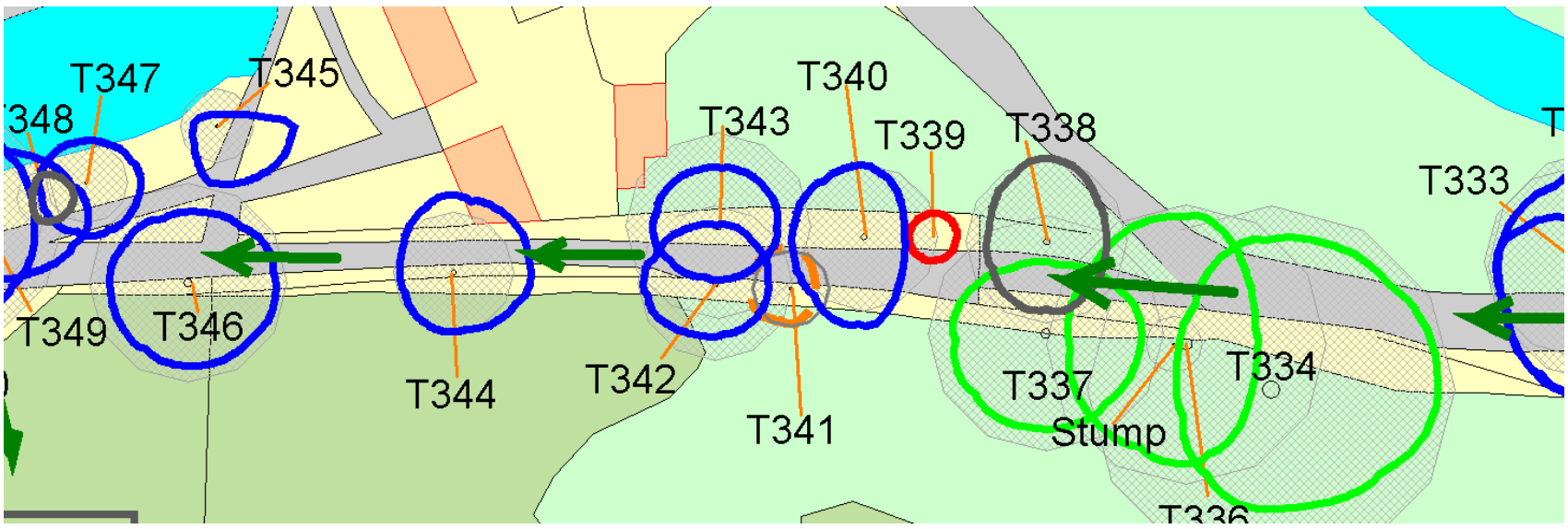


Figure 2: Green arrow shows the proposed construction route to the development area

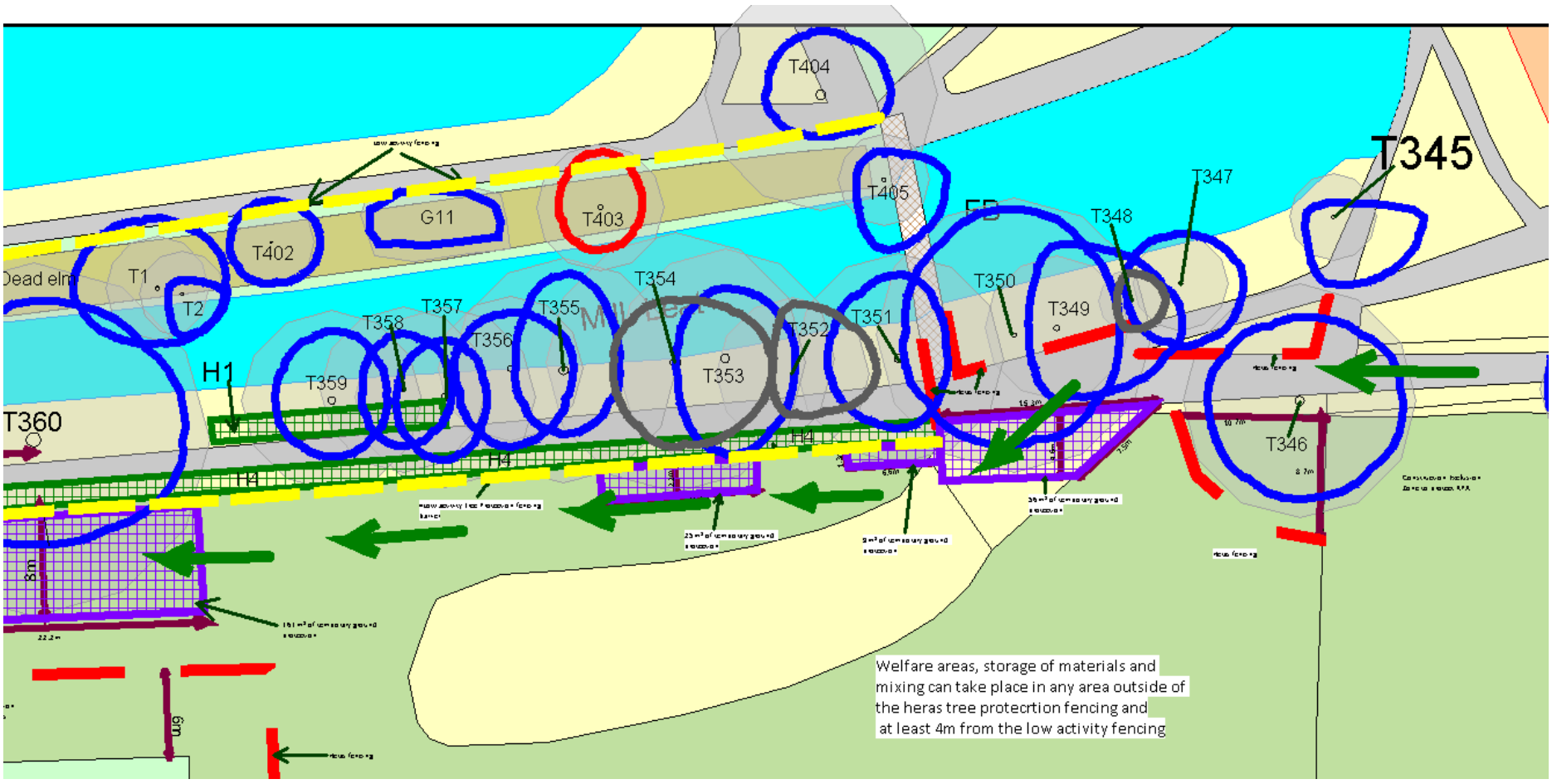


Figure 3: Green arrow shows the proposed construction route to the development area and the proposed access route over the stream (pink lines), with tree removals required shown by dashed orange outlines

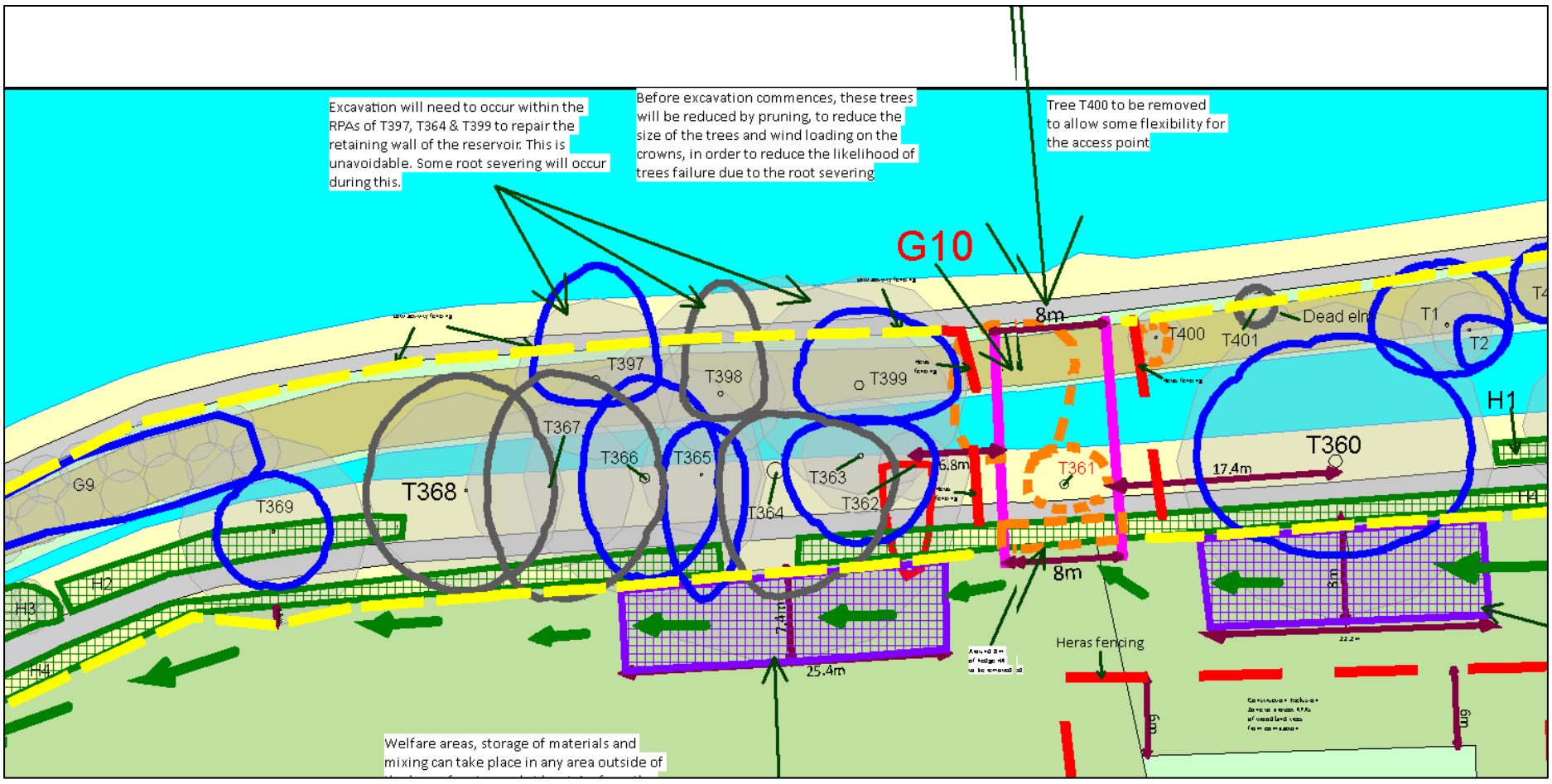


Figure 4: Green arrow shows the proposed construction route to the development area and the proposed access route over the stream (pink lines), with tree removals required shown by dashed orange outlines

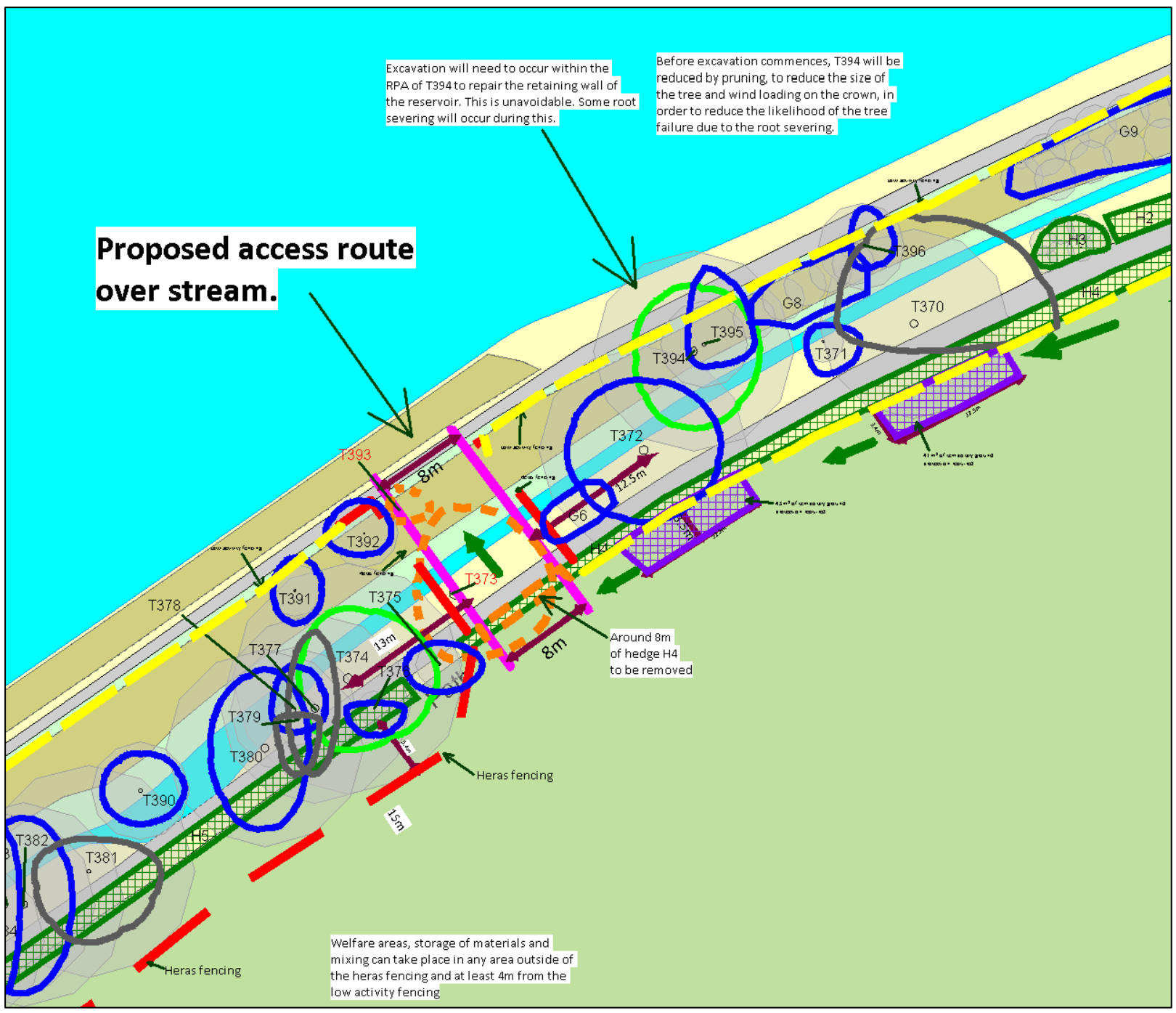


Figure 5: Green arrows show the proposed construction route to the development area and the proposed access route over the stream (pink lines), with tree removals required shown by dashed orange outlines

Direct Impact 1:

3.3 Tree removals required for development:

- T341- Hawthorn, Category C2
- T361- Willow, Category C2
- G10- A group of Hawthorn trees- Category B2
- T373- Willow, Category C2
- T393- Hawthorn, Category B2
- Around 8m of hedge H4 (Hawthorn hedge Category B2), opposite T361
- Around 8m of hedge H4 (Hawthorn hedge Category B2) opposite T373
- T339- hawthorn- dead tree- Category U- remove the tree
- T400- willow – Category C2
- T362- Willow category U - Remove the tree due to its poor structure which will create conflict with the path in the medium to long term.

3.4 These tree removals are required for construction access to the development areas. The proposed access routes over the stream have been chosen to minimise the impacts on the existing trees as much as possible.

The first access way over the stream to the south side of the reservoir:

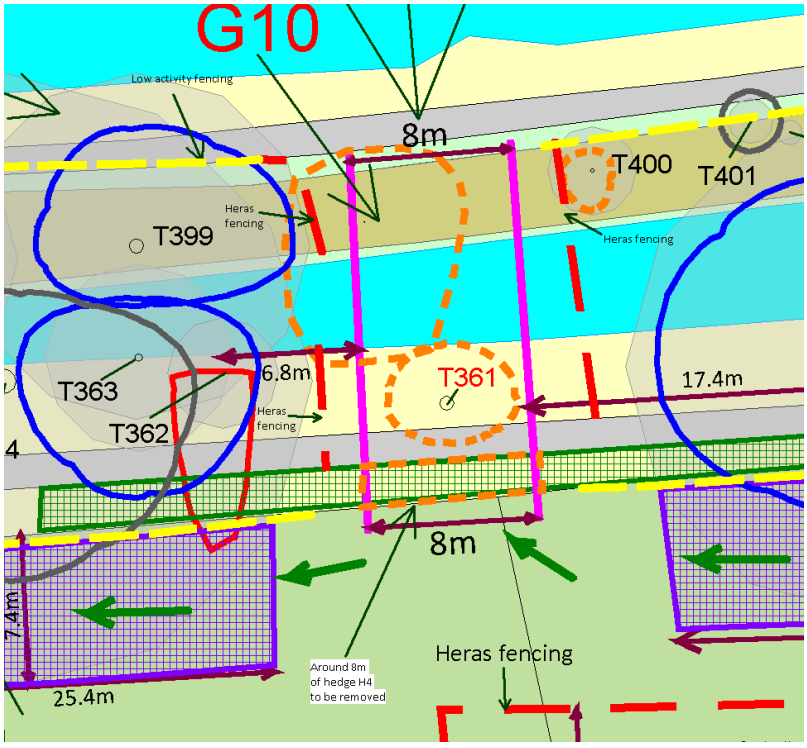


Figure 6 (above): excerpt taken from the Tree Protection Plan. The pink lines show one of the proposed access routes across the stream. The trees to be removed are outlined by orange dashed lines (and a solid red outline (cat U trees)). Red dashed lines show the position of Heras fencing (see later section for fencing detail). The proposed construction access route is illustrated by green arrows. Low-activity mesh fencing is illustrated by blue dashed lines.

The second accessway over the stream to the south side of the reservoir:

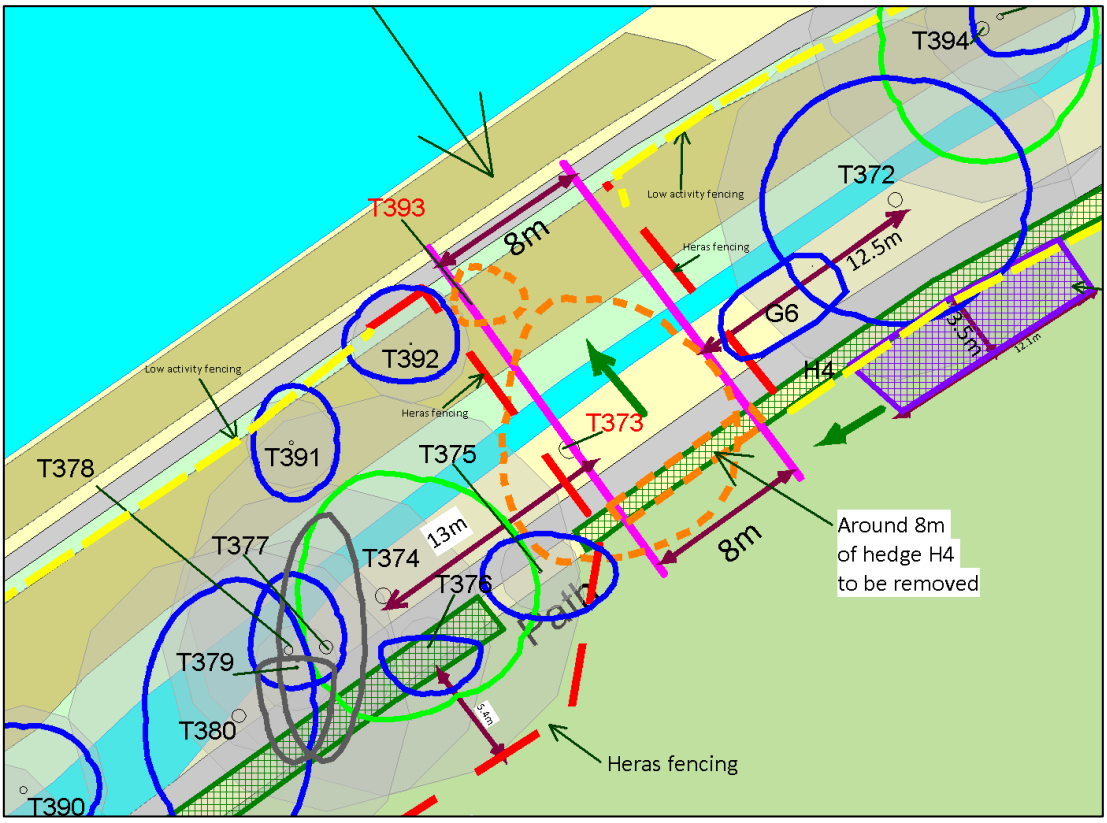


Figure 7 (above): excerpt taken from the Tree Protection Plan. The pink lines show the second proposed access routes across the stream. The trees to be removed are outlined by orange dashed lines (and a solid red outline (cat U trees)). Red dashed lines show the position of rigid protective fencing (see later section for fencing detail). The proposed construction access route is illustrated by green arrows. Low-activity mesh fencing is illustrated by blue dashed lines.

3.5 The trees to be removed have been assigned BS5837 retention categories B and C. 5 x trees, 1 x dead tree, 1 x group of trees and 2 x sections of hedging are proposed to be removed to facilitate construction access to the development area. These two access routes have been chosen to minimise the trees impacted. After development completion, there is sufficient space to replant the trees and sections of the hedge removed, and further space is available for further tree planting in the site area.

3.6 Facilitation Access pruning required for this development:

Tree and category	Works required
T308- Beech- Category B2	Crown lift pruning on the northwest side to create 6m clearance over the access road
T309- Beech- Category B2	Crown lift pruning on the north side to create 6m clearance over the access road
T315- Beech- Category B2	Crown lift pruning on the north side to create 6m clearance over the access road
T337- Sycamore Category A	Crown lift pruning on the north side to create 6m clearance over the access road
T340- Sycamore- Category B2	Crown lift pruning on the south side to create 6m clearance over the access road
T342- Ash- Category B.1.2	Crown lift pruning on the north side to create 6m clearance over the access road
T343- Hawthorn- Category B.2	Crown lift pruning on the south side to create 6m clearance over the access road
T346- Sycamore – Category B2	Crown lift pruning on the north side to create 6m clearance over the access road
T350- willow- Category B2	Crown lift pruning on the south side to create 6m clearance over the access road
T398- Willow- Cat C	Crown lift pruning on the south side to create 6m clearance for work area
T360- Willow- Category B2	Tip reduction pruning on the south side by around 2.5m back to suitable pruning points, for the facilitation of construction vehicles
T364- Willow – category C	Tip reduction pruning on the south side by around 2m back to suitable pruning points, for the facilitation of construction vehicles
T365- Willow- Category B2	Tip reduction pruning on the south side by around 2m back to suitable pruning points, for the facilitation of construction vehicles.

3.7 Pruning has been specified as outlined in the above table, to allow access for construction and delivery vehicles, without these damaging the trees.

Direct Impact 2: Other pruning required due to excavation and disturbance within RPAs

3.8 Excavation is required to repair the failing retaining wall of the reservoir. Therefore, excavation is unavoidable within the RPAs of the following trees;

- T394- Oak- Category A1.2
- T397- Willow- Category B2
- T364-Willow- Category C
- T399- Willow Category B2

3.9 The loss of these trees is not desirable, in particular the category A Oak tree and category B Willow.

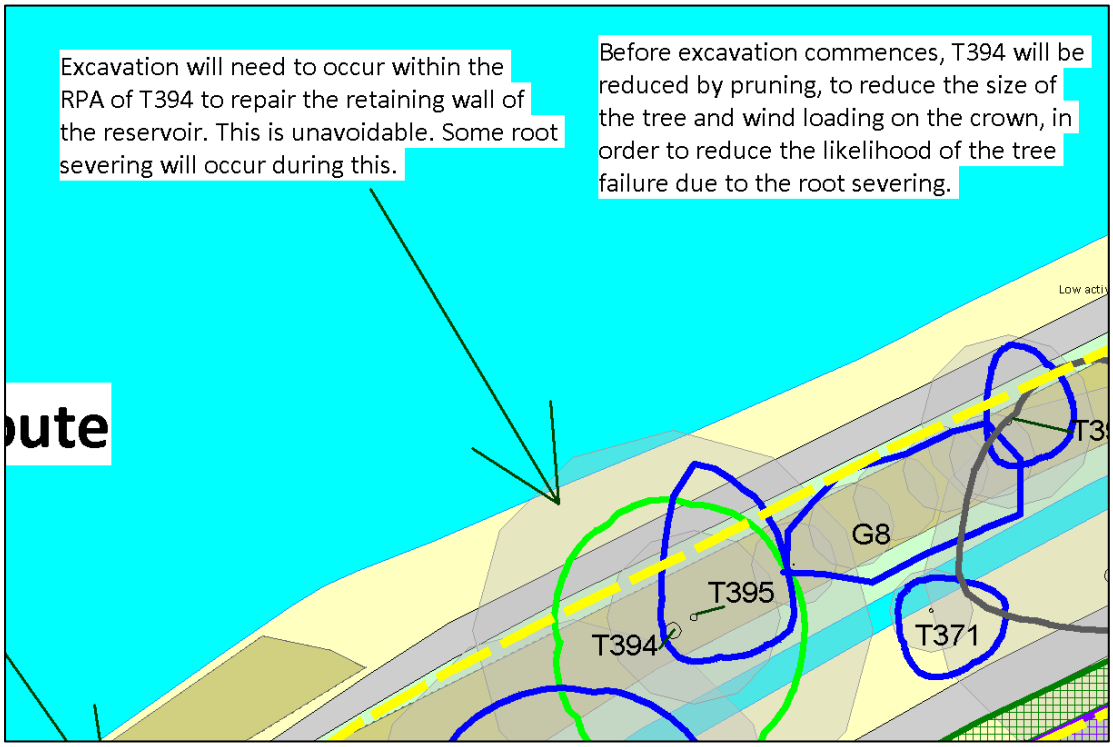


Figure 8 (above): excerpt taken from the Tree Protection Plan. The section of the RPA of T394 will require excavating to repair the wall.

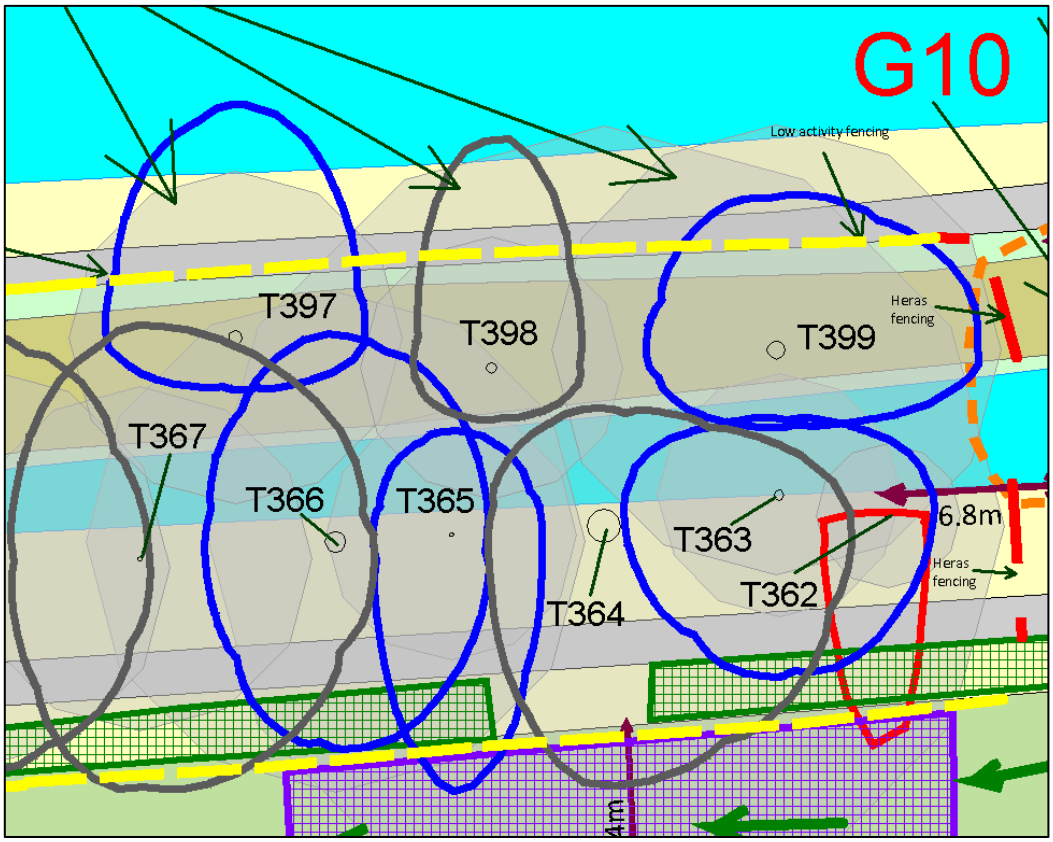


Figure 9 (above): excerpt taken from the Tree Protection Plan. Sections of the RPAs of T397, T364, and T399 will require excavating to repair the wall.

Mitigation

3.10 As excavation is unavoidable, to attempt to retain the trees, with the unavoidable root loss, it is proposed that reduction pruning is carried out on these trees before excavation commencement. The purpose of this is to reduce the wind loading on the trees and reduce the likelihood of the trees falling over, following excavation and inevitable root severance.

3.11 These trees then will require regular inspection by an arboriculturist to monitor their stability and condition. In time, it is hoped that the trees will be able to recover from the root severance and continue to function in the future. If the trees are deemed to be too unstable following the necessary excavation, the trees may require removing or veteranization techniques and this decision will be made by the project arboriculturist and local authority tree officer, if and when necessary.

3.12 Regular site monitoring and recording by an arboriculturist is essential to assess the safety of these trees during, and for some time after development.

Tree and category	Current height	Works required
T394- Oak- Category A1.2	14m	Reduce the crown of the tree by 2m, to suitable pruning points. The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back.
T397- Willow- Category B2	13m	Reduce the crown of the tree by 2m, to suitable pruning points. The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back.
T364-Willow- Category C	14m	Reduce the crown of the tree by 2m, to suitable pruning points. The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back.
T399- Willow Category B2	15m	Reduce the crown of the tree by 2m, to suitable pruning points. The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall.

		The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back.

3.13 The extent of these proposed reductions is not ideal from an Arboricultural perspective, as it will result in a significant amount of photosynthetic material and energy storage being lost in one operation. However, considering the root loss that will occur, this pruning, in my opinion, is unavoidable to attempt to retain these trees.

3.14 Due to the extent of this proposed pruning, the trees will likely create epicormic growths in response. Future pruning to sensitively manage this new growth and help the tree form new crowns and canopies will be required.

3.15 All pruning needs to be in accordance with BS3998,2010- 'Tree Work-recommendations'.

3.16 The access routes to the development areas have been positioned to minimise the number of tree removals required and to minimise the impact on the existing trees as much as reasonably practical. The construction routes shall be as illustrated by the **Green Arrows on the Tree Protection Plan**. No other access routes will be used. These access routes shall be outside of RPAs and crown spreads of trees to be retained.

Direct Impact 2:

3.17 Construction machinery and vehicles may cause accidental physical damage to trees during operation. Such plant may also cause compaction to the rooting areas of trees in the surrounding areas. Compaction reduces pore spaces in the soil, suffocating tree roots, which can lead to root death and the decline of trees.

Mitigation- Protective fencing:

3.18 Two types of tree protection fencing shall be used to protect trees from physical damage and from compaction to the rooting areas, depending on the construction activities in proximity to the trees. The two types are:

- Rigid Heras fencing
- A plastic mesh low-activity barrier

3.19 Rigid Heras-style protective fencing will be positioned as illustrated on the Tree Protection Plan by the **Red Dashed lines** to prevent access into RPAs by all construction machinery, vehicles and workers, to prevent compaction within the RPAs during development. The fencing will protect an area known as the **Construction Exclusion Zone.**

3.20 The Plastic Mesh low activity barrier will be installed in areas where temporary ground protection has been proposed, and in areas that will have low construction activity in proximity to trees. This low activity barrier has been illustrated on the Tree Protection Plan by the **Yellow dashed lines**:

Photographs of the type of Heras fencing to be used are shown below:

:



Photo 1 (Above): Photograph example of Heras fencing to be used



Photo 2 (above): Photograph example of Heras fencing to be used



Photo 3 (above): Photograph example of Low activity plastic mesh fencing to be used in low-activity areas and in areas where temporary ground protection will protect RPAs

Example of Low Activity barrier - Plastic Barrier Fencing/mesh:

Barrier fencing mesh is an extruded polypropylene plastic mesh fencing, stabilised with standard steel fencing pins inserted into the ground (minimum 1m height).



Photo 4 (above): Photograph example of Low activity plastic mesh fencing to be used in low-activity areas and in areas where temporary ground protection will protect RPAs



Figure 11: Fixed to the outside of all types of fencing will be words such as 'TREE PROTECTION AREA – NO ACCESS OR WORKING WITHIN THIS AREA'. These notices will be fixed to the fencing using suitable fixings such as cable ties and should be A3 in size and laminated

3.21 Protective fencing will be strong enough to withstand accidental strikes by machinery, plant or booms to prevent mechanical damage or compaction damage to trees to be retained. No materials or construction debris shall be stored within the protective fencing around the RPAs of any retained trees on site.

Mitigation- Material storage and designated welfare areas

3.22 Welfare areas, storage of materials and mixing can take place in any area outside of the heras fencing and at least 4m from the low activity fencing

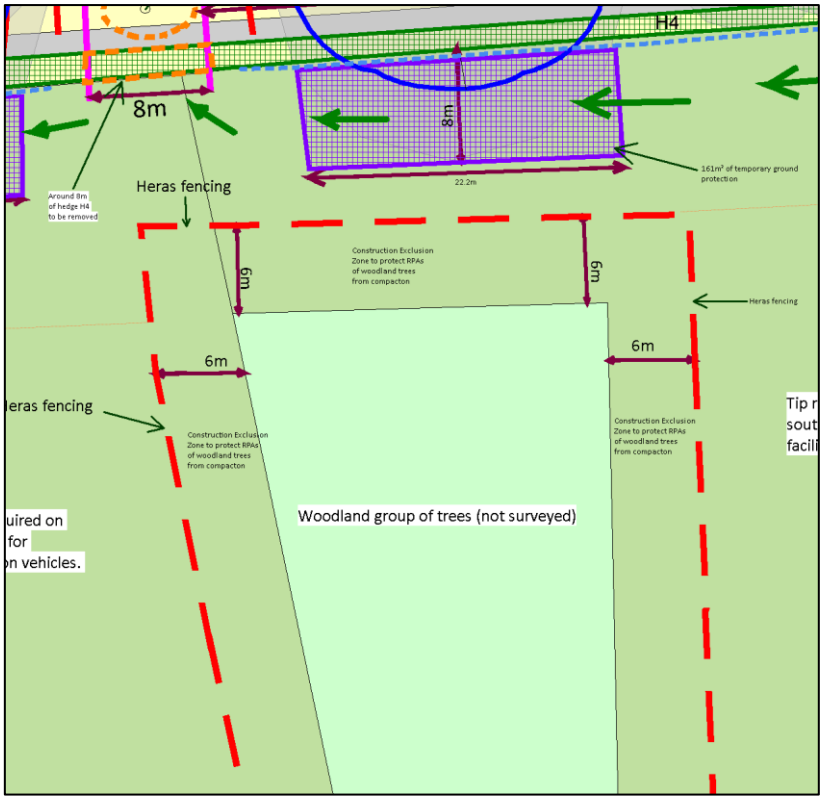


Figure 10 (above, excerpt from the TPP): Illustrated Heras fencing (red dashed lines) and 6m distance from the group of trees within the field south of Hedge H4. Within this fencing is the Construction Exclusion Zone. Beyond this is the tree safe distance where materials can be stored, mixing can take place, and welfare areas can be situated

Construction worker parking

3.24 Construction worker parking will be in the existing car park area, east of Worsborough Country Park

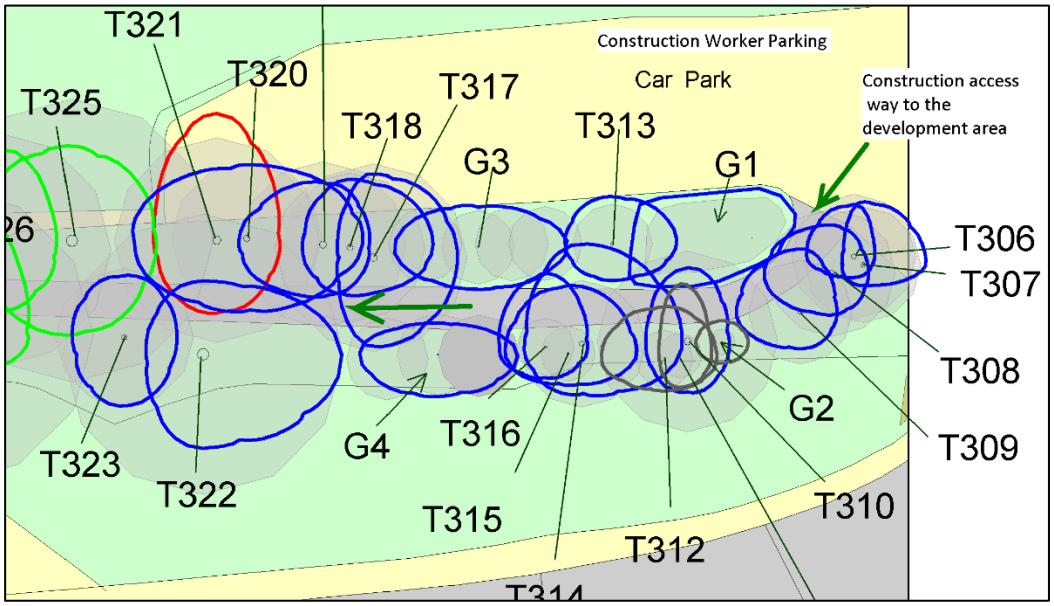


Figure 11: (above). Construction worker parking area as shown on the Tree Protection Plan. Green arrows show the construction access route.

Indirect Impact 1- Potential Compaction within RPA of T350 (Willow, Cat. B2) by construction traffic

3.25 The proposed access route for construction access will be partially within the RPA of T350. Compaction of the soil within the RPA can lead to tree decline and even death, due to the lack of oxygen that can suffocate tree roots, during compaction. Therefore, compaction MUST be avoided.

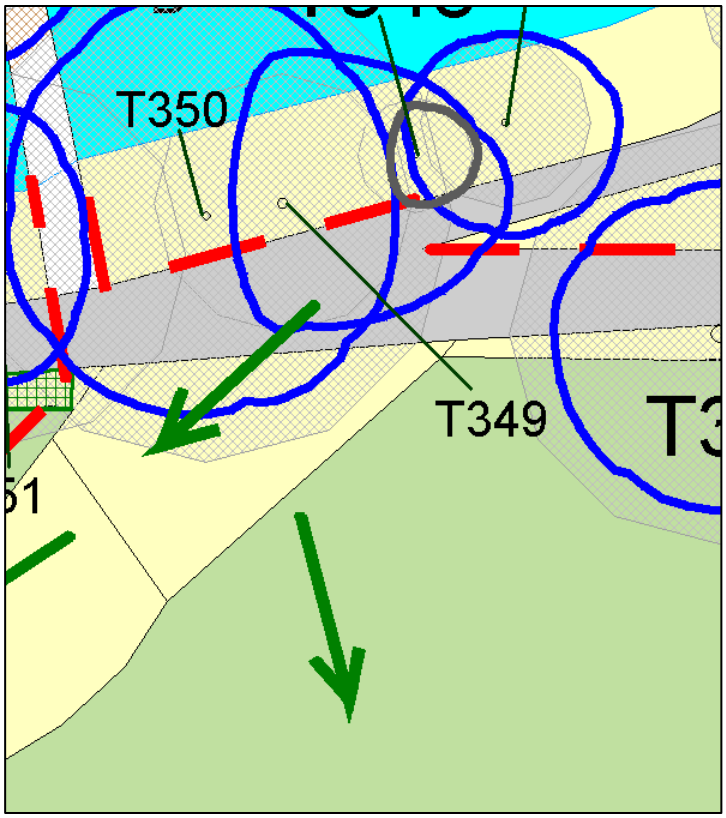


Figure 12 (above): The green arrows show the proposed construction access way, which will run from the existing hard surfacing, south, into the field, which will encroach within a portion of the RPA of T350 in the field.

Indirect Impact 2- Compaction within RPAs of T354, T360, T364, T370, and T372- construction access will be required through these RPAs in the field to reach the development areas

3.26 Compaction within RPAs of trees from construction vehicles, and pedestrian access can suffocate tree roots leading to the decline and sometimes even death, of a tree. Therefore, compaction MUST be avoided or minimised

Mitigation for Indirect Impacts 1 and 2

3.27 Temporary ground protection will be installed within the RPAs of T350, t354, T360, T364, T370, and T372 as shown on the Tree Protection Plan map, to minimise the compaction of the soil within this RPA.

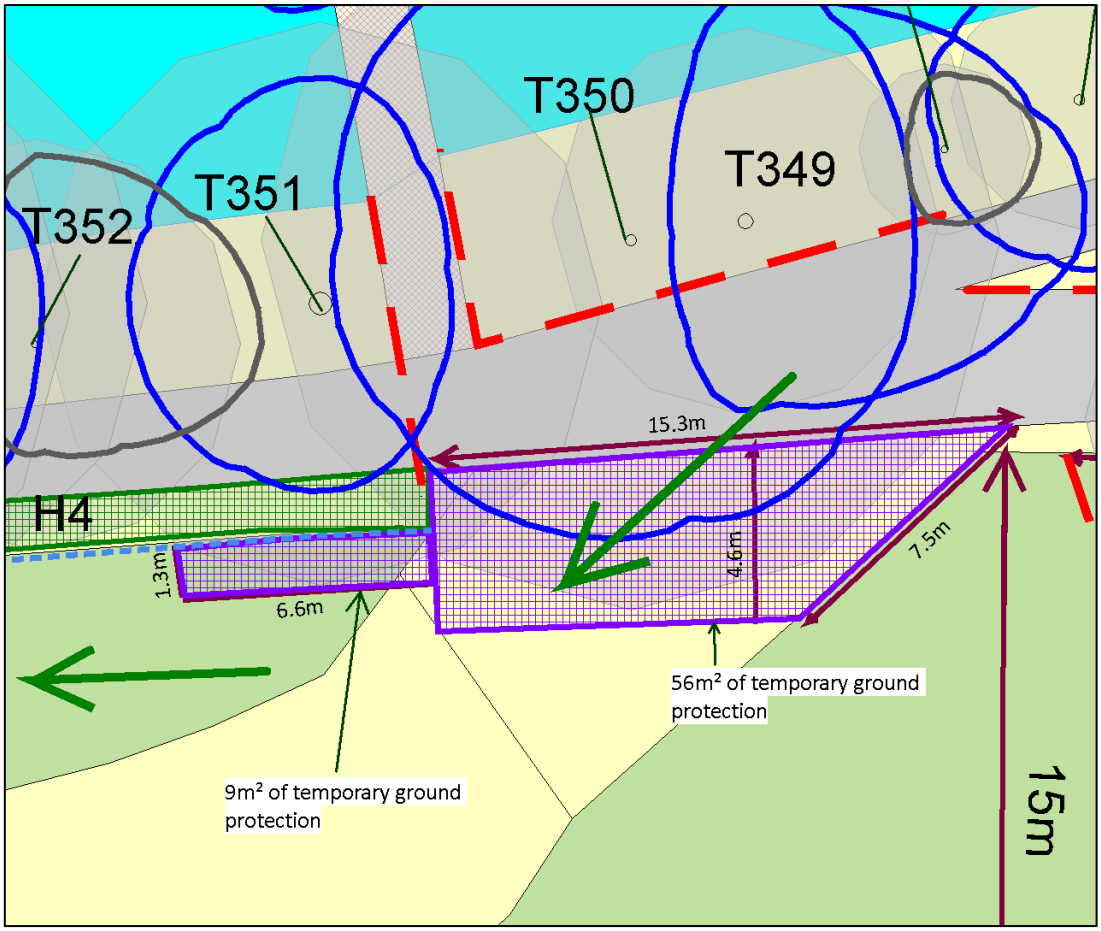


Figure 13 (above): Temporary ground protection will be positioned as illustrated on the Tree Protection Plan by the Purple Hatched Area, within the RPA of T350

3.28 For this section of the RPA of T350, the ground appeared quite boggy. The construction contractor informed us that they may need to excavate down in this area to find more stable soil to lay the temporary ground protection. This likely would result in some root severing.

3.29 If this is the case, T350 will require some reduction pruning. The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. This will be confirmed at the pre-commencement site meeting with the development contractor.

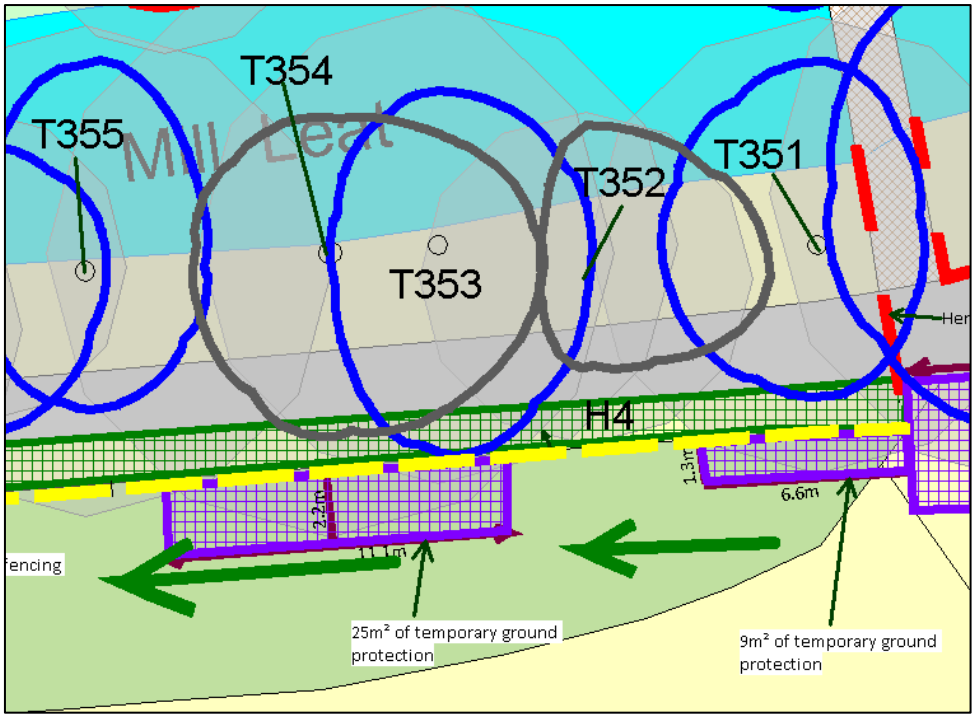


Figure 14 (above): Temporary ground protection illustrated on the Tree Protection Plan by Purple hatched areas, within the RPAs of T351 and T354.

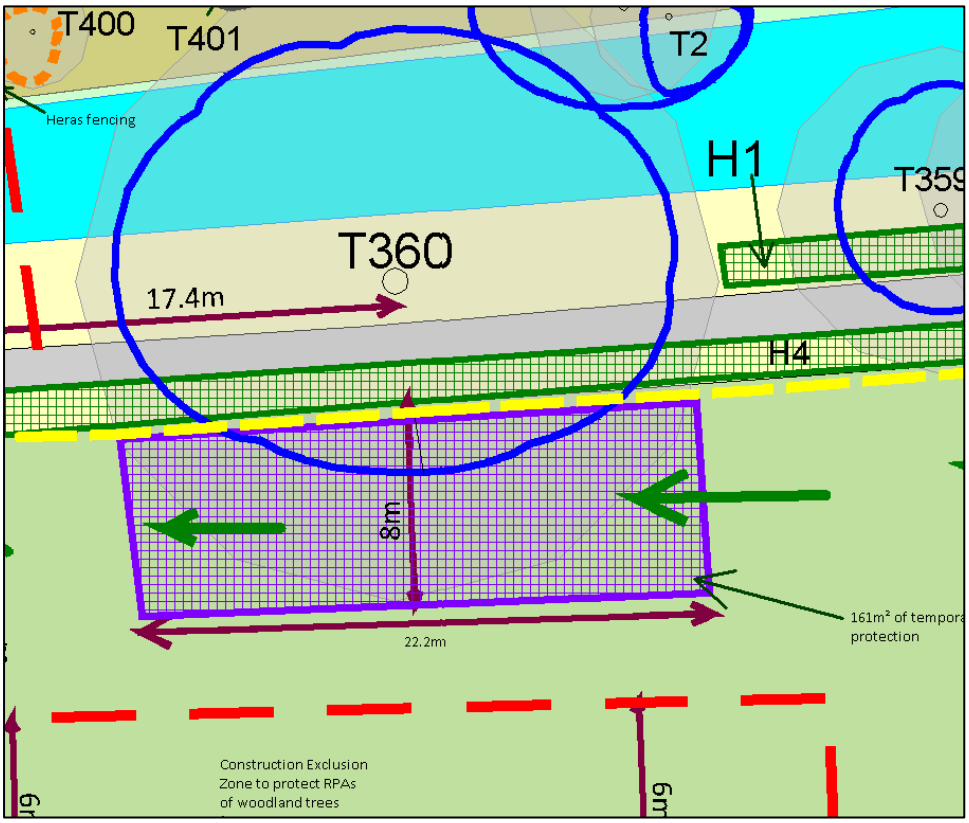


Figure 15 (above): Temporary ground protection illustrated on the Tree Protection Plan by Purple hatched area, within the RPA of T360.

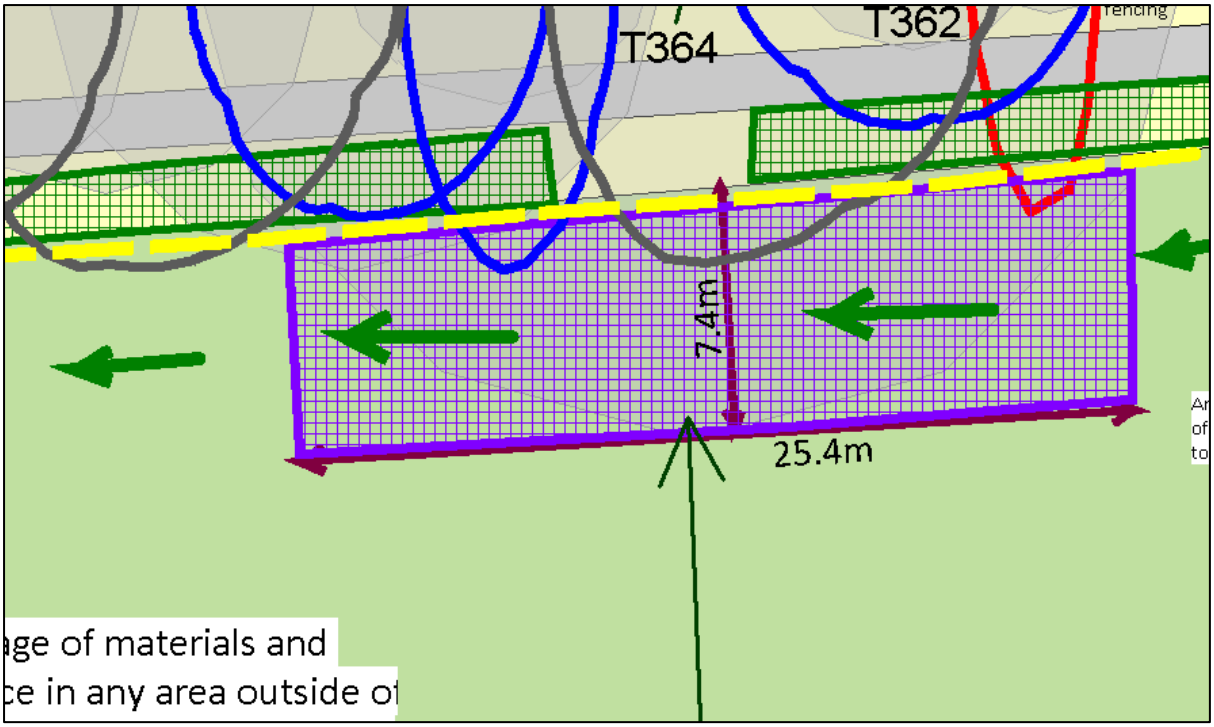


Figure 16 (above): Temporary ground protection illustrated on the Tree Protection Plan by Purple hatched area, within the RPA of T364.

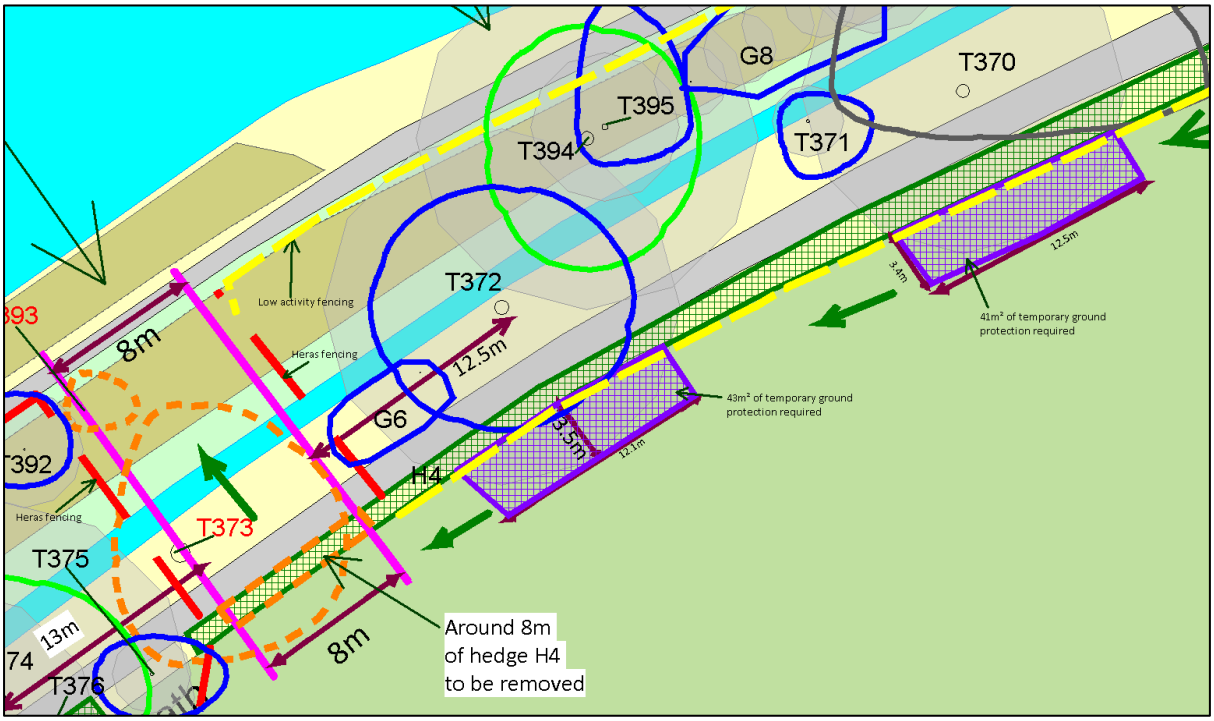


Figure 17 (above): Temporary ground protection illustrated on the Tree Protection Plan by Purple hatched area, within the RPA of T370 and T372.

3.30 The type of temporary ground protection used will consist of a Ground Protection Board system such as **Lion Panel, or Hybrid Panel.** A geotextile membrane will be laid, then **a 150mm depth of woodchip**, and then the protection board system will be laid on top. LION PANELS and other similar systems are profiled aluminium panels which are used to reinforce assembly areas, access roads and event venues. They have low weight and can distribute concentrated loads (Reference: 20_LIONPANEL_Study_Part02_SRM-Calc_ENG.pdf)

3.31 The woodchip acts as a compressible layer which absorbs and spreads the loads of construction traffic. The geotextile membrane prevents the woodchip being absorbed into the soil under the ground boards

3.32 The table below for a ground boards system, demonstrates that ground boards can be used to support different loads to minimise compaction.

Traffic	Gross weight	Ground Protection Boards	Layers of boards	Compression layer	Membrane
Pedestrians only		GroundGuards MultiTrack	1	100mm woodchip	Geotextile
Pedestrian plant	Up to 2 t	GroundGuards MultiTrack	1	150mm woodchip	Geotextile
Vehicular plant	2 - 10 t	GroundGuards MultiTrack	2	150mm woodchip	Geotextile
Vehicular plant	10 - 20t	GroundGuards MaxiTrack	2	150mm woodchip	Geotextile
Vehicular plant	Over 20 t	GroundGuards XtremeMats	1	150mm woodchip	Geotextile

The above information is credited to: https://www.ground-guards.co.uk/wp-content/uploads/2022/01/Tree-Root-Protection-GroundGuards-White-Paper.pdf : Ground Protection Practice Note GPPN8/21, Tree Root Protection using Temporary Access Trackways, By M J Oliver, Product Development Manager, Ground Guards



Photograph $ (above): An example of a ground protection boards system on top of a compressible mulch chip layer and membrane, to spread the load and lessen compaction onto the soil below: Photo credit to: https://www.ground-guards.co.uk/product/multitrack-2-44m-x-1-22m-8x4/

Indirect Impact 1- Soil contamination within RPAs

3.33 Spoil from mixing, fuel for machinery and other liquid contaminants could run, if spilt, into the RPAs of the trees. Such spoilage could affect the pH value, nutrient availability and other features in the soil in which roots grow, which can negatively affect the health of the trees.

Mitigation:

3.34 Mixing will only take place in a designated area on the site, as illustrated in the Tree Protection Plan. This will be are far away from protective feincng as reasonably practical. If refuelling of machinery and vehicles with fuel is required during development, this will either be carried out outside of the site or if machinery is on site, this will be carried out an absorbent material to prevent any spills from leaching into the soil.

3.35 Mixing will take place on tarpaulin or other impermeable sheeting/surface. Spill kits shall be present on site for all mixing, and for when concrete is delivered to the site. Mixing will take place on tarpaulin or on an absorbent spill kit material to prevent any fuel spillage from leaching into the soil or onto the new permeable driveway, or temporary ground protection.

3.36 Any spills of fuel, concrete mixing, spoil or other contaminants, on the soil or the permeable ground protection system, will be cleaned up immediately, using a spill kit.

3.37 Spoil will not be thrown away on-site; spoil will be thrown away into a skip. The skip will be located in a designated area on the site, or outside of the site.

4.0 ONSITE CONSULTATION AND SUPERVISION

4.1 An onsite meeting will be held with all relevant parties; including the developer, appointed Arboricultural supervisor and Local Planning Authority (LPA) representative. The purpose of this meeting is to agree on the location of permanent and temporary access, the location of site storage, and the location of tree preservation barriers:.

Report compiled by:

Rachel Selwyn

Signed…… Date 9/03/2023

Report checked by:

Sam Selwyn

Signed…… Date 9/03/2023

The following appendices give some further general information including tree categorisation, protective fencing and ground root protection for trees within RPAs

APPENDIX 1: BRITISH STANDARD BS 5837:2012 TABLE 1 CASCADE CHART FOR TREE QUALITY ASSESSMENT

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

APPENDIX 2: INITIAL TREE WORKS SCHEDULE

Tree	Category	Work required	Reason	Date undertaken
T341- Hawthorn,	Category C2	Remove tree	To facilitate development.	
T361- Willow	Category C2	Remove tree	To facilitate development.	
G10- A group of Hawthorn trees	Category B2	Remove tree	To facilitate development.	
T373- Willow	Category C2	Remove tree	To facilitate development.	
T393- Hawthorn	Category B2	Remove tree	To facilitate development.	
T400- willow	Category C2	Remove tree	To provide clearance to facilitate development	
Around 8m of hedge H4 Hawthorn hedge opposite T361	Category B2	Remove	To facilitate development.	
Around 8m of hedge H4 Hawthorn hedge opposite T373	Category B2)	Remove	To facilitate development.	
T339- hawthorn	Category U	Remove	Tree is dead	
T362 - Willow	Category U	Remove	Remove tree due to its poor structure which will create conflict with the path as it continues to grow in the medium to long term.	
T308- Beech	Category B2	Crown lift pruning on the northwest side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T309- Beech	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T315- Beech	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	

Tree	Category	Work required	Reason	Date undertaken
T337- Sycamore	Category A	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T340- Sycamore	Category B2	Crown lift pruning on the south side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T342- Ash	Category B.1.2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T343- Hawthorn	Category B.2	Crown lift pruning on the south side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T346- Sycamore	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T360-Willow	Category B2	Carry out tip reduction pruning on south side by 2.5m to suitable pruning points for clearance	For facilitation access for construction vehicles	
T365- Willow	Category B2	Carry out tip reduction pruning on south side by 2m to suitable pruning points for clearance	For facilitation access for construction vehicles	
T350- Willow	Category B2	Crown lift pruning on the south side to create a 6m clearance over the access road. **If soil within the RPA requires excavation to lay the temporary ground protection, due to the boggy soil then the additional pruning is required:** **Prune to reduce the crown of the tree by around 2m to suitable pruning points**	For facilitation access for construction vehicles The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated due to it being boggy and exaction required to find more stable soil to lay the temporary ground protection	

Tree	Category	Work required	Reason	Date undertaken
			The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to.	
T394- Oak-	Category A1.2	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	
T397- Willow-	Category B2	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	
T364-Willow-	Category C	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section	

Tree	Category	Work required	Reason	Date undertaken
			of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	
T398- Willow	Category C	Crown lift pruning on the north side to create a 6m clearance over the access road and work area.	For facilitation access for construction vehicles, plant and workers	
T399- Willow	Category B2	Reduce the crown of the tree to around 9m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	

Pruning will be carried out to correct pruning points, as outlined in BS3998:2010

APPENDIX 3: STATUTORY PROTECTION

A3.1 Wildlife and Countryside Act 1981 (with amendments) and European Protective Species

A3.2 The Wildlife and Countryside Act protects wildlife and their habitats and includes the protection of birds, bats and other protected species. It is an offence to knowingly or recklessly disturb them therefore it is important to recognise their presence. Any tree works should be timed to not disturb such protected species and be considerate of their presence. More information can be found at

APPENDIX 4: TERMS OF REFERENCE

A4.1 BS5837:2012 'Trees in relation to design, demolition and construction – recommendations'

A4.2 BS3998:2010 Tree work – recommendations

A4.3 NJUG 4 – National Joint Utilities Group "Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees. Volume 4, issue 2. London: NJUG 2007" To include Operatives Hand-out Guidance

A4.4 BGS Open Source Soil Data http://www.bgs.ac.uk/nercsoilportal/maps.html

A4.5 Cranfield University LandIS Land Information System http://www.landis.org.uk/services/soilscapes.cfm

A4.6 Cranfield Soil and Agrifood Institute http://www.landis.org.uk/soilscapes/

A4.7 'Guidance Note 12: The Use of Cellular Confinement Systems Near Trees: A Guide to Good Practice', by the Arboricultural Association (2020)

A4.8 Ground Protection Practice Note GPPN8/21, Tree Root Protection using Temporary Access Trackways, By M J Oliver, Product Development Manager, GroundGuards

APPENDIX 5: BACKGROUND TO TREE PROTECTION

A5.1 Any development work on the site may detrimentally affect the trees to be retained if those trees do not receive protection. The risk of damage to trees both above and below ground needs to be controlled by a strong physical barrier. The ground beneath the trees might be used by traffic or for storage of materials or be excavated, all of these will potentially be detrimental to the root systems.

A5.2 The majority of tree roots generally occur in the top 90cm of soil, as at lower depths there is less access to water and oxygen. Contrary to popular belief mature trees do not have large tap roots that obtain water from great depths. Tree roots need to take up water, oxygen and minerals to survive. Therefore, any compromise to a tree's rooting area may affect its stability, ability to function and survival.

A5.3 Construction activity can significantly affect the rooting area by compacting soil around trees and thus reducing the pore spaces. Pores are very important in soil for holding water and oxygen. Compaction inhibits root growth and penetration as well as decreases the oxygen in the soil which is essential for the growth and function of the roots.

A5.4 Damage caused to rooting environments can disrupt the balance between the roots and crown established by a tree over many years, and this could be potentially detrimental to the tree's health or may compromise the structural integrity or the stability of the tree. Trees can decline in health and even die from root severance and damage.

A5.5 Possibilities of damage to trees during and following construction processes include direct and indirect damage. Direct damage involves mechanical physical damage to trees or their roots or root systems via machinery, soil excavation or hazards such as fire. Indirect damage involves an injury that occurs to a tree by activities that take place near the tree, such as compaction, level changes, soil damage or chemical contamination near the root plate.

A5.6 For trees to be retained, light tree surgery work such as crown lifting and/or other tree protection methods along with implemented construction methods can reduce the risk of damage.

A5.7 For protecting trees that are to be retained BS 5837:2012 –'Trees in relation to Design, Demolition and Construction' gives guidance on how to manage trees close to proposed works. BS 5837:2012 gives guidance on calculating the Root Protection Area (RPA) around a tree which estimates the area of soil needed to ensure the survival of retained trees.

A5.8 The RPA gives guidance on the rooting area needed for a tree to survive. Once the RPA around trees to be retained has been set, no entry into the RPA by machinery should be allowed, nor should the RPAs be used for any type of storage or access pathway. Encroaching into a tree's RPA should only be undertaken if agreed by the Local Planning Authority (LPA). By adopting such measures, lasting damage to existing trees can be avoided and the amenity values can be preserved. For groups, an average RPA for 1 tree or 1 clump of trees is taken and used to illustrate a likely representative RPA for the whole group on the associated maps.

A5.9 In certain circumstances RPAs may be subject to a 20% offset but on one side only. The offset must be accounted for on the remaining sides, and can only be agreed upon after taking into account site-specific and tree-specific factors.

A5.10 By considering the RPAs and existing site features (including natural and man-made topography) and by adopting construction and tree protection techniques that minimise root disturbance, successful construction projects can be achieved.

APPENDIX 6: AUTHOR'S QUALIFICATIONS AND EXPERIENCE

Miss Rachel Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA, QTRA registered.

Rachel is a consultant at Selwyn Trees and has 7 years of experience working in the role. She has a BSc Hons degree in Arboriculture & Urban Forestry from the University of Central Lancashire. She is a professional member of the Arboricultural Association and is a registered user of the Quantified Tree Risk Assessment methodology. Her work ranges from detailed tree assessment using specialist technology to producing a range of tree reports for development projects and providing tree protection solutions to BS5837 standards.

Mr Sam Selwyn Dip Arb L4 (ABC), ISA Certified Arborist, TecharborA

Sam has over ten years of experience working as a climbing arborist and is certified by the International Society of Arboriculture. He has the Level 4 Diploma in Arboriculture, is a technical member of the Arboricultural Association and has the Lantra professional tree inspection (PTI) qualification. Sam prepares reports for development sites and undertakes aerial inspections of trees. He also assists with undertaking condition surveys and detailed tree assessments using specialist technology.

SELWYN TREES

ARBORICULTURAL CONSULTANTS

Arboricultural Method Statement Rev. D

Survey for trees at the site:	The area south of Worsbrough Reservoir, Worsbrough, Barnsley, S70 5LJ
Prepared for:	Barnsley Metropolitan Borough Council
Arboricultural Survey Reference	TreeSurvey **0321**
Date(s)	9th March 2023
Surveyor (s)	R D Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA / S Selwyn Dip Arb L4 (ABC)

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The following maps are attached separately and should be read with this report:

- 'Introduction to Arboricultural Survey BS5837'
- 'Tree Protection Plan Map'
- 'Arboricultural Impact Assessment'
- Tree Shade Map

1.0 A SUMMARY OF SEQUENCED METHODS

The developer's arboriculturist must be informed of any changes to this schedule:

Pre-development stage

- **Phase 1:** Pre-contract meeting
- **Phase 2:** Schedule of Arboricultural works.
- **Phase 3:** Tree Protective fencing. Protective fencing will be installed as detailed in the 'Tree Protection Plan Map'.
- **Phase 4 Ground protection:** Ground protection, permanent and temporary installed in locations as directed in the 'Tree Protection Plan Map'.

Development Stage

- This stage is subject to site monitoring visits by the developer's arboriculturist at intervals as agreed at the pre-commencement site meeting. These visits are to ensure that the agreed protection measures are functional and correctly achieving their purpose.
- **Phase 1:** Site accessible to demolition and construction traffic
- **Phase 2:** Development
- **Phase 3**: Development completion.
- **Phase 4:** Removal of tree-protective fencing and temporary ground protection
- **Phase 5:** New Tree Planting

Use of this document on site:

This is a working document; it is designed to be updated and used to record details of site supervision and monitor progress throughout the duration of the project.

A copy of this document must be permanently available on-site for the duration of the development activity. It can be:

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

The Arboricultural Consultant MUST be informed if there are any necessary changes required to this Method Statement The Local Planning Authority **MUST** also be informed if there are any changes to this Arboricultural Method Statement, or if there are any tree-related difficulties post-permission.

2.0 PRE-DEVELOPMENT STAGE

2.1 The methodology described follows a logical sequence that references British Standard BS 5837:2012- 'Trees in relation to Design, Demolition and Construction – Recommendations' and British Standard BS 3998: 2010 Tree Work-Recommendations and the National Joint Utilities Group Guidelines.

3.0 PHASE 1: PRE-CONTRACT SITE MEETING AND SUPERVISION SCHEDULE

3.1 An onsite meeting will be held with all relevant parties; including the developer, appointed Arboricultural supervisor and Local Planning Authority (LPA) representative. The purpose of this meeting is to agree on, the location of permanent and temporary access, the location of site storage, and the location of tree preservation barriers.

3.2 The table below shows an auditable system detailing specific site events requiring input/supervision as per BS 5837:2012 section 6.3.

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Pre-Development:			
Pre-commencement site meeting. Meeting with all parties to agree on tree protection measures (Will be undertaken before any development work commences). This meeting SHALL include: **Confirm** the logistics of construction worker access to the site, the position of Heras-style fencing and the unloading of materials **Confirm** where materials will be stored on-site and where contractors will park vehicles. **Confirm** where mixing will take place on site Any necessary changes to this method statement will be alerted to the LPA at this stage.	All parties: Site manager, client, and arboriculturist	All relevant trees	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Confirm whether the soil within the RPA of T350 is boggy and whether the contractor needs to excavate the soil within the RPA of T350 to lay the temporary ground protection. If excavation is required within the RPA, due to the boggy soil, T350 will require pruning as outlined in the table below. If excavation is not required, T350 will not require any pruning	**Yes,** by Arboriculturist contractor, and client	T350	
Discuss logistics of delivering the woodchip to the site and transporting to the areas required. The woodchip will likely be delivered to the car park area of the site. Then a dumper truck or similar shall likely be used to transport it the areas when temporary ground protection is required. The logistics of this shall be discussed at this stage with the contractor. The installation of the temporary ground protection will need to be sequenced and installed in a specific order (starting at the closest area to car park, T350, and then moving away) to ensure compaction does not occur within the RPAs of trees during the delivery of the mulch to the areas where temporary ground protection is required.			
The undertaking of any suggested **tree work** (Will be undertaken before any development work commences)	**Yes,** by Arboriculturist	See details below:	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken

Arboricultural Schedule of Tree Work:

Tree	Category	Work required	Reason	Date undertaken
T341- Hawthorn,	Category C2	Remove tree	To facilitate development.	
T361- Willow	Category C2	Remove tree	To facilitate development.	
G10- A group of Hawthorn trees	Category B2	Remove tree	To facilitate development.	
T373- Willow	Category C2	Remove tree	To facilitate development.	
T400- willow	Category C2	Remove tree	To provide clearance to facilitate the development	
Around 8m of hedge H4 Hawthorn hedge opposite T361	Category B2	Remove	To facilitate development.	
Around 8m of hedge H4 Hawthorn hedge opposite T373	Category B2)	Remove	To facilitate development.	
T339- hawthorn	Category U	Remove	Tree is dead	
T362 - Willow	Category U	Remove	Remove the tree due to its poor structure which will create conflict with the path as it continues to grow in the medium to long term.	
T308- Beech	Category B2	Crown lift pruning on the northwest side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T309- Beech	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T315- Beech	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	

Activity		Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
T337- Sycamore	Category A	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T340- Sycamore	Category B2	Crown lift pruning on the south side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T342- Ash	Category B.1.2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T343- Hawthorn	Category B.2	Crown lift pruning on the south side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T346- Sycamore	Category B2	Crown lift pruning on the north side to create a 6m clearance over the access road.	For facilitation access for construction vehicles	
T360-Willow	Category B2	Carry out tip reduction pruning on south side by 2.5m to suitable pruning points for clearance	For facilitation access for construction vehicles	
T365- Willow	Category B2	Carry out tip reduction pruning on south side by 2m to suitable pruning points for clearance	For facilitation access for construction vehicles	
T350- Willow	Category B2	Crown lift pruning on the south side to create a 6m clearance over the access road. **If soil within the RPA requires excavation to lay the temporary ground protection, due to the boggy soil then additional pruning is required:** **Prune to reduce the height of the tree by around 2m to**	For facilitation access for construction vehicles The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated due to it being boggy and excavation required to find more stable soil to lay the temporary ground protection	

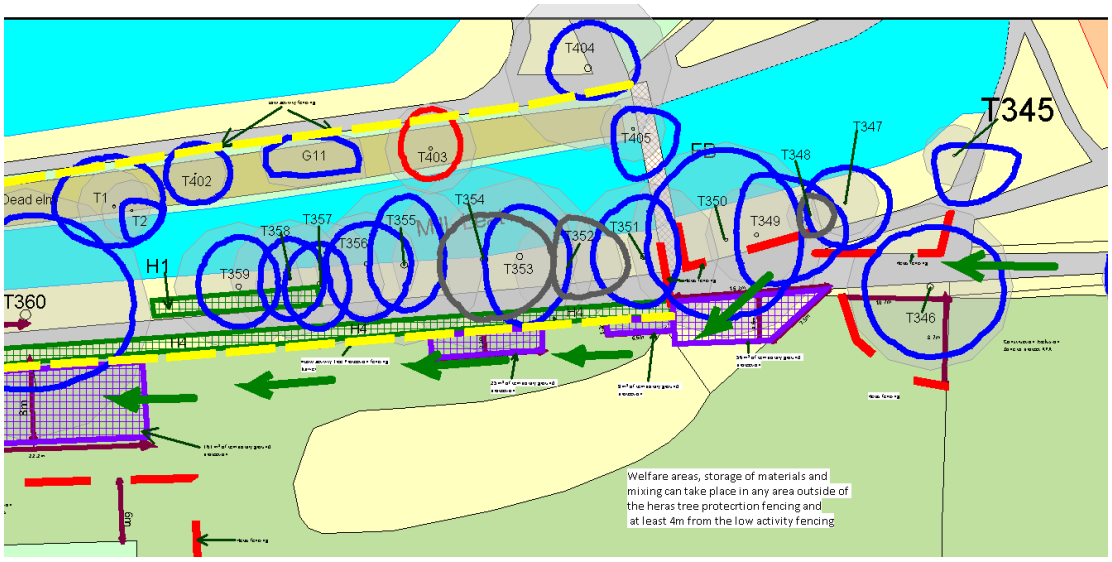
Activity		Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
		suitable pruning points	The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	
T394- Oak-	Category A1.2	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to	
T397- Willow-	Category B2	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to.	
T364-Willow-	Category C	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been	

Activity		Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
			excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to.	
T399- Willow	Category B2	Reduce the crown of the tree by around 2m, to suitable pruning points.	The aim is to reduce the wind loading and potential for the tree to fail, after a section of the RPA has been excavated for the repair of the retaining wall. The project arboriculturist will supervise and work closely with the arborist (tree surgeon) to determine to most appropriate final pruning points to reduce the crown back to.	

All tree work will be undertaken by competent and qualified professionals and will conform with BS3998:2010 'Tree work- recommendations'. Pruning will be carried out to correct pruning points, as outlined in BS3998:2010

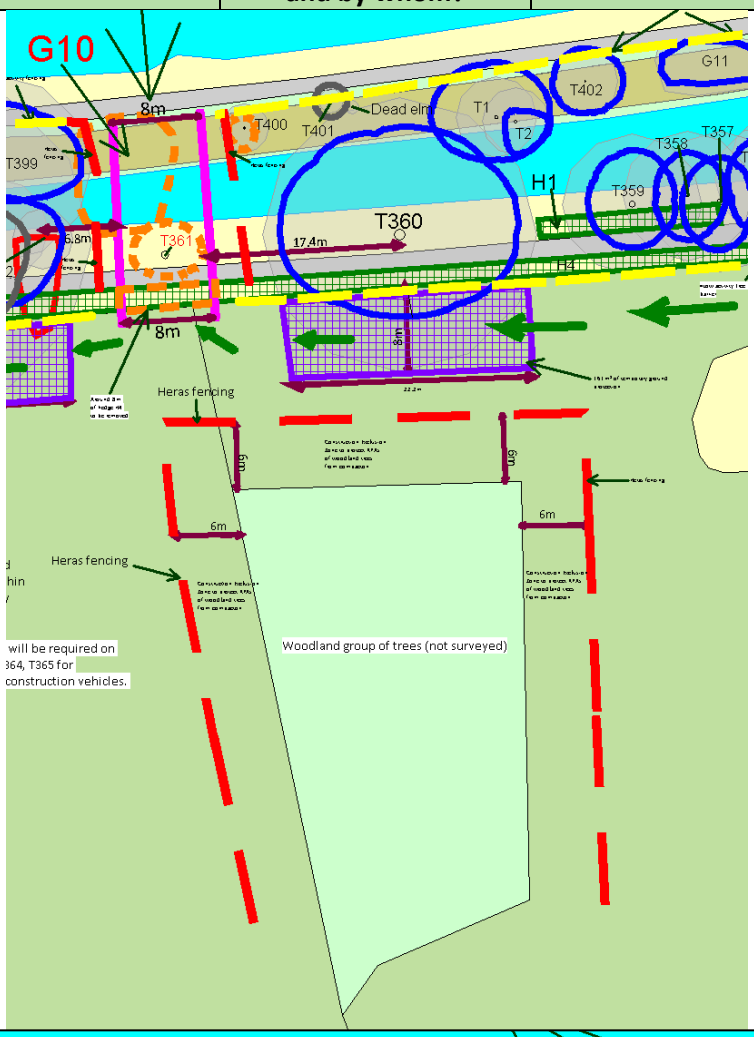
Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Erect the types of tree protection fencing to be used: 1. **Heras** tree protection fencing 2. **Low-activity mesh** fencing. **Heras Fencing will be positioned as shown by the RED DASHED LINES** on the Tree Protection Plan: **Low-activity fencing will be positioned** as shown by **the YELLOW dashed lines:** Excerpts from the TPP are shown below:	Yes, by Arboriculturist and a site supervisor	All trees	

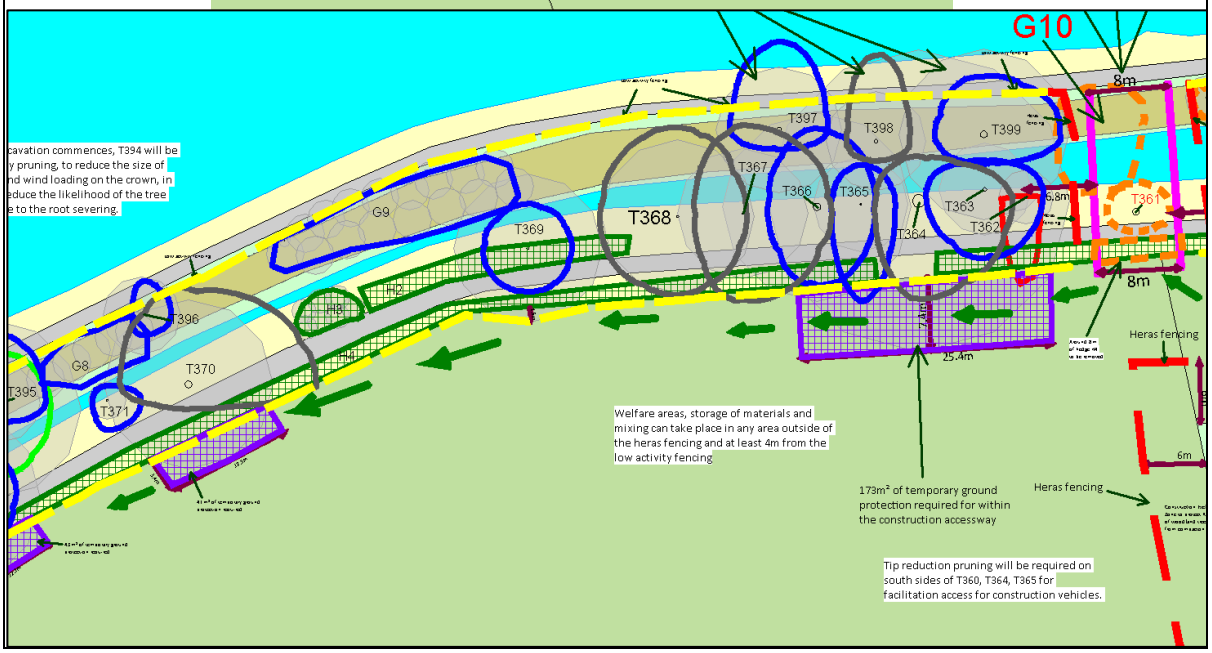
Excerpts from the TPP are shown below:



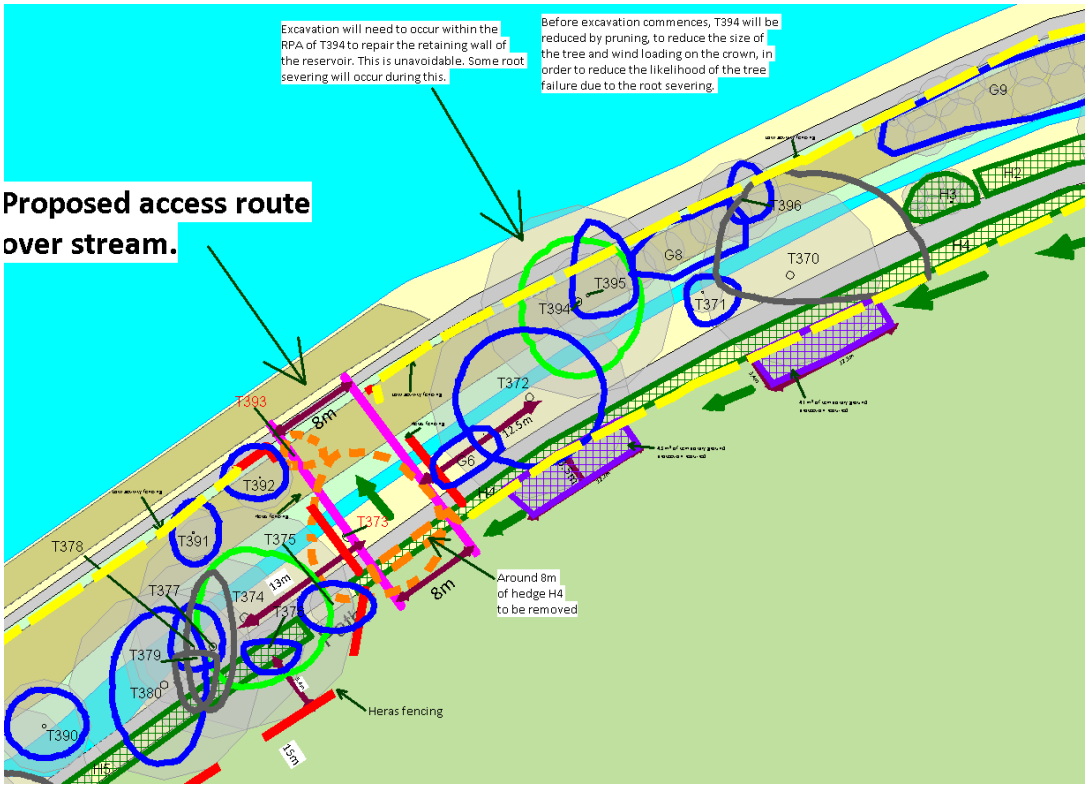
:

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken





Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken



Rigid Heras-style protective fencing will be positioned as illustrated on the Tree Protection Plan by the **Red Dashed lines** to prevent access into RPAs by all construction machinery, vehicles and workers, to prevent compaction within the RPAs during development. The fencing will protect an area known as the **Construction Exclusion Zone.**

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken



Photo 1 (Above): Photograph example of Heras fencing to be used



Photo 2 (above): Photograph example of Heras fencing to be used

Low-activity mesh fencing will be positioned as shown by **the YELLOW dashed lines on the Tree Protection Plan.** The fencing will protect an area known as the **Construction Exclusion Zone.:**

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken



Photo 3 (above): Photograph example of Low activity plastic mesh fencing to be used in low-activity areas and in areas where temporary ground protection will protect RPAs from excessive compaction

Example of Low Activity barrier - Plastic Barrier Fencing/mesh:

Barrier fencing mesh is an extruded polypropylene plastic mesh fencing, stabilised with standard steel fencing pins inserted into the ground (minimum 1m height).



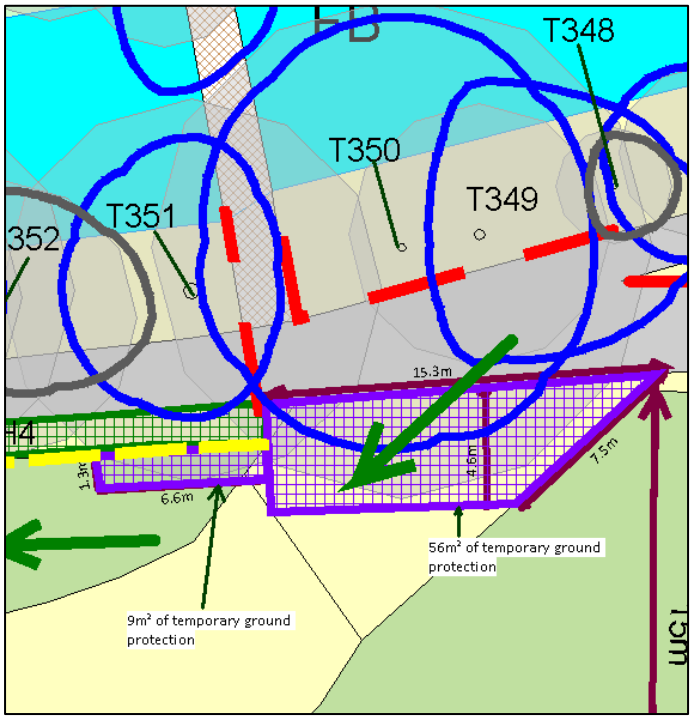
Photo 4 (above): Photograph example of Low activity plastic mesh fencing to be used in low-activity areas and in areas where temporary ground protection will protect RPAs

Fixed to the outside **of ALL** the fencing will be words such as 'TREE PROTECTION AREA – NO ACCESS OR WORKING WITHIN THIS AREA'. These notices will be fixed to the fencing using suitable fixings such as tie wires and should be A3 in size and laminated:

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
 			
A section of the soil within the RPA of T350 appeared quite boggy. The construction contractor informed us that they may need to excavate down in this area to find more stable soil to lay the temporary ground protection. This likely would result in some root severing. If excavation is required within the RPA of T350 in order to lay the temporary ground protection, and arboriculturist Shall supervise this. The arboriculturist SHALL carry out root pruning where required to ensure any severed roots are cleanly cut to a suitable pruning point.	Yes, by Arboriculturist and a site supervisor	T350	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Ensure the woodchip, geotextile membrane and ground protection boards are ordered prior to installation at this stage. The type of temporary ground protection used will consist of a Ground Protection Board system such as **Lion Panel, or Hybrid Panel.** A membrane will be laid, then **a 150mm depth of woodchip**, and then the protection board system will be laid on top. LION PANELS and other similar systems are profiled aluminium panels which are used to reinforce assembly areas, access roads and event venues. They have low weight and can distribute concentrated loads Install the temporary ground protection as illustrated by the **Purple hatched areas** on the Tree Protection Plan. The installation shall be sequenced to ensure the transportation machinery e.g., dumper truck, for the mulch delivery, does not encroach across any unprotected RPAs. The temporary ground protection within the RPA of T350 shall be installed first. Then the areas will be installed in a step sequence, moving from east to west across the site. The areas are illustrated on the Tree Protection Plan. Excerpts from the TPP are inserted belowK	Yes, by Arboriculturist and a site supervisor	T350, T354, T360, T364, T370, T372	

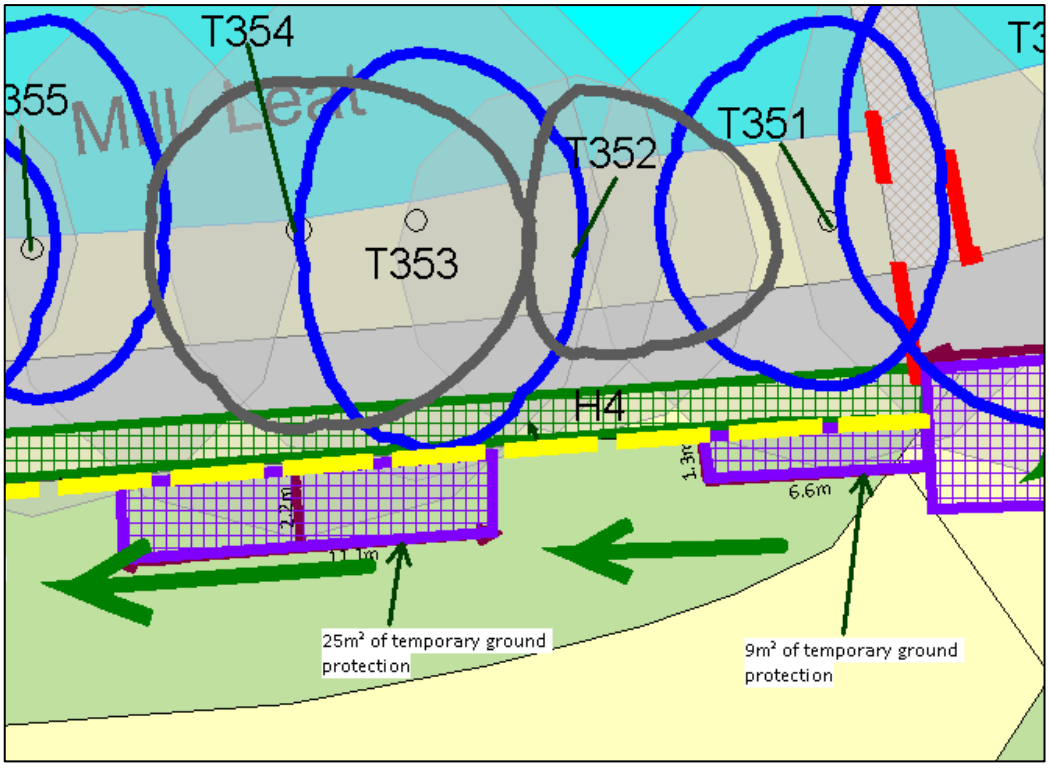
Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken



(left) 56m² of temporary ground protection will be required for the unprotected section of the RPA of T350, through which the construction access route will run (illustrated by the purple hatched area of the TPP)

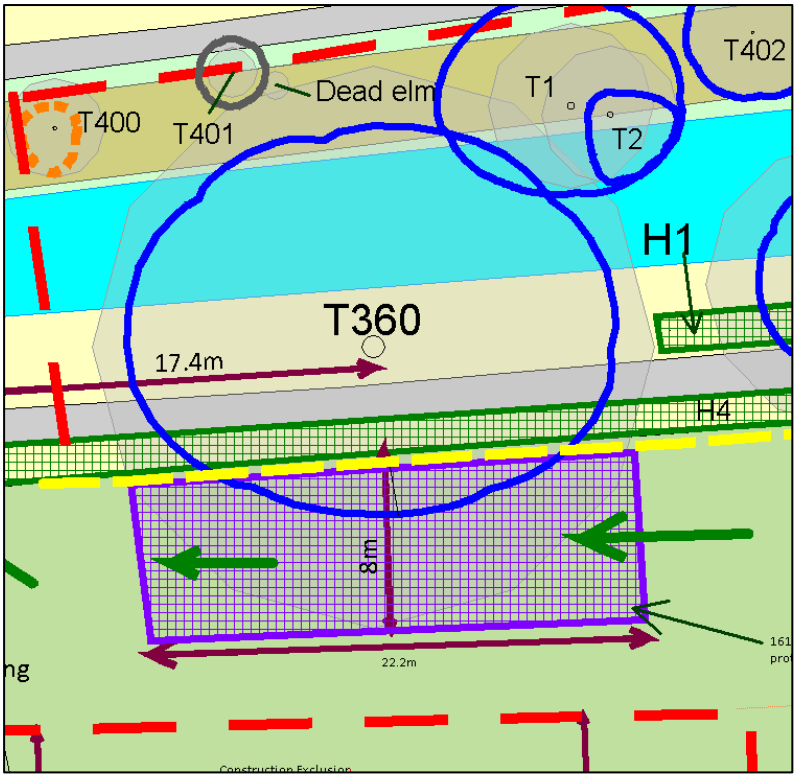
56m² of temporary ground protection will be required within the RPA OF T351

Temporary ground protection within RPAs of T351 and T354 (below):

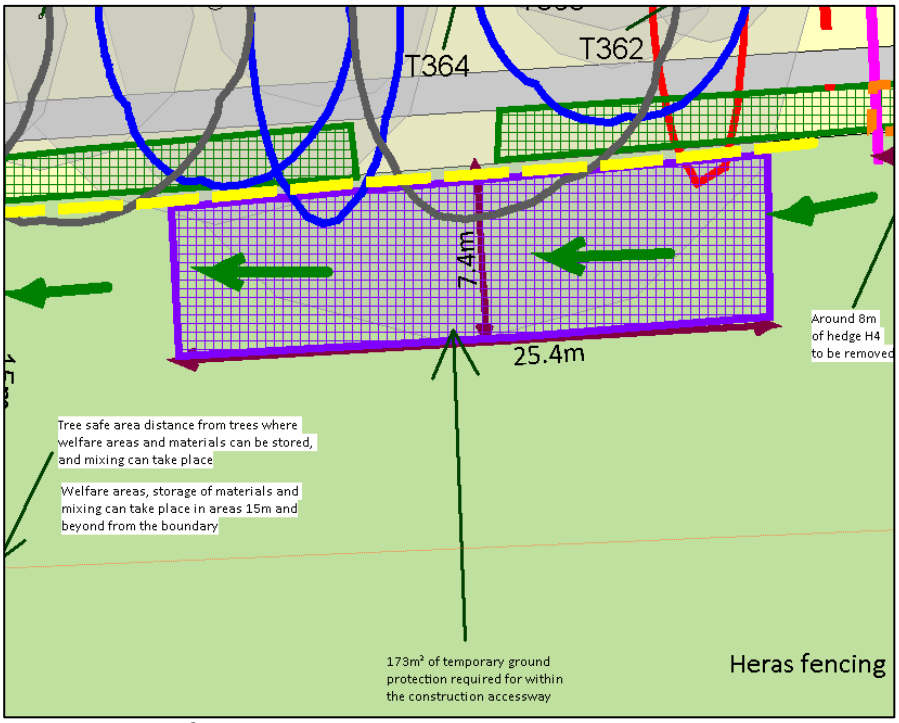


The figure above: **shows 9m²** of temporary ground protection will be required within the RPA of T351 and **25m²** will be required within the RPA of T354

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken

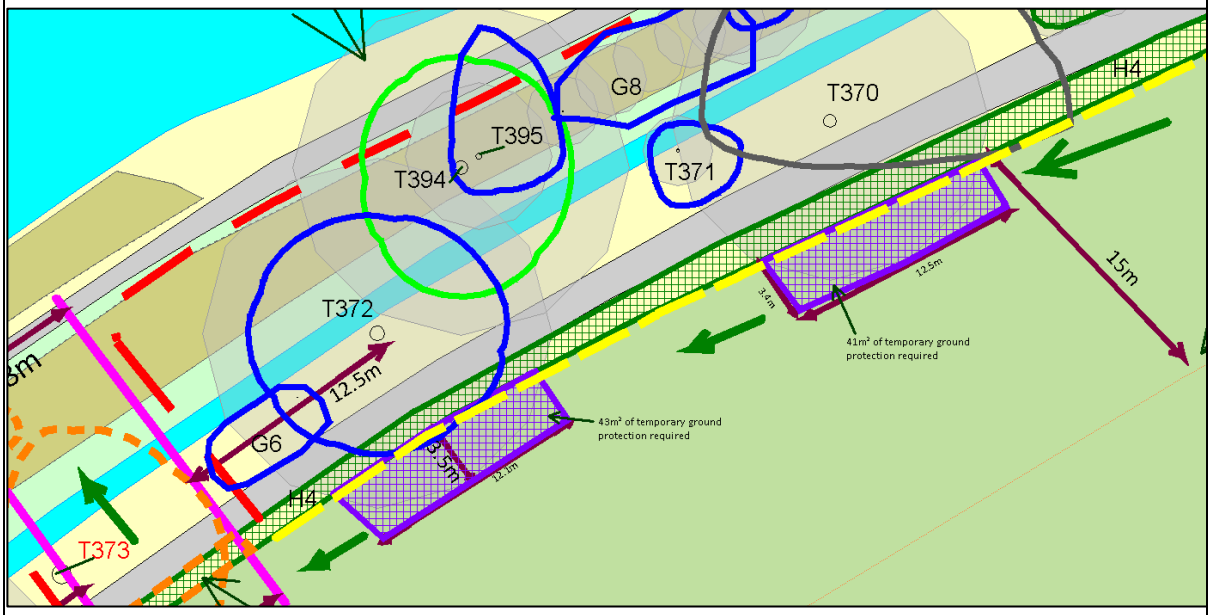


The figure above: **161m²** of temporary ground protection will be required within the RPA OF T351



The figure above: **173m²** of temporary ground protection will be required within the RPA OF T351

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken



The figure above: **41m²** of temporary ground protection will be required within the RPA of T370, and **43m²** of temporary ground protection will be required within the RPA of T372



Photograph 3 (above): An example of a ground protection boards system on top of a compressible mulch chip layer and membrane, to spread the load and lessen compaction onto the soil below: Photo credit to: https://www.ground-guards.co.uk/product/multitrack-2-44m-x-1-22m-8x4/

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Confirm onsite the "tree safe" areas where the storage of materials, mixing and welfare areas can occur and be situated on site. Welfare areas, storage of materials and mixing can take place in any area outside of the heras fencing and at least 4m from the low activity fencing **COMMUNICATE** this to all personnel on-site.	Yes, by Arboriculturist and a site supervisor		
An **absorbent spill kit** material **SHALL** be present to prevent any spillages running towards RPAs of trees, Spill Kits will also be used to prevent any fuel spillage leaching into the soil.	Yes, by Arboriculturist and site manager/ supervisor		
Mixing on site and minimising soil contamination: Mixing will take place **on Tarpaulin** to prevent contamination with the soil should spillage. Any spills of fuel, concrete mixing, spoil or other contaminants, on the soil or the permeable ground protection system, will be absorbed immediately, using a **Spill Kit**. Spoil will not be thrown away on site and instead **into a designated skip** located within this designated area, or outside of the site **Confirm this** with the site manager	Yes, by Arboriculturist and site manager/ supervisor	All trees	
Construction worker parking shall be outside of the site. **Confirm this** with the site manager	Yes, by Arboriculturist and site manager/ supervisor	N/A	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Designated welfare area: A Welfare area will be designated and confirmed, and this will be in the 'tree safe' area	Yes, by Arboriculturist and site manager/ supervisor	It SHALL NOT be situated within the RPAs of any trees	
The Construction access way into the site SHALL be as illustrated by the **GREEN ARROWS** on the Tree Protection Plan, a snapshot of which is inserted below:	Yes, by Arboriculturist and site manager/ supervisor		

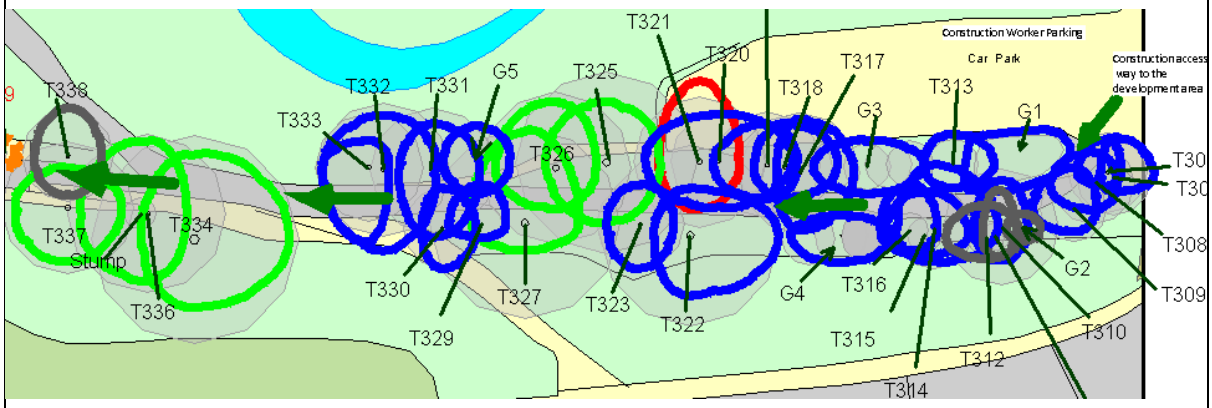


Figure 14 (above, excerpt from the TPP)

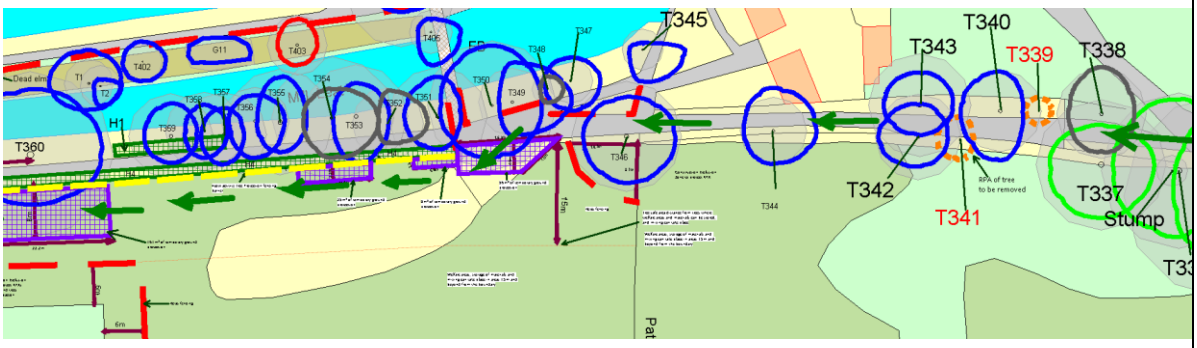


Figure 15 (above, excerpt from the TPP)

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken

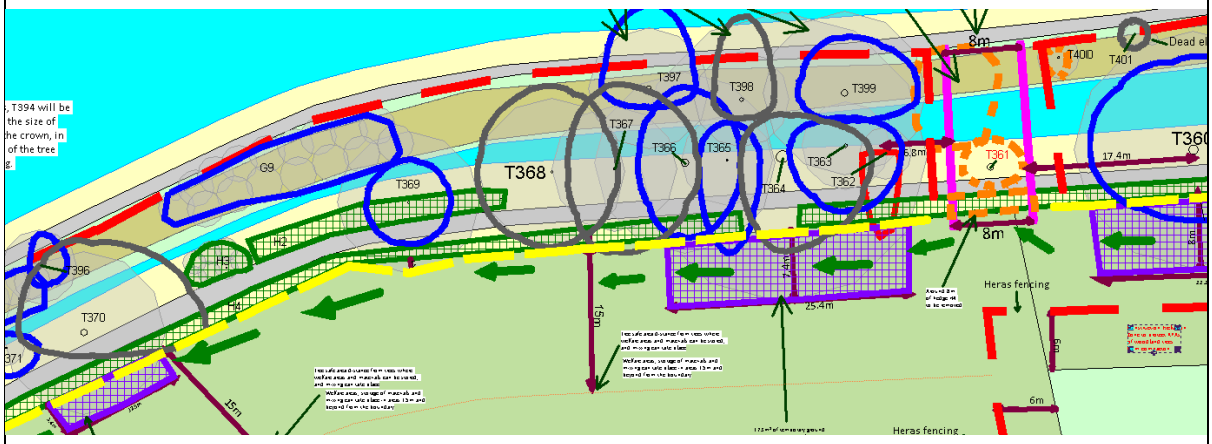


Figure 16 (above, excerpt from the TPP)

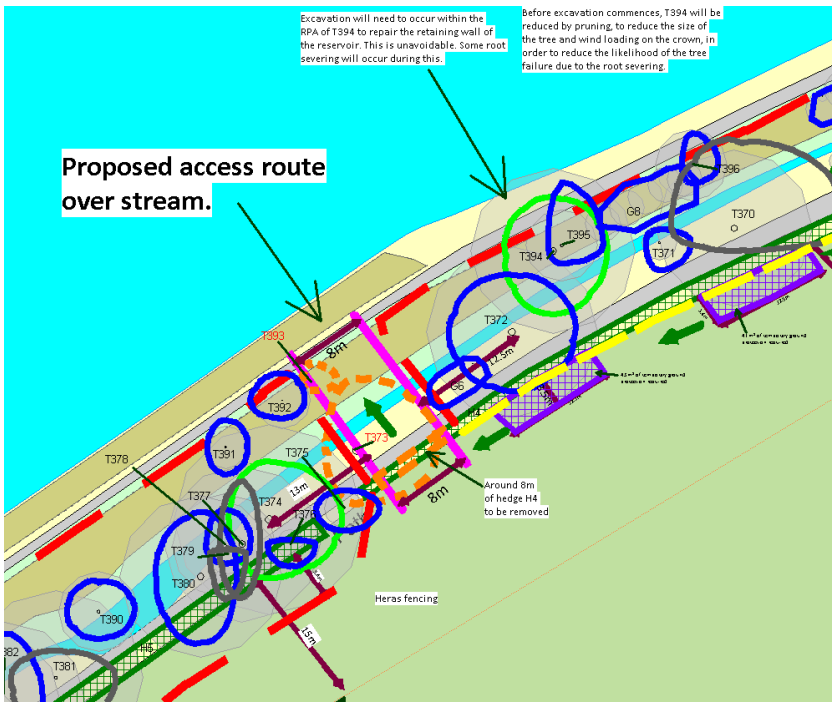


Figure 17 (above, excerpt from the TPP)

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Development commences: **This only occurs once all protective fencing and ALL ground protection have been installed and checked by the project arboriculturist.**			
The development commences. The protective fencing and all load-bearing ground protection **SHALL** stay in place and be inspected regularly throughout development by an independent arboriculturist, to ensure it is kept in place throughout development.	Yes, by Arboriculturist	All trees	
Arboricultural supervision SHALL occur during the excavation within the RPAs of T394, T397, T364 and T399.	Yes, by Arboriculturist	T394, T397, T364 and T399.	
The arboriculturist SHALL carry out root pruning where required to ensure any severed roots are cleanly cut to a suitable pruning point.	Yes, by Arboriculturist	T394, T397, T364 and T399.	
The arboriculturist shall carry out monitoring of these trees during this, to monitor their stability.	Yes, by Arboriculturist	T394, T397, T364 and T399.	
1 week after excavation has taken place the arboriculturist shall revisit to inspect these trees, inspecting for any signs of instability.	Yes, by Arboriculturist	T394, T397, T364 and T399.	
If root severing occurred within the RPA of T350 for the installation of the temporary ground protection system, T350 will also be reinspected by an arboriculturist 1 week after root severing occurred.	Yes, by Arboriculturist	T350	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
If the methodology requires changing in regards to tree protection measures during development, this **SHALL** be communicated to the LPA and the arboriculturist **SHALL** be consulted accordingly	Yes, by Arboriculturist	All trees	
Development completion			
Development completion. All development materials, plant, machinery and vehicles will be removed from the site The welfare units, spill kits and tarpaulin in the mixing areas will be removed.	Yes, by Arboriculturist	All trees	
The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees	Yes, by Arboriculturist	T350 T394 T397 T399	
An Arboricultural site visit by the project Arboriculturist to confirm that all materials and machinery have been removed from the site. Dismantling of protective measures: **Protective fencing, (red dashed lines and yellow dashed lines.** and **temporary ground protection**, **(Purple hatched areas)** on the Tree Protection Plan) SHALL be removed when all development has been completed and all materials and machinery have been removed from the site	Yes, by the site supervisor and Arboriculturist Yes, by the site supervisor and Arboriculturist Yes, by the site supervisor and Arboriculturist	All trees	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
Post-development			
3 months after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.	Yes, by Arboriculturist	T350 T394 T397 T399	
New tree planting and landscaping will take place after development has been completed, (if proposed) Compacted soil can make new tree establishment difficult, as water and oxygen availability are reduced in the soil. The lack of pore spaces also makes it difficult for new roots to grow and develop. If the soil in proposed tree planting areas, has been compacted by construction traffic, decompaction using an air tool and compressor, will be carried out after development has been completed, and before new tree planting. An air tool breaks apart compacted soil, allowing water and oxygen to percolate through the soil, which is essential for root growth. This would be essential for the successful establishment of new trees in soil that has been compacted by construction traffic.	Yes, by Arboriculturist	All new areas proposed for new tree planting may have been compacted by construction activities.	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
6 months after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.	Yes, by Arboriculturist	T350 T394 T397 T399	
12 months after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.	Yes, by Arboriculturist	T350 T394 T397 T399	
18 months after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.	Yes, by Arboriculturist	T350 T394 T397 T399	
24 months after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs	Yes, by Arboriculturist	T350 T394 T397 T399	

Activity	Arboricultural supervision required, and by whom?	Trees affected	Date action undertaken
to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.			
3 years after development completion: The Arboriculturist will visit the site to inspect the trees that had excavation occur within their RPAs to assess the stability and condition of these trees. If there are concerns regarding the stability or condition of these trees, the arboriculturist will make appropriate recommendations, e.g., further pruning, or tree removal if no other management options are suitable.	Yes, by Arboriculturist	T350 T394 T397 T399	

Table 1: The table shows an auditable system detailing specific site events requiring input/supervision as per BS 5837:2012 section 6.3.

Note: existing planning regulations include the provision for local planning authorities to enforce planning requirements. The project Arboriculturist appointed by any developer can only help monitor site activity. Any enforcement is the responsibility of the local authority.

4.0 CONCLUSIONS

4.1 All retained trees shall be protected before and during any construction as per the fencing detail and the Arboricultural supervision measures outlined. Tree protection in addition to the Arboricultural supervision measures detailed SHALL ensure no significant root disruption or damage to tree stems or crowns will occur to trees shown for retention during enabling works or construction.

Method statement compiled by:

Rachel Selwyn

Signed…… Date 9/03/2023

Report checked by:

Sam Selwyn

Signed…… Date 9/03/2023

APPENDIX 1: ADDITIONAL INFORMATION AND GUIDANCE REGARDING CHANGES TO THE METHOD STATEMENT

Additional information to be taken into account

A.1 If any service runs are located within the RPA due to engineering difficulties post permission, the route will be designed to be as far away from any of the trees and if at all possible trenchless techniques considered. The LPA must be consulted and informed if there are any changes to this Arboricultural Method Statement.

A.2 An Arboricultural Officer or Consultant must supervise if a trench has to be excavated within the area designated as the RPA. It must be remembered that hand digging is time-consuming and efficiency is often compromised due to the space and size needed to install the piping, ducting or actual service run within the trench. Air excavation needs to be considered when locating services within the RPA as this minimises damage caused to root systems.

APPENDIX 2: NOTES ON CONSTRUCTION OPERATIONS ON SITES WITH TREES

A2.1 Avoiding crown and stem damage: - Planning of site operations will take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs) so that they can operate without coming into contact with retained trees. Such contact can result in serious damage to the trees and might make their safe retention impossible.

A2.2 Consequently, any transit or traverse of plant in proximity to trees will be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is maintained at all times.

A2.3 Any rubble/ demolition debris (concrete, bricks, corrugated sheets etc.) will be removed from the site.

A2.4 Storage of materials will be beyond tree protection barriers, no closer than 5m to protective fencing. No top or sub-soil is to be removed within the Tree Protective Fencing. No soil will be piled into areas within Tree Protective Fencing.

New service utilities and drainage routes

A2.5 Underground service and drainage service routes **SHALL be** located beyond the RPA of all trees retained. Any excavation for services within the tree protection area will be undertaken following the guidelines published by NJUG Guidelines for the planning, Installation and Maintenance of Utility Apparatus in proximity to trees.

A2.6 If the service runs are located within the RPA due to engineering difficulties post permission, the route will be designed to be as far away from any of the trees and if at all possible trenchless techniques are considered.

A2.7 An Arboricultural Officer or Consultant must supervise if a trench has to be excavated within the area designated as the RPA. It must be remembered that hand digging is time-consuming and efficiency is often compromised due to the space and size needed to install the piping, ducting or actual service run within the trench. Air excavation needs to be considered when locating services within the RPA as this minimises damage caused to root systems.

A2.8 **Development notes from BS5837 2012:**

A2.9 To avoid disturbance to the physical protection, it is essential to make allowance for, and plan, all construction operations which will be undertaken in the vicinity of trees. Factors that need to be considered include, but are not limited to:

a) Site construction access;
b) The intensity and nature of the construction activity;
c) Contractors' car parking;
d) Phasing of construction works;
e) The space needed for foundation excavations and construction works;
f) The availability of special construction techniques;
g) The location and space needed for all temporary and permanent apparatus and service runs, including foul and surface water drains, land drains, soakaways, gas, oil, water, electricity, telephone, television or other communication cables;
h) All changes in ground level, including the location of retaining walls, and steps and making adequate allowance for foundations of such walls and backfilling;
i) Working space for cranes, plant, scaffolding and access during works;
j) Space for site huts, temporary toilet facilities (including their drainage) and other temporary structures;
k) The type and extent of landscape works which will be needed within the protected areas, and the effects these will have on the root system;
l) Space for storing (whether temporary or long-term) materials, spoil and fuel and the mixing of cement and concrete;
m) The effects of slope on the movement of potentially harmful liquid spillages towards or into protected areas.

To avoid below-ground damage for new utility services:

A2.10 For below ground:

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any work, particularly if this involves excavating through the surface 600mm, where the majority of roots develop.

A2.11 Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extremes of heat. It is therefore important to protect exposed roots where a trench is to be left open

overnight where there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

A2.12 Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

A2.13 The appropriate method of working within the Precautionary Zone should be determined in consultation with the local authority (or for privately owned trees the owner or their agent) and may depend on the following circumstances;

• the scope of the works (e.g. one-off repair or part of an extensive operation)

• degree of urgency (e.g. for restoration of supplies)

• knowledge of the location of other apparatus

• soil conditions

• age, condition, quality and life expectancy of the tree Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage. Acceptable techniques in order of preference are;

Acceptable techniques in order of preference are;

a) Trenchless

Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones. To avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

b) Broken Trench - Hand-dug

This technique combines hand-dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases, the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench - Hand-dug

The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective is to retain as many undamaged roots as possible. Hand digging within the Prohibited or Precautionary zones must be undertaken with great care requiring closer supervision than normal operations.

After careful removal of the hard surface material digging must proceed with hand tools. Clumps of roots less than 25mm in diameter (including fibrous roots) should be retained in situ without damage. Throughout the excavation works great care should be taken to protect the bark around the roots.

All roots greater than 25mm in diameter should be preserved and worked around. These roots must not be severed without first consulting the local authority tree officer/arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

APPENDIX 3: NEW TREE PLANTING

A3.1 General information on tree planting has been provided below.

A3.2 New planting helps safeguard the long-term amenity value of the area. Such a policy will provide for a more effective long-term safeguarding of the local urban forest and the Arboricultural amenity value of the area.

A3.3 New planting will take into account ultimate size and position to minimise future shading conflicts and direct pruning conflicts. Trees will be positioned to allow them to reach their mature size without being impeded or risk causing conflict in future (e.g. *"the right tree in the right place").* The crown habitat of the species and ultimate size is therefore very important for tree species selection for new planting

How to plant a tree

A3.4 The following information on how to plant a tree successfully is taken from the International Society of Arboriculture (2019) and the BS 8545:2014 Trees: from nursery to independence in the landscape.

1. Locate all underground utilities before digging.

2. Identify the trunk flare. The trunk flare is where the trunk expands at the base of the tree. This point should be partially visible after the tree has been planted.

3. Dig a tree pit. Holes should be no deeper than the existing rootball or container depth and have a diameter of at least 75mm greater than that of the root system. During the excavation of the tree pit, the soil dug should be placed to one side separating topsoil and subsoil as far as is practical.

4. Remove the containers or cut away the wire basket. Inspect container tree root balls for circling roots. Straighten, cut, or remove them. The tree's root system should be wetted before planting

5. Place the tree at the proper height. Take care to dig the hole to the proper depth – and no more. If the tree is planted too deep, new roots will have difficulty developing because of a lack of oxygen. The tree should be planted at the correct depth taking into account the position of the root flare and the finished level. Allowance should be made for the settling of the soil after planting.

6. Straighten the tree in the hole. Before backfilling, have someone view the tree from several directions to confirm it is straight.

7. Fill the hole gently, but firmly. Pack soil around the base of the root ball to stabilize it. Fill the remainder of the hole, firmly packing the soil to eliminate air pockets that may dry out roots. Further, reduce air pockets by watering periodically while backfilling. Avoid adding fertilizer at the time of planting. Backfill should be added gradually in layers of 150mm to 230mm depth ensuring the tree is held upright. At each stage the fill should be firmed in to eliminate all air pockets under and around the root system, but with care being taken not to excessively compact the soil.

8. Use a support system (stake), if necessary. Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. Therefore, staking should be carried out if it is deemed necessary.

9. Mulch the base of the tree. Mulch is organic matter spread around the base of a tree to hold moisture, moderate soil temperature extremes, and reduce grass and weed competition.

10. Immediately after planting, the tree should be saturated to field capacity.

11. Provide follow-up care. Keep the soil moist, but not water-logged. Water trees at least once a week, barring rain, and more frequently during hot, windy weather. Formative pruning.

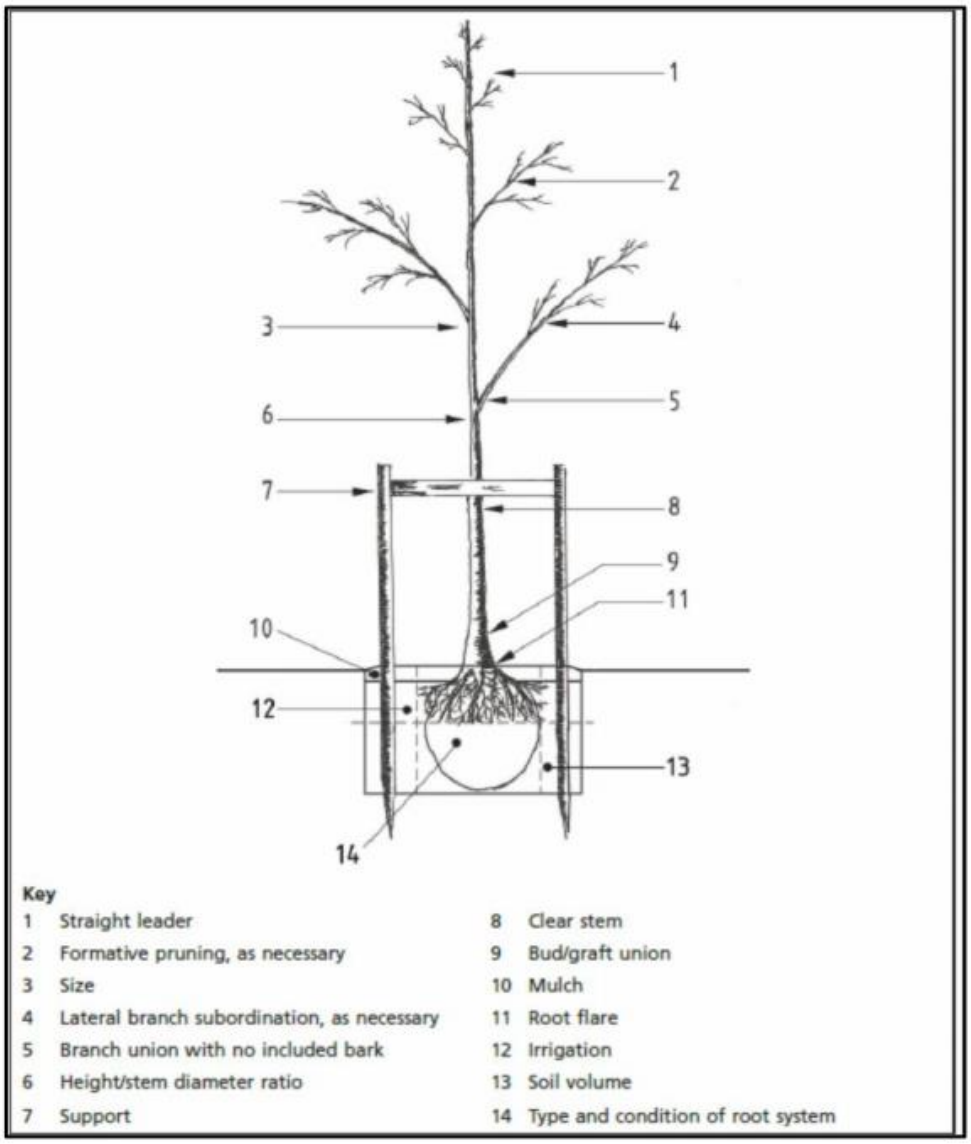


Figure 1.2 Factors involved with tree planting © BS 8545:2014

Fig. 4: Diagram credit to BS8545: 2014

Where and When to Plant

A3.5 Ideally trees will be planted in the dormant season when weather conditions are cool which allows plants to establish roots in the new location before spring rains and sun warmth stimulate growth.

A3.6 Trees will be suited to the soil type in the area and take into account the nature of the site; i.e exposed, sheltered, full sun, shade, general weather and presence of nearby structures. The ultimate size of the tree should be taken into account when choosing species. Minimising future conflict with roads, buildings and driveways when a tree reaches maturity, is a very important factor for sustainable tree planting.

A3.7 Trees will ideally be positioned at least 1.5-2m from pavements and roads, to minimise future conflict, and ideally at least 1m from boundaries.

Tree Stock

A3.8 Trees should be from a reputable nursery and should be in good condition on arrival. Stock size should be specified.

A3.9 All new trees will require watering regularly during the first 5 years. For small hedging-type stock, the trees can be smaller. Generally, younger plants and trees can establish better than older trees due to them experiencing less transplanting stress.

Watering

A3.10 Watering is very important in the first years of a tree's life to help it establish itself. Trees must be watered regularly for the first years, especially during the summer months. Formative or corrective pruning can also be part of long-term tree maintenance.

A3.11 Any tree that fails to establish itself within 5 years after planting will be replaced.

A3.12 An irrigation system shall be used for all newly planted trees. This will consist of a large capacity irrigation system with a fixed grid inlet, for tree planting in a soft scape (see below example from Green Blue Urban, 2021). The grid lid prevents debris and rodent ingress.



Photo 1: Example of a large-capacity irrigation system from Green Blue Urban. Copyright to Green Blue Urban (2021)



Photo 2: Example of a tree with an irrigation system installed. The grid lid is present at ground level. Copyright to Green Blue Urban (2021)

A3.13 The irrigation system allows both rainwater and direct watering to have a higher chance of reaching the root system and therefore providing the roots with the water they require. Watering and irrigation of new trees are essential for increasing the likelihood of trees surviving after planting.

Maintenance and management of grass and weeds around trees

A3.14 Without weed and grass management, trees will struggle to compete and become overcrowded ultimately affecting their long-term future. Grass should be kept away from the base of trees, at least 40-50cm, to prevent lawn mower and strimmer damage. Strimming should not be carried out around trees as it can cause serious damage.

Mulch

A3.15 Mulch will add organic matter to the soil and provide nutrition for the tree roots. It is recommended that mulch is thoroughly incorporated into the backfill of the soil and into the surrounding area, to encourage healthy root growth into the surrounding soil.

A3.16 Mulch will also be applied around the base of trees to help prevent grass and weeds from growing around the tree. It will be kept at least 10cm away from the bark at the base of the tree. Mulch will help suppress grass and weeds to some extent. However, removing weeds by hand would also be an

important part of the general upkeep and maintenance of newly planted trees, to prevent resorting to chemical weed killers as a control.

A3.17 Reapplying mulch, manually removing weeds and manually ensuring grass is kept approx. 40-50cm away from the bases of trees are imperative parts of a successful landscaping scheme. Grass and weeds grow the most during the growing season, from approximately March-October. Regular maintenance in these months is therefore crucial for successful establishment.

Staking

A3.18 Double stake:- This is the standard method of staking container-grown and root-balled trees. Two or three stakes can be inserted opposite each other, or equally spaced around the tree outside the root ball, and secured to the trunk by long ties or a timber crossbar and tie. This method is also useful on windy sites (RHS, 2020). The stakes should be as low as practically possible to allow some movement in the main stem and allow stem taper to develop, to allow the tree to build adaptive strength in the main stem.

A3.19 Special tree ties are available made of durable, long-lasting plastic, with buckles for fastening and adjustment. These ties can be loosened as the tree's girth expands. Use spaces to prevent the stem and stake from rubbing against each other. Make a figure of eight to hold the tree to the stake, with the spacer in between the tree and the stake, and secure the tie to the stake with a nail. (RHS, 2020). Biodegradable ties such as degradable hessian can also be used. These ties will require loosening when required to prevent them from damaging the young stems.

A3.20 Problems with staking:- Most problems with staking come from the stakes being too high and the ties becoming too tight or from damage after storms. Check the ties regularly for rubbing and adjust them if necessary. Constriction of the stem by ties happens very quickly, so fast-growing trees need frequent checking. After bad weather, check for abrasion and snapped stakes or ties (RHS, 2020).

Strimmer damage

A3.21 Strimmer damage can cause major damage to the stems of young trees. Some trees never recover from such damage. Therefore, it is recommended that grass guards are installed around trees to prevent strimmer damage. Mulch around the base of the tree, but not piled up against the stem, can also help suppress weeds and grass, limiting strimmer damage.

APPENDIX 4: BRITISH STANDARD BS 5837:2012 TABLE 1 CASCADE CHART FOR TREE QUALITY ASSESSMENT

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

APPENDIX 5: STATUTORY PROTECTION

A5.1 Wildlife and Countryside Act 1981 (with amendments) and European Protective Species

A5.2 The Wildlife and Countryside Act protects wildlife and their habitats and includes the protection of birds, bats and other protected species. It is an offence to knowingly or recklessly disturb them therefore it is important to recognise their presence. Any tree works should be timed to not disturb such protected species and be considerate of their presence. More information can be found at https://www.gov.uk/topic/planning-development/protected-sites-species

APPENDIX 6: TERMS OF REFERENCE

A6.1 BS5837:2012 'Trees in relation to design, demolition and construction – recommendations'

A6.2 BS3998:2010 'Tree work – recommendations'

A6.3 NJUG 4 – National Joint Utilities Group "Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees. Volume 4, issue 2. London: NJUG 2007" To include Operatives Hand-out Guidance

A6.4 BGS Open Source Soil Data http://www.bgs.ac.uk/nercsoilportal/maps.html

A6.5 Cranfield University LandIS Land Information System http://www.landis.org.uk/services/soilscapes.cfm

A6.6 Cranfield Soil and Agrifood Institute http://www.landis.org.uk/soilscapes/

A6.7 Installation-Guide-Cellweb-Installation-Guide-81-3

A6.8 Clean Angular Stone 4-20 (97)

APPENDIX 7: AUTHOR'S QUALIFICATIONS AND EXPERIENCE

Miss Rachel Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA, QTRA registered.

Rachel is a consultant at Selwyn Trees and has 7 years of experience working in the role. She has a BSc (Hons) degree in Arboriculture & Urban Forestry from the University of Central Lancashire. She is a professional member of the Arboricultural Association and is a registered user of the Quantified Tree Risk Assessment methodology. Her work ranges from detailed tree assessment using specialist technology to producing a range of tree reports for development projects and providing tree protection solutions to BS5837 standards.

Mr Sam Selwyn Dip Arb L4 (ABC), ISA Certified arborist, TecharborA

Sam has over ten years of experience working as a climbing arborist and is certified by the International Society of Arboriculture. He has the Level 4 Diploma in Arboriculture, is a technical member of the Arboricultural Association and has the Lantra professional tree inspection (PTI) qualification. Sam prepares reports for development sites and undertakes aerial inspections of trees. He also assists with undertaking condition surveys and detailed tree assessments using specialist technology.

Introduction to Arboricultural Survey BS5837: 2012

Survey for trees at site:	Section close to an area known locally as 'The shallows' at Worsbrough Reservoir, off of Haverlands Lane, Barnsley
Prepared for:	Omar Sharif on behalf of Align Property Partners.
Reference:	TreeSurvey **0264**
Date:	14/12/2021
Surveyor (s)	R D Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA/ R Selwyn BA(Hons)

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The following documents are attached separately and should be read with this report:

- BS5837 Tree Survey Table

The following maps are attached separately and should be read with this report:

- Tree Constraints Plan
- Tree Shade Map

1.0 Introduction

1.1 Omar Sharif on behalf of Align Property Partners engaged Selwyn Trees to carry out an Arboricultural Survey for the site close to an area known locally as 'The Shallows' at Worsbrough Reservoir, off of Haverlands Lane, Barnsley. The purpose of the survey was to advise on the conditions of any trees and report on any trees which may be affected by any planning proposals. The brief included drawing up these reports as per BS5837: 2012- 'Trees in relation to Design, Demolition and Construction - Recommendations' to ensure that trees to be retained are protected during future development.

1.2 An Arboricultural site visit was carried out on the 22nd November 2021 to assess the condition of any trees on the site and that may be affected by a proposal. The survey assessed the condition of the trees, categorised the trees and provided calculated RPA (Root Protection Area) information (where appropriate) in accordance with BS 5837:2012. The Arboricultural survey is found in the attached document '**BS5837 Survey Table'.**

1.3 We were provided with the following documents:

- 3539-01
- 3539-02
- 3539-04

1.4 The report was compiled by Rachel Selwyn, BSc (Hons) in Arboriculture and Urban Forestry, who has 6 years' experience working for Selwyn Trees and is a professional member of the Arboricultural Association; and was assisted by Richard Selwyn BA (Hons).

2.0 Scope of Report

2.1 The purpose of the survey was to advise on the conditions of any trees and report on any trees which may be affected by planning proposals. The brief included drawing up these reports as per BS5837: 2012- 'Trees in relation to Design, Demolition and Construction - Recommendations' to ensure that trees to be retained are protected during future development. If required, detailed information on the impacts of a specific proposal can be compiled in an Arboricultural Impact Assessment.

2.2 The purpose of an Arboricultural survey and an Arboricultural Impact Assessment is to allow and help the preservation of trees to be retained within a site, in respect to any future proposed developments. The Arboricultural Survey aims to include information on the trees present and their current status and contribution. General information and guidance on impacts of any proposed development may be given. An Arboricultural Impact Assessment aims to comment on the Arboricultural implications of a proposed development and set out

preservation guidelines including tree protection methods, working techniques and construction practices.

2.3 If the principles and guidelines set out in these reports are not followed, then there is a risk of damage or death being caused by construction activities to retained trees. Any damage caused to trees may result in a decline in health or complete tree failure.

2.4 For any development proposed, adhering to the guidelines set out is crucial for the success of the recommendations, which are to be approved and enforced by the Local Planning Authority (LPA). If the recommendations are acceptable then we recommend they should be controlled at key stages of the development.

3.0 Arboricultural Survey Scope and Limitations

3.1 The full Arboricultural Survey is found in the attached table **'BS5837 Survey Table'.** The findings and recommendations are limited to those trees shown in the Arboricultural survey and those being shown to be retained by the developer. This Arboricultural survey is valid for 12 months from the date of the survey.

4.0 Caveats and Limitations

4.1 The inspection was carried out from a ground level Visual Tree Assessment. The survey did not include any climbing or investigation beyond what was visible from accessible points. Digital Scanning Software and other decay detection methods were not available to detect internal decay.

4.2 This report includes an evaluation of the tree(s) on the day the site visits were made. Where access was limited, measurements were estimated. This report takes into account findings from these visits. Due to the large number of trees present, some trees were surveyed in groups and smaller trees were noted but not surveyed individually. Where smaller trees are present next to a large tree, the largest of the group was surveyed so that this RPA (Root Protection Area) would take into account the RPAs of the smaller trees nearby, and the smaller trees were not surveyed individually.

4.3 No soil samples were taken.

4.4 Any legal descriptions stated or given by the consultant are understood to be accurate.

4.5 Selwyn Trees will not assume responsibility for legal matters that arise from this survey, and will not be required to act as a legal witness to give testimony or attend court unless agreed arrangements are subsequently made.

4.6 The Arboricultural survey is valid only for typical weather conditions. Healthy trees, or parts of healthy trees, may fail at any time. Structural failures occur when the stresses due to the forces acting on a tree exceed the strength of the tree structure or the tree–soil connection supporting the tree. Even a structurally strong tree, free of defects, will fail when a load is applied that exceeds the load-carrying capacity of one or more of its parts. Most tree structural failures involve a combination of structural defects or conditions, such as the presence of decay or poor structure and an unusual or extreme loading event, such as strong wind. Every effort has been made to identify defects or hazards but no guarantee can be given for their individual safety. Healthy trees may fail in unusually high or unpredictable winds or violent storms and as the consequences of such weather phenomena are unforeseeable, Selwyn Trees cannot be held liable for any such failures.

4.7 Trees are changeable organisms; their health and condition can change rapidly due to the dynamic nature and other site conditions. Therefore, this report is only valid for the 12-month period from the date of the site survey.

4.8 Land managers are responsible for any work on surveyed trees or for carrying out any recommendations.

4.9 Where similar trees are growing in large groups, their height and diameters may be estimated. Trees were surveyed if they affected the site and if their diameters at 1.5m exceeded 150mm in a woodland setting (75mm for individual trees). Where trees are young in age their measurements may be denoted as 'young'.

5.0 Site Description

5.1 The site surveyed is close to an area known locally as 'The Shallows' at Worsbrough Reservoir, Barnsley. The survey was requested due to refurbishment works being required for a retaining wall that has failed along the northern embankment. We were instructed, in an onsite meeting, of the area required for surveying, which consisted of the area of trees on the embankment close to the failed retaining wall in this area. This was also the area shown in the topographical survey provided.

5.2 The embankment in the area surveyed is steep with a sharp incline to the north, and was possibly artificially created. Various trees are situated on this embankment, as well as understorey brambles (*Rubus futicosus*). The embankment appeared to have a couple of channels running from top to bottom, possible old paths or rain run-off trenches. This site

area has been used previously for fishing and it is possible that the area may continue to be used as a fishing embankment after the retaining wall has been repaired. The site area is currently fenced off from all use due to the failure of the retaining wall. The main access way to the site area is via the north from the road, Haverlands Lane, and then via public footpaths.

5.3 The ground level of the site generally slopes downwards from Rotherham Road south towards the existing dwelling. The proposed car port is proposed in an area of existing gravel.

5.4 According to the Cranfield Soil and Agrifood Institute (2021) the soil type in the area is freely draining lime-rich loamy soils

5.5 TPO and Conservation Area Status

5.5.1 We understand the site is not within a Conservation Area.

5.5.2 TPOs (Tree Preservation Orders)

5.5.3 We understand there are no Tree Preservation Orders (TPOs) amongst the trees surveyed.

6.0 Background

6.1 Any development work on the site may detrimentally affect trees to be retained if those trees do not receive protection. The risk of damage to trees both above and below ground needs to be controlled by a strong physical barrier. The ground beneath the trees might be used by traffic or for storage of materials or be excavated, all of these will potentially be detrimental to the root systems.

6.2 The majority of tree roots generally occur in the top 90cm of soil, as at lower depths there is less access to water and oxygen. Contrary to popular belief mature trees do not have large tap roots that obtain water from great depths, but rather lateral and spreading. Tree roots need to take up water, oxygen and minerals in order to survive. Therefore, any compromise to a tree's rooting area may affect a tree's stability, ability to function and survival.

6.3 Construction activity can significantly affect the rooting area by compacting soil around trees and thus reducing the pore spaces within the soil. Pores are very important in soil for holding water and oxygen. Compaction inhibits root growth and penetration as well as decreasing the oxygen in the soil that is essential for the growth and function of the roots.

6.4 Damage caused to rooting environments can disrupt the balance between the roots and crown established by a tree over many years, and this could be potentially detrimental to tree health or may compromise the structural integrity or the stability of the tree.

6.5 Possibilities of damage to trees during and following construction processes include direct and indirect damage. Direct damage involves the mechanical physical damage to trees or their roots or roots systems via machinery, soil excavation or hazards such as fire. Indirect damage involves injury that occurs to a tree by activities that take place near the tree, such as compaction, level changes, soil damage or chemical contamination near the root plate.

6.6 For trees to be retained, light tree surgery work such as crown lifting and/or other tree protection methods along with implemented construction methods can reduce the risk of damage.

6.7 For protecting trees that are to be retained BS 5837:2012 –'Trees in relation to Design, Demolition and Construction' gives guidance on how to manage trees close to proposed works. BS 5837:2012 gives guidance on calculating the Root Protection Area (RPA) around a tree which estimates the area of soil needed to ensure the survival of retained trees.

6.8 The RPA gives guidance on the rooting area needed in order for a tree to survive. Once the RPA around trees to be retained has been set, no entry into the RPA by machinery should be allowed, nor should the RPAs be used for any type of storage or access pathway. Encroaching into a trees RPA should only be undertaken if agreed by the Local Planning Authority (LPA). By adopting such measures, lasting damage to existing trees can be avoided and the amenity values can be preserved.

6.9 RPAs may be subject to a 20% offset, but on one side only, in certain circumstances. The offset must be accounted for on the remaining sides and must take into account the tree conditions and the context of the site.

6.10 By considering the RPAs and existing site features (including natural and man-made topography) and by adopting construction and tree protection techniques that minimise root disturbance, successful construction projects can be achieved.

7.0 Instructions and Brief

7.1 The brief was to undertake a tree survey in accordance with British Standard BS 5837:2012 'Trees in relation to design, demolition and construction: Recommendations'.

7.2 The survey is based on the conditions found on the day(s) and based on the findings of the visit. A site visit was made on the 8th November 2021. The weather on the day of the site visits was mostly dry. Where access was limited, measurements were estimated. This report takes into account findings from this visit. Quantitative data is provided on tree species, height, diameter, age class, crown spread, British Standard category, crown clearance and brief assessment on tree condition and future potential. Trees found to be structurally dangerous or in poor condition are identified.

7.3 With regards to British Standard BS 5837:2012 'Trees in relation to design, demolition and construction- Recommendations' a calculation has been made for the theoretical Root Protection Areas (RPA) in metres.

7.4 This survey should be regarded as an initial assessment and appraisal of the trees on the site and gives outlines of construction practices around trees to BS 5837:2012 'Trees in relation to design, demolition and construction- Recommendations'.

7.5 The location of the trees with their calculated RPAs is shown in the attached map plan.

7.6 The survey includes the information below:

Key:

Survey Reference number- Trees were tagged.

Species - Species identification is based on visual observation with the common English name given first and the botanical name give in italics. If the species was not identified it is marked with Unidentified.

Tree Heights – These were measured in metres using laser technology. Where access was limited or there was little visibility due to overcrowding, heights were estimated.

Stem Diameters – Measured using diameter tape in mm. In the case of grouped trees the largest diameter was recorded.

Crown Spread - The crown spread was measured in metres in the North, South, East and West directions. Where access was limited crown spread was estimated.

Crown Clearance - the height of the first significant branch was measured. Where access or visibility was limited this was estimated.

Age class – trees were recorded as young, semi-mature, early mature, mature, over mature as prescribed in BS 5837:2012.

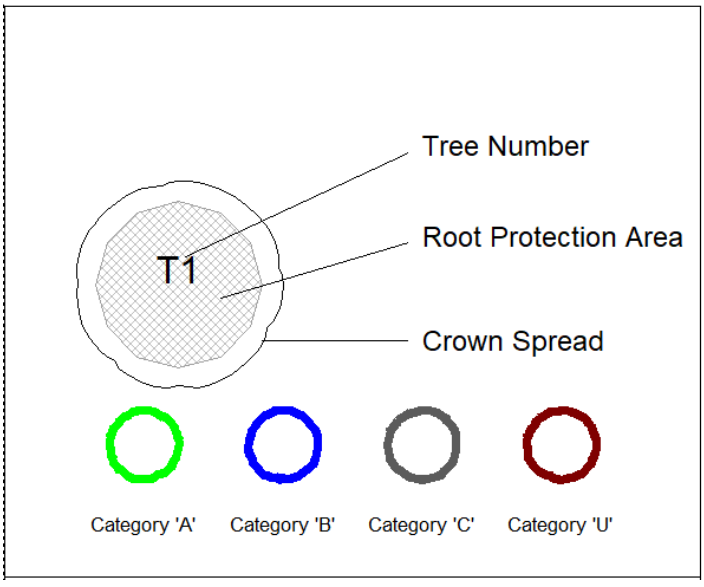
Condition – tree condition was recorded briefly particularly in respect to structural and/or physiological condition (eg. The presence of decay, physical defects and/or preliminary management recommendations)

Where trees are grouped or in case of woodlands, the condition stated will be typical of the feature. Groups of trees and woodlands are represented and the RPA will be included in the total area shown. The RPA will be calculated by taking an average measurement of stem diameter.

Estimated Remaining Contribution/ Life Expectancy – estimated (eg. Less than 10 years, 10-20 years, 20 – 40 years, 40+ years)

RPA (Root Protection Area) - The Root Protection Area for a tree is the minimum area required to meet the everyday needs of a normal healthy tree. The standard root protection area of a tree is described as a circle (with the tree at the centre) with a radius of 12 times the stem diameter, measured at 1.50m above ground level. The maximum radius for a root protection area (excluding ancient and veteran trees) is capped at 15.0m. BS:5837 recommends that there should be no excavation, no changes of soil level (either increases or decreases) and no compaction within the root protection area. The radius of the root protection area for ancient and veteran trees, based on the current Standing Advice, is 15 x stem diameter (measured at 1.50m above ground level) or 5.0m beyond the edge of the canopy, whichever is the greater. The RPAs are illustrated on the associated maps by grey hatched polygons. The RPA illustrated polygon is a design tool used to calculate the minimum area of soil a tree needs at its current size to survive. However, the true root spread may be different from the polygon design tool illustrated, depending on the site conditions and site features. Therefore, these are taken into account when assessing root spread and impacts of any development on roots.

The RPA Polygons and crowns spreads of the trees surveyed are illustrated on the map plans by the following key:



Retention Category- Corresponds with BS 5837:2012

A - Trees of high quality and value, including visual amenity (sub categories 1, 2, 3). It is usual for such trees to be retained unless the planning merits of a particular scheme or lay-out override.

B – Trees of moderate quality and value, including visual amenity value (sub categories 1, 2, 3). Such trees should be considered for retention

C – Trees of low quality and value including visual amenity (sub categories, 1, 2, 3)

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

Sub categories – trees in categories A to C will qualify under one or more of three sub categories (1, 2, 3). Sub categories 1, 2 and 3 are intended to reflect Arboricultural and landscape qualities, and cultural values, respectively. This is set out in Appendix 2.

The tree survey lists which sub category applies. Each sub category is intended to have equal weight such that, for example, an A1 tree has the same retention priority as an A2 tree. Some trees could qualify under more than 1 criterion.

Trees were surveyed if they had a stem diameter above 75mm as per the BS 5837: 2012 guidelines (150mm for woodland trees). Trees with stem diameters less than this are classed as too young to be significant.

For more information of tree categorisation, please see **Appendix 1 British Standard BS5837:2012**

Deadwood -

Minor deadwood- less than 25mm in diameter

Moderate deadwood- 25-50mm in diameter

Major deadwood – Greater than 50mm in diameter

Physiological condition-

Those trees marked 'Good' can generally be classed as having good overall structural and physiological condition. They usually contribute significantly to the local or site amenity.

Those trees marked 'Fair' can generally be classed as having reasonable structural and physiological condition. They may contain smaller areas of included bark within either major or minor fork junctions. They may be subject to single or multiple fungal invasions, bacterial or virus. They may be subject to minor crown dieback, unusually pale or smaller foliage or have been subjected to outside influences such as restriction of rooting spread, vandalism or mechanical damage, but should be viewed as in generally good overall condition.

Those trees marked 'Poor' can generally be classed as having poor overall structural or physiological condition. They may contain large areas of included bark either within major fork junctions. They may be subject to single or multiple fungal invasions, bacteria or virus. They may contain splits or cracks throughout the branching structure. They may be subject to significant crown dieback or

exhibit unusually pale or small foliage. They may be subject to outside influences such as restriction of rooting spread, vandalism or mechanical damage and costly to retain.

Root Protection Area (RPA) –All trees in retention categories A, B and C have their RPA calculated and the RPA figure given represents the radial distance, from the tree's trunk, at which barriers should be erected. The calculation for the RPA is as per section 4.6 of BS 5837:2012.

For single stem trees, the RPA should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter. For trees with more than one stem, one of the two calculation methods below should be used. In all cases, the stem diameter(s) should be measured in accordance with Annex C, and the RPA should be determined from Annex D. The calculated RPA for each tree should be capped to 707 m2.

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

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

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

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

N.B. Where all stem diameters were not accessible, this averaging formula has been adopted.

The RPA for each tree should initially be plotted as a circle centred on the base of the stem. Modifications to the shape of the RPA should reflect a soundly based Arboricultural assessment of likely root distribution.

Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system: a) the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus); b) topography and drainage; c) the soil type and structure; d) the likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.

8.0 Initial General Observations, Comments and Pictures

8.1 Please see the table in the attached document 'BS5837 Survey Table' attached, which provides details, measurements and comments regarding the trees surveyed. Trees were

plotted onto the Tree Constraints plan map using a topographical survey. Where trees were surveyed that were not indicated on the topographical survey, a GPS receiver was used. GPS has an accuracy of 1-3m.

8.2 The trees surveyed include species *Salix*, *Quercus* and *Crataegus monogyna.* Approx. 14 trees were surveyed plus a couple of groups. The trees are situated on and close to the northern embankment of Worsborough Reservoir. The measurements of the stem diameters taken on the site visited were used to calculated RPAs (Root Protection Areas) which have been plotted as grey hatched polygons on the attached Tree Constraints Plan. This RPA illustration is a design tool used to calculate the minimum area of soil a tree needs at its current size in order to survive. The true root spread may be different from the polygon design tool illustrated, depending on the site conditions and site features. Therefore, these are taken into account when assessing root spread and impacts of any development on roots.

Preliminary observations with regards to any future proposed works to the retaining wall of the northern embankment

8.3 The trees closest to the existing retaining wall are T708 (willow *Salix alba*) and T713 (Oak *Quercus robur*). These trees are also the amongst the largest in the area.

8.4 T708 was calculated to have an RPA spread radius of around 11.67m, measured from the centre of the tree trunk. Based on this and the position of the tree, it can be expected that the roots of this tree will be present up to the retaining wall, and it is likely roots are present spreading underneath into the reservoir. Willows (*Salix* spp.) tend to be moisture hungry and can develop very large spreading root systems. The roots can also be expected to spread along the embankment.

8.5 T713 (oak) is situated further back from the retaining wall of the northern embankment. The tree is situated approximately 3.8m from the edge of the reservoir. The tree was calculated to have an RPA spread radius of around 9.64m, measured from the centre of the tree trunk. Based on this and the position of the tree, it can be expected that the roots of this tree will be present up to the retaining wall, and it is possible roots are present spreading underneath into the reservoir. The RPA polygon design tool indicates the theoretical RPA of T713 may spread underneath the reservoir by around 60.11m².

8.6 However the root morphology of trees T708 and T713 may differ from the illustrated polygons on the Tree Constraints Plan map due to the reservoir. Generally, tree roots tend to be surface orientated with 90% of roots occurring within the top 1m of soil. This is because there is less oxygen and water at lower depths. Tree roots need oxygen in order to survive as they are porous.

8.7 Therefore whilst tree roots can survive for short periods of time submerged within water under anaerobic conditions, tree roots generally don't grow within water; they need soil and some aerobic conditions. Therefore, it is possible the tree roots extend underneath the reservoir. However, the anaerobic conditions here may limit their spread and the roots of these trees may in fact spread further east, west and north along the embankment, further than the basic grey hatched polygon design tool indicates on the Tree Constraints Plan.

8.8 The calculated RPAs (Root Protection Areas) of trees T709 (Oak), T710 (Willow), T711 (Hawthorn), T712 (Hawthorn), T714 (Hawthorn), and all other trees and groups surveyed, do not extend across into the footprint reservoir, accordingly to the Tree Constraints Plan map. The RPA of T709 would theoretically spread to approx. 2m from the retaining wall of the embankment.

Guidance for impacts on existing trees with the repair and rebuilding of the failed retaining wall of the northern embankment.

8.9 Under the BS587:2012 'Trees in relation to Design, Demolition and Construction-Recommendations' guidelines the following need to be observed in order to minimise impacts of development on trees and to ensure trees can be retained undamaged.

8.10 Guidance from BS5837: 2012 on protecting tree roots within RPAs states that for tree roots to be retained undamaged there must be no excavation, no soil stripping and no soil grading of the site within the Root Protection Area of retained trees i.e No digging. Root severing damages a root system and can cause the decline, instability and death of trees. Compaction reduces the pore spaces in the soil reducing the water and oxygen available for tree roots, which can cause roots to become asphyxiated and die.

Within Root Protection Areas the guidance follows that:

- Roots must not be severed, cut or broken – no digging
- Ground levels must not be changed- no digging, no soil raising
- Soil must not be compacted- no tracking of vehicles
- Oxygen must be able to diffuse into the soil beneath the engineered surface- no tracked vehicles

8.11 If permanent hard surfacing is proposed within RPAs of retained trees it must following no dig principles e.g. no excavation, it must be load-bearing and must be porous. Ground protection such as the Cellweb TRP system is one system that is compliant with BS5837:2012 for any new hard surfacing within RPAs (Root Protection Areas) of retained trees. Another

alternative would be to create raised platforms for walkways above the soil surface to minimise root severing and compaction within tree rooting areas.

8.12 The precise impacts on the roots of trees present, especially T708 and T713 will depend on the proposal for repairing the failed wall along the northern embankment. It may be that some damage to existing tree roots of T708 and T713 will be unavoidable in order to repair the retaining wall. The extent of damage would depend on the proposal and the methods used.

8.13 T708 (Willow) has significant hollowness in its main stem and has had numerous major breakouts. The tree provides unique habitat for wildlife within the hollowed area but is vulnerable to future failures. Therefore, if the tree is retained it is strongly recommended that its target zone needs to be kept free of pedestrians. If pedestrians are to regularly be present within the target zone, pruning work needs to be considered to reduce the risk of failure, or tree removal needs to be considered. From an Arboricultural perspective the tree has wildlife value and therefore should be retained if possible.

8.14 Removing the existing failed retaining wall would likely result in some root loss of tree T708 and T713. T708 would likely be most affected, and if significant, removal of this tree may need to be considered. T713 (Oak) is a large tree with good value that should be retained. It is likely removing the retaining wall and repairing (which may involve excavating some of the embankment) would result in some root loss of T713. This tree is mature and mature trees generally struggle to cope with stresses to their root systems compared to younger trees. It is possible that if significant root damage occurs, tree T713 could decline, in which case pruning, or in the most severe case tree removal, may need to be considered to lower the risk of harm due to a tree failure.

General guidance on planting opportunities

8.15 There is opportunity for new planting to be carried out on the embankment in the survey area, particularly towards the eastern side. Significant brambles are currently present on the embankment, which will smother any new trees planted. Therefore, if tree planting is to take place, the brambles present will require removing and the area maintained free of weeds and other ground vegetation to prevent competition with new trees and present new trees being smothered.

8.16 A group of 2 young oak (*Quercus robur)* trees and 1 young hawthorn (*Crataegus monogyna)* are present on the embankment, referenced as T715, T715a and T716 on the map. These are young trees at present and are growing very close together. The oak trees have the potential to form massive spreading trees (20m+ in height). Their position has been approximately illustrated on the Tree Constraints Plan. These young trees are situated relatively close to the public footpath.

8.17 Future management will likely be required for these trees. One of the oak trees may require removing to allow the remaining oak sufficient space to grow. Oak is very slow growing species. However, the client may choose to remove both young oak trees and replant with an alternative species that has a smaller mature height, due to oak trees having a large ultimate size.

8.18 New tree planting can be carried out on the banking and the roots would help bind the soil together to lessen soil erosion. The ultimate height of trees planted should be taken into consideration when species are chosen. As a general guide, planting a variety of species will help diversify the Arboricultural value of the local area. It is beneficial to plant British native species, and to choose species that fit in within the existing Arboricultural area. In the site and surrounding areas, the common tree species present are Oaks (*Quercus* spp.), Hawthorn (*Crataegus monogyna*), willows (*Salix* spp.), birch (*Betula* spp.), Hazel (*Corylus avellana*) and Ash (*Fraxinus excelsior*).

8.19 Other British native species, that have a small to medium in ultimate size include:

- Dog rose (*Rosa canina),*
- Alder buckthorn (*Frangula alnus),*
- Guelder rose (*Viburnum opulus)*
- Dogwood (*Cornus sanguinea)*
- Holly (*Ilex aquifolium),*
- Blackthorn (*Prunus spinsosa)*
- Yew (*Taxus baccata)*
- Field maple *(Acer campestre)*
- Rowan *(Sorbus aucuparia)*
- Whitebeam *(Sorbus aria)*

8.20 General guidance on planting can be found in Appendix 4.

Pictures

8.21 Please see general pictures of the site below:



Photo 1: Looking west towards T708



Photo 2: Cavity and hollowness in main stem of T708



Photo 3: Looking northeast towards T714



Photo 4: Looking west towards T708, with broken limbs visible in crown



Photo 5: Looking northwest towards trees T715, T715a, T716. These are young trees growing very close together and surrounded by brambles.



Photo 6: Looking west towards tree T713 (oak). The main stem of T713 is approximately 3.8m from the edge of the reservoir



Photo 7: Looking northeast towards tree T713



Photo 8: Looking east towards G1 and G2. These are both stumps which have resprouted.



Photo 9: Looking west along the northern embankment towards trees T708, T713 and others further up the embankment. Areas of heavy brambles are present on this embankment, shown to the right in the above photo. Small woody plants are also growing out of the retaining wall, such as Corylus avellana



Photo 10: Looking west from the existing public pathway towards tree T718. The northern embankment is to the left in this picture and tree T713 (oak) is visible.



Photo 11: Looking north from public footpath towards tree T718. Please see the table BS5837 Tree Survey for details and recommendations regarding this tree.



Photo 12: Looking north from public footpath towards Tree T719.



Photo 13: Looking northwest from public footpath towards Tree T718.

9.0 Conclusions

9.1 The attached document 'BS5837 Tree Survey Table' provides details regarding the trees surveyed.

9.2 Some tree work recommendations have been provided regardless of whether development occurs on site. It is recommended that all trees close to targets are inspected regularly. More details can be provided on the precise impacts and any protective measures, once a specific development is proposed. Overall, some degree of damage can realistically be expected to occur to the roots of T708 and T713 when the retaining wall is repaired, as excavation may be required to remove the failed wall, and roots may be present within these areas. If significant root damage occurs to the roots of T708 and T713, the trees may decline. T708 is already in decline and therefore action may be required for this tree regardless of development. Carrying out any excavation work sensitively would help lessen the impacts on tree roots. For any new surfaces, using no dig construction methods or raised platforms would also lessen the impacts on existing tree roots.

9.3 A **Tree Constraints Plan** is attached, plus a **Tree Shade Map**, showing the positions of the trees, the RPA spreads, the crown spreads and the shade cast by the trees surveyed. The RPA measurements and other tree measurements, are shown in the document 'BS5837 Survey Table', attached.

9.4 The following appendices give some further general information including tree categorisation, protective fencing and ground root protection for trees within RPAs.

Appendix 1

British Standard BS 5837:2012 Table 1

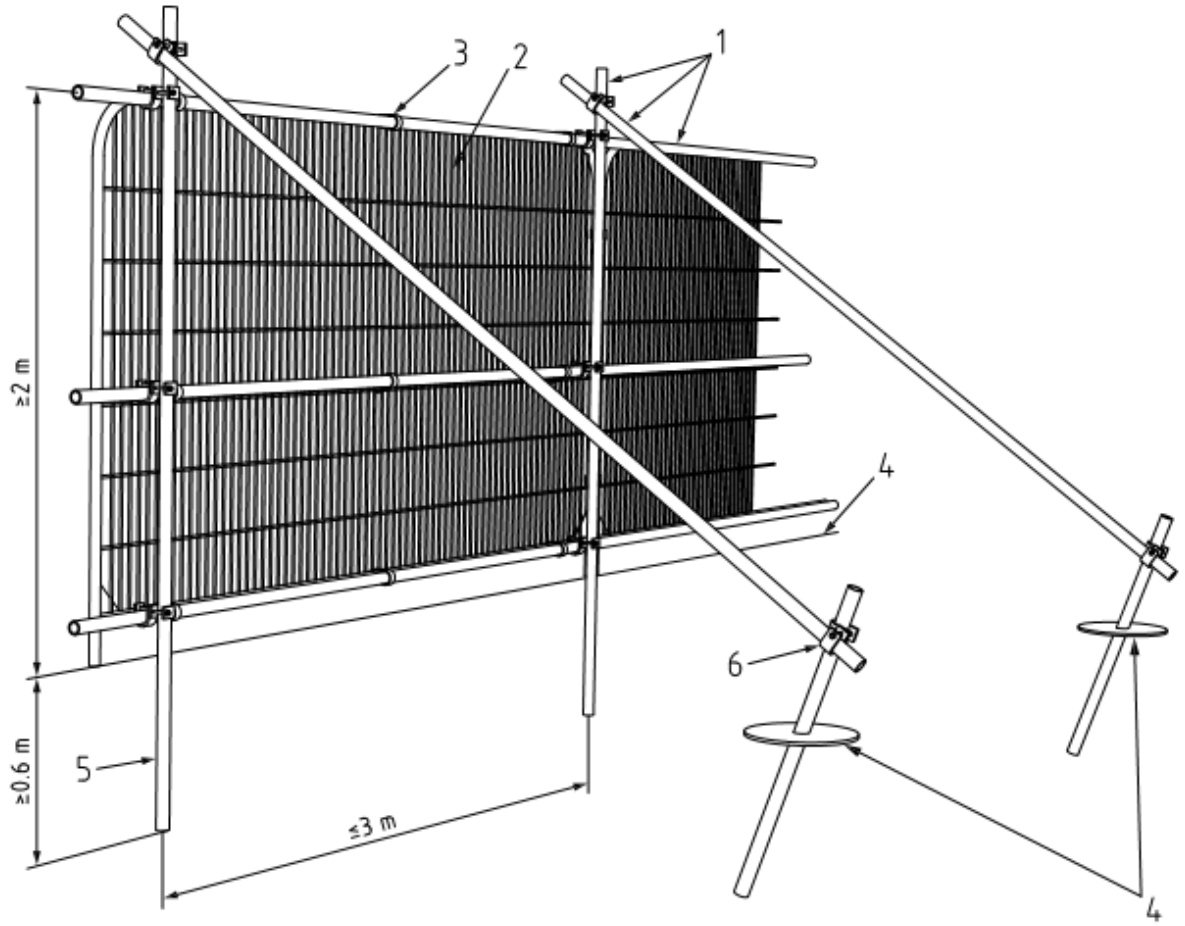
Appendix 1 British Standard BS 5837:2012 Table 1 Cascade chart for Tree Quality Assessment

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

Appendix 2

Tree Protection, Protective Fencing Detail, and Ground Protection Detail

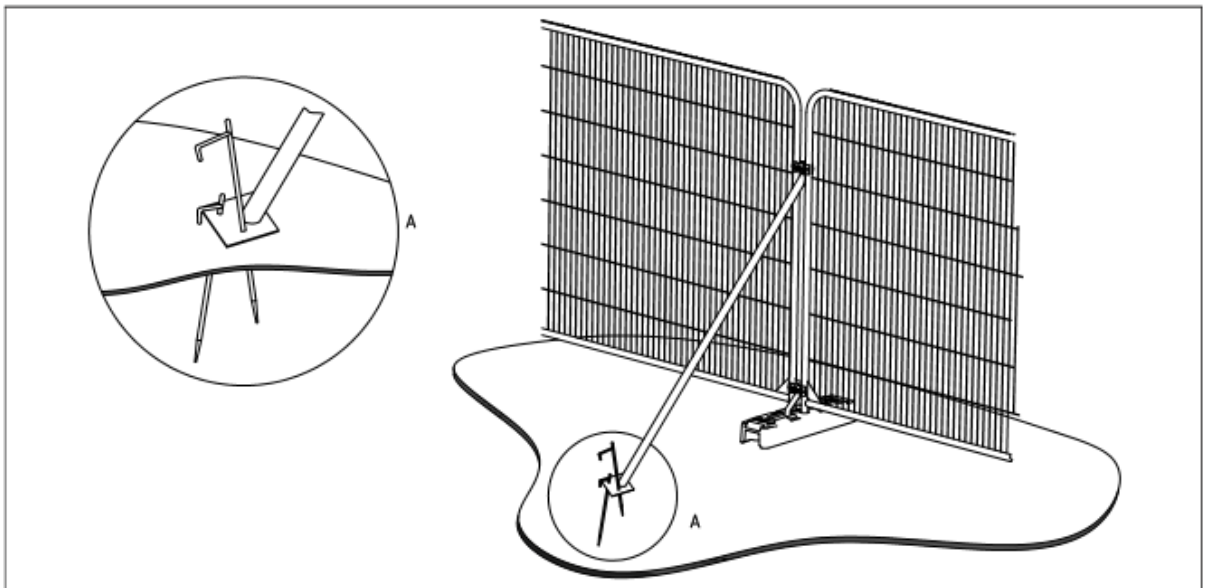
Default specification for protective barrier BS 5837:2012 –Trees in relation to Design, Demolition and Construction



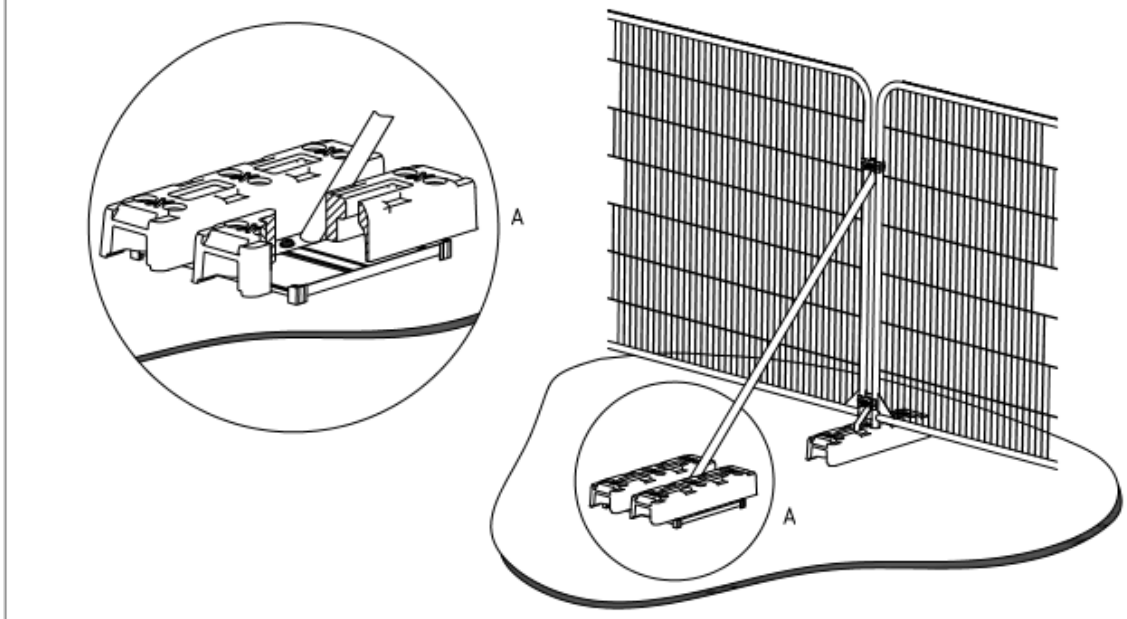
Key

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

Examples of above ground stabilizing systems BS 5837:2012 –Trees in relation to Design, Demolition and Construction



a) Stabilizer strut with base plate secured with ground pins



b) Stabilizer strut mounted on block tray

Example of Ground Protection for Plant Access and surfaces within RPAs

Ground Protection and effective site access systems can be achieved using products such as Cellweb, specifically designed for protecting ground for areas within RPAs and compliant with BS5837:2012.

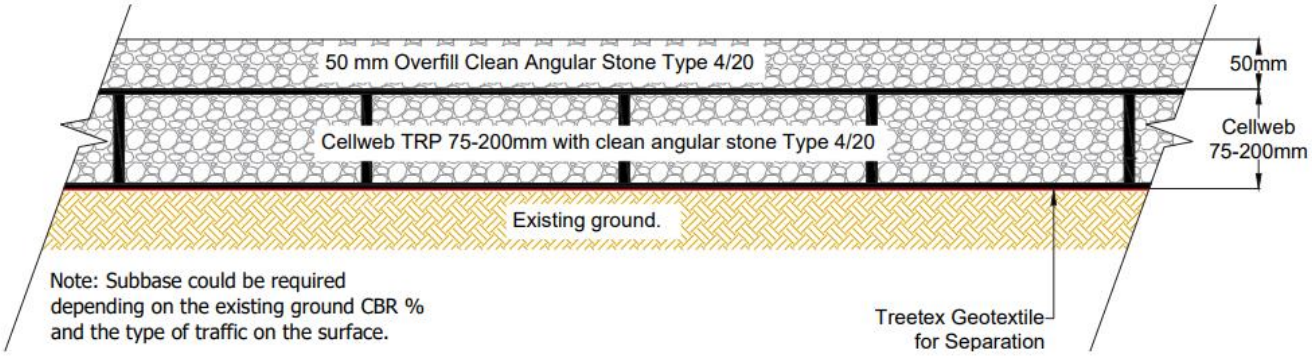


Figure 3: Indicative Cellweb TRP no dig ground protection system, with overfill

Cellweb® Tree Root Protection

Cellweb® Tree Root Protection System provides a flexible and permeable solution for protecting tree roots whilst creating a robust and stable platform when creating vehicular or pedestrian access paths.

Cellweb®TRP has a unique cellular structure and perforated cell walls which reduces the vertical load pressure on sub soils to tree roots, therefore preventing damage. With clean granular materials as infill, air and moisture can reach the roots to encourage healthy prolonged growth.

With no-dig solutions being the preferred option, Cellweb®TRP is ideal as only the surface vegetation need be removed. As well as avoiding disruption to the roots, this reduces construction times and costs.

By using the Cellweb®TRP, sub base depths can be reduced significantly, in most cases by as much as 50%, providing further cost savings. The use of Cellweb®TRP also prevents surface rutting; increasing the long-term performance and aesthetics of the final surface.

Geosynthetics Limited provides a full engineering service, including the provision of surveys, structural designs, CAD drawings and installation supervision at no cost to the client.

Benefits of using Cellweb®TRP:

- No dig solution
- Prevents compaction of sub soils
- Only guaranteed system on the market
- Complies with BS:5837:2012
- 100% success rate
- Full technical support from our Tree Root Protection Team
- Technical Recommendations from qualified Civil Engineers
- Provides moisture and air paths
- Reduces sub base depths
- Independently tested
- Environmentally friendly
- Simple to install
- Extensive bank of case studies
- Educational Seminars Find out more

If you would like more information or for site specific project design information please call our sales department on 01455 617139

Downloads

Cellweb® Tree Root Protection
Click here for downloads

Case Studies



Fountaindale School - Cellweb TRP

Roehampton Downshire - Cellweb TRP

Gibside National Trust - Cellweb TRP

Castle Gardens - Cellweb TRP

Calke Abbey Ancient Tree - Cellweb TRP

Parkside School - Cellweb TRP

Enquire about this product

Name *

Email *

Telephone *

Message *



Photo 28: Photo showing an example Cellweb TRP installation for a new driveway

Construction using No-Dig methods and ground protection (taken from Arboricultural Practice Note 12, *Through the Trees to Development*, The Tree Advice Trust, 2007)

Construction should incorporate two main components:

- A synthetic load spreading material
- A no-fines aggregate sub-base

'Load spreading' materials, are synthetic grids/webs designed to support roads on soft ground by distributing the load of a wheel over a larger area than would normally occur. They may be 2- or 3-dimensional.

When placed on a 2-dimensional grid, appropriate, no-fines granular sub-base material penetrates the mesh, but is unable to pass through it, forming a positive interlock. This interlock between aggregate and grid provides a reinforced platform and efficient load spread into the underlying ground over a wider area than the footprint of the wheel on the surface. A suitable geogrid/aggregate combination constructed with the grid under tension should prevent rutting of the ground beneath construction.

The 3- dimensional load spreading products (Cellular confinement system) creates cells into which the sub base material is placed. Such a construction does not support the sub-base material, it confines the material in discrete cells. Manufactures recommend, therefore, that a geotextile is

placed between the ground and the load spreader to prevent the cell- contained mineral material being pressed down into the underlying soil.

A no-dig construction will need to be contained to prevent outward creep under the weight of vehicles. This may be achieved with an edging support provided its construction does not require excavation. A suitable material may be long-life timbers pinned through the load spreader into the underlying soil. This could add strength to the structure because the pressure of vehicles forcing the sub-base downwards and onwards will tend to increase the tension on the grid and any tendency to rutting.

The granular sub base material should have a no 'fines' content which means that even when it is compacted it should be freely draining and will allow oxygen to diffuse into, and damaging gases (e.g. carbon dioxide and methane) out of the soil. The minimum distance from the tree should be 0.5m.

Further information should be sought from the manufacturer.

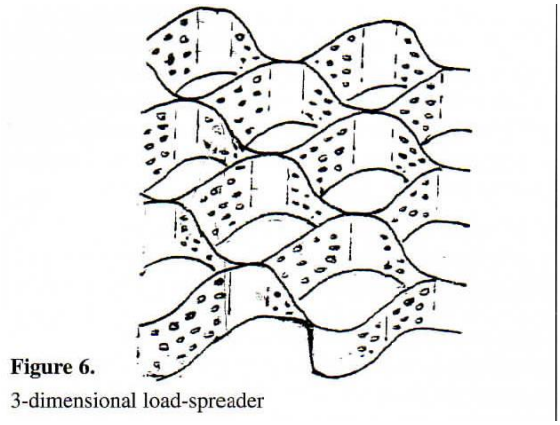


Figure 6.
3-dimensional load-spreader

Diagram of 3-dimensional load spreader, from Arboricultural Practice Note 12, (2007)

Within the Root Protection Areas:

- Roots must not be severed, cut or broken – no digging
- Ground levels must not be changed- no digging, no soil raising
- Soil must not be compacted- no tracking of vehicles
- Oxygen must be able to diffuse into the soil beneath the engineered surface- no tracked vehicles

A system compliant under BS5837:2012 is the Cellweb TRP system with a Treetex Geotextile (manufacturer Geosynthetics Ltd.). Other systems are available.

A 'No-Dig Construction' ground protection system should incorporate the following main components:

- A **geotextile separation layer (e.g. Treetex Geotextile**) laid onto top of the existing ground and top soil, separating the system above from the soil and rooting environment below.

- A **synthetic 3D cellular confinement grid (e.g. Cellweb TRP)** laid onto of the geotextile separation layer. This is a load spreading material that is designed as a grid/web to support driveways and roads by distributing load.

- The **3D synthetic cellular confinement grid (eg. Cellweb TRP)** infilled with a 4-20mm clean angular stone. The confined angular stone locks together to produce a rigid stone mattress, while maintaining air pockets for continuous water permeation and gas exchange. A porous surface can then be laid on top.

This information provided is specific for the Cellweb TRP system of ground protection. For the Cellweb system, the cellular confinement grid is provided in different depths, and the depth required is dependent on the proposed traffic loadings and existing site ground conditions.

For domestic traffic (cars), a cellular confinement depth of 100mm is usually sufficient (Geosynthetics Ltd). The manufacturer can provide technical specifications from a topographical survey

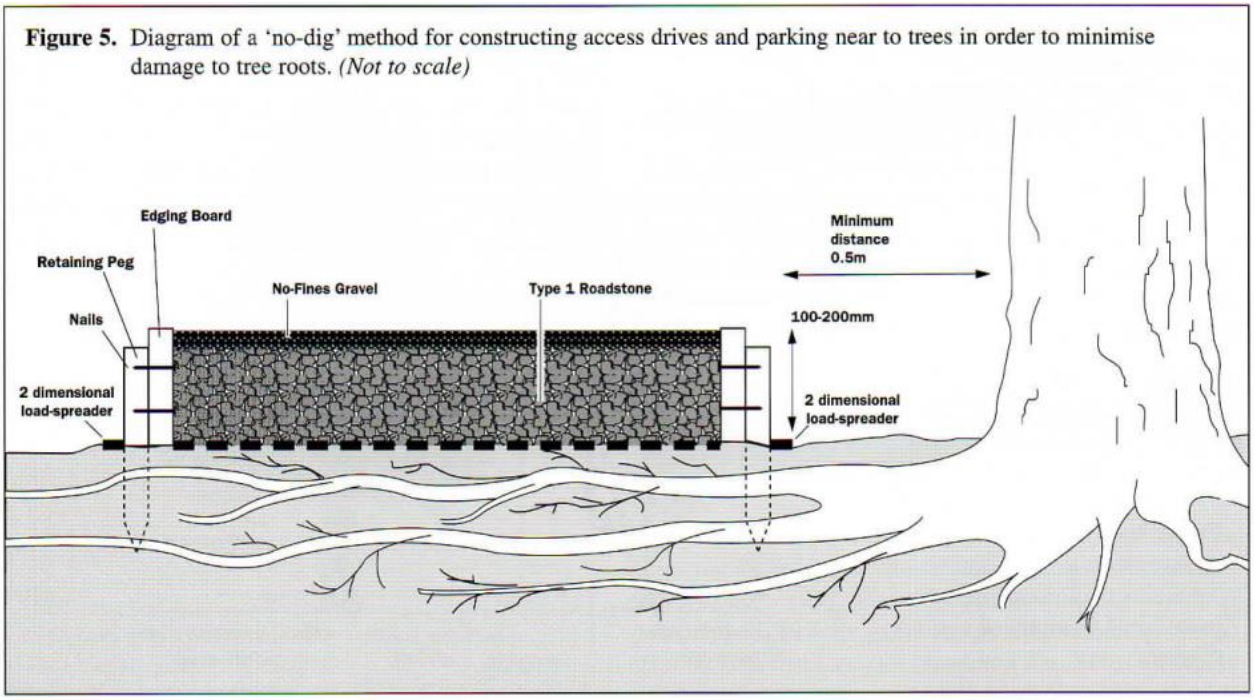


Figure 5. Diagram of a 'no-dig' method for constructing access drives and parking near to trees in order to minimise damage to tree roots. *(Not to scale)*

Figure 5 is taken from the Arboricultural Practice Note 12- 'Through the trees to development'.

Appendix 3

Tree Protection Site Notice and Arboricultural Monitoring Schedule

Tree Protection Site Notice





Arboricultural Supervision Schedule

Activity	Arboricultural supervision require, and by whom?	Date action undertaken
Undertaking of suggested tree work	Yes by appointed contractor	
Erection of protective fencing	Yes by Arboriculturist and site supervisor	
Installation of temporary ground protection (if deemed necessary)	Yes by Arboriculturist and site supervisor	
Dismantling of protective measures	Yes by site supervisor	

Appendix 4- General Information on Planting

1.1 Information on tree planting has been provided below.

1.2 New planting helps safeguard the long-term amenity value of the area. Such a policy will provide for a more effective long-term safeguarding of the local urban forest and the Arboricultural amenity value of the area.

1.3 New tree planting will need to take ultimate size of the trees and shading into account. New planting will take into account ultimate size and position to minimise future shading conflicts, and direct pruning conflicts.

How to plant a tree

1.4 The following information on how to plant a tree successfully is taken from the International Society of Arboriculture (2019) and the BS 8545:2014 Trees: from nursery to independence in the landscape.

1. Locate all underground utilities prior to digging.

2. Identify the trunk flare. The trunk flare is where the trunk expands at the base of the tree. This point should be partially visible after the tree has been planted.

3. Dig a tree pit. Holes should be no deeper than the existing rootball or container depth and have a diameter at least 75mm greater than that of the root system. During excavation of the tree pit, the soil dug should be placed to one side separating topsoil and subsoil as far as is practical.

4. Remove the containers or cut away the wire basket. Inspect container tree root balls for circling roots. Straighten, cut, or remove them. The tree's root system should be wetted prior to planting

5. Place the tree at the proper height. Take care to dig the hole to the proper depth – and no more. If the tree is planted too deep, new roots will have difficulty developing because of a lack of oxygen. The tree should be planted at the correct depth taking into account the position of the root flare and the finished level. Allowance should be made for settling of the soil after planting.

6. Straighten the tree in the hole. Before backfilling, have someone view the tree from several directions to confirm it is straight.

7. Fill the hole gently, but firmly. Pack soil around the base of the root ball to stabilize it. Fill the remainder of the hole, firmly packing the soil to eliminate air pockets that may dry out roots. Further reduce air pockets by watering periodically while backfilling. Avoid adding fertilizer at the time of planting. Backfill should be added gradually in layers of 150mm to 230mm depth ensuring the tree is held up right. At each stage the fill should be firmed in to eliminate all air pockets under and around the root system, but with care being taken not to excessively compact the soil.

8. Use a support system (stake), if necessary. Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. Therefore, staking should be carried out if it is deemed necessary.

9. Mulch the base of the tree. Mulch is organic matter spread around the base of a tree to hold moisture, moderate soil temperature extremes, and reduce grass and weed competition.

10. Immediately after planting, the tree should be saturated to field capacity.

11. Provide follow-up care. Keep the soil moist, but not water-logged. Water trees at least once a week, barring rain, and more frequently during hot, windy weather. Formative pruning.

New positions for tree planting

1.5 Trees will be positioned to allow them to reach their mature size without being impeded or risk causing conflict in feature (e.g. "*the right tree in the right place").* The crown habitat of the species and ultimate size is therefore very important for tree species selection for new planting.

1.6 Figure 4 illustrates how best to plant a tree to help it establish in a new location. The figure below has been sourced from Nichol's Garden Group Ltd. (2019)

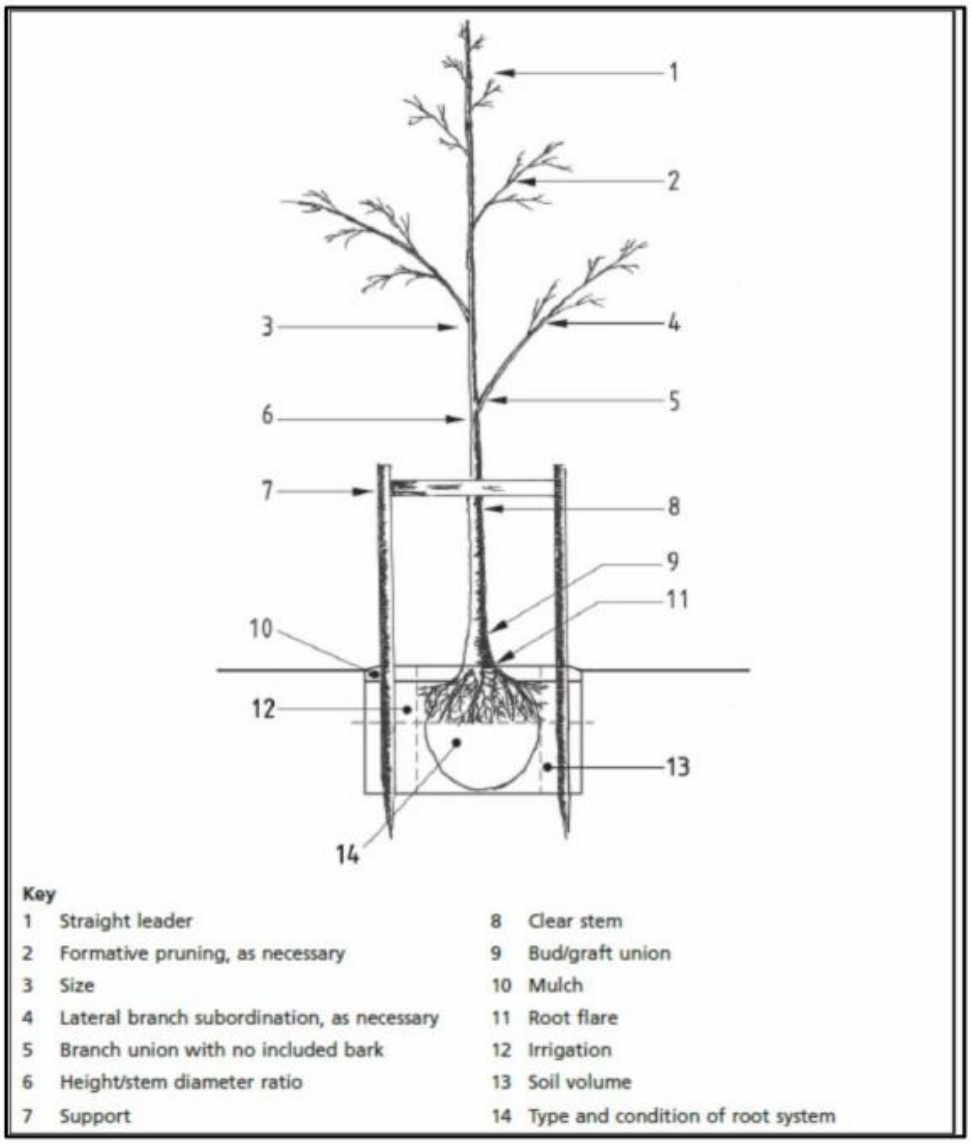


Figure 1.2 Factors involved with tree planting © BS 8545:2014

Fig. 4: Diagram credit to BS8545: 2014

Where and When to Plant

1.7 Ideally trees will be planted in the dormant season, when weather conditions are cool which allow plants to establish roots in the new location before spring rains and sun warmth stimulate growth.

1.8 Trees will be suited to the soil type in the area and take into account the nature of the site; i.e exposed, sheltered, full sun, shade, general weather and presence of nearby structures. The ultimate size of the tree should be taken into account when choosing species.

Minimising future conflict with roads, buildings and driveways when a tree reaches maturity, is a very important factor is sustainable tree planting

1.9 Trees will ideally be positioned at least 1.5-2m from pavements and roads, to minimise future conflict, and ideally at least 1m from boundaries.

Tree Stock

1.10 The tree stock chosen for new planting should suit the area.

1.11 All new trees will require watering regularly during the first 5 years. For small hedging type stock, the trees can be smaller. Generally, younger plants and trees can establish better than older trees due to them experiencing less transplanting stress.

Watering

1.12 Watering is very important in the first years of a tree's life to help it establish. It is important that trees are watered regularly for the first years, especially during the summer months. Formative or corrective pruning can also be part of long-term tree maintenance.

1.13 Any tree that fails to establish within 5 years after planting this should be replanted.

Maintenance and management of grass and weeds around trees

1.14 Without weed and grass management, trees will struggle to compete and become overcrowded ultimately affecting their long-term future. Grass should be kept away from the base of trees, at least 40-50cm, to prevent lawn mower and strimmer damage. Stimming should not be carried out around trees as it can cause serious damage. Grass ad weeds guards may be helpful in reducing competition from weeds and to protect from animals.

Mulch

1.15 Mulch can be applied around the base of trees to help prevent grass and weeds growing around the tree. It will be kept at least 10cm away from the bark at the base of the tree. Mulch will help suppress grass and weeds to some extent. However, removing weeds by hand would also be an important part of general upkeep and maintenance of newly planted trees, to prevent resorting to chemical weed killers as a control.

1.16 Reapplying mulch, manually removing weeds and manually ensuring grass is kept approx. 40-50cm away from the bases of trees are imperative parts of a successful landscaping scheme. Grass and weeds grow the most during the growing season, from approximately

March-October. Regular maintenance in these months is therefore crucial for successful establishment.

Staking

1.17 Double stake:- This is the standard method of staking container-grown and rootballed trees. Two or three stakes can be inserted opposite each other, or equally spaced around the tree outside the root ball, and secured to the trunk by long ties or a timber crossbar and tie. This method is also useful on windy sites (RHS, 2020). The stakes should be as low as practically possible to allow some movement in the main stem and allow stem taper to develop, to allow the tree to build adaptive strength in the main stem.

1.18 Special tree ties are available made of durable, long-lasting plastic, with buckles for fastening and adjustment. These ties can be loosened as the tree girth expands. Use spacers to prevent the stem and stake rubbing against each other. Make a figure of eight to hold the tree to the stake, with the spacer in between the tree and the stake, and secure the tie to the stake with a nail. (RHS, 2020). Biodegradable ties such as degradable hessian, can also be used. These ties will require loosening when required to prevent them damaging the young stems.

1.19 Problems with staking:- Most problems with staking come from the stakes being too high and the ties becoming too tight or from damage after storms. Check the ties regularly for rubbing and adjust if necessary. Constriction of the stem by ties happens very quickly, so fast-growing trees need frequent checking. After bad weather, check for abrasion and snapped stakes or ties (RHS, 2020).

Strimmer damage

1.20 Strimmer damage can cause major damage to the stems of young tree. Some trees never recover from such damage. Therefore, it is recommended that grass guards are installed around trees to prevent strimmer damage. Mulch around the base of the tree, but not piled up against the stem, can also help suppress weeds and grass, limiting strimmer damage.

SELWYNTREES

ARBORICULTURAL CONSULTANTS

14th March 2023

Initial tree works schedule for enabling repair works to the north bank of Worsbrough Reservoir, Barnsley- REVISION B

Tree	Work required	Reason	Date undertaken
H1- A group of trees including Maple and Hawthorn overhanging access way Hawthorn,	On 4 trees- crown lift and tip reduction pruning required on east side of overhanging branches, to create 6m clearance over access road	For facilitation access for construction	
H2- Hawthorn hedge	Average height of hedge: 3.5m Remove 8m section of hedge for access from the field to the access path.	For facilitation access for construction	
T1- multi-stemmed Willow growing from stump	Remove tree 6-7m height currently	To facilitate development.	
T865- Sycamore	Situated on other side of fence. Crown lift pruning required- remove at least 4 branches on south side to create 6m clearance over access way, plus prune some lower epicormics around the base for clearance	For facilitation access for construction	
T866-Cherry	Crown lift pruning- remove at least 2 main branches on south side, plus lower tip reduction pruning on lower pendulous branches over access way, to create 6m clearance over access way	For facilitation access for construction vehicles	

Tree	Work required	Reason	Date undertaken
T717	Possibly remove this tree if it is within influencing distance (this tree was surveyed in December 2021 (Tree survey Ref 0264- Selwyn Trees)	To facilitate development.	

Notes and caveats:

All pruning and tree work needs to be carried out to BS3998:2010 'Tree Work-Recommendations'.

This is NOT a BS5837 Arboricultural Survey. This is NOT a TREE Constraints Plan or Tree Protection Plan

Some trees were surveyed in December 2021. These were tees T713 to T721 (Tree survey Ref 0264- Selwyn Trees). A BS5837 Arboricultural Survey has NOT been undertaken for the rest of the trees referenced in this document and in the associated Tree Location Map Plan

The canopy outlines shown on the map are for illustrative purposes only and DO NOT indicate the true crown spread of the trees, groups and hedges.

Trees were NOT measured

Trees have NOT been assigned BS5837 retention Categories. All tree canopy outlines are illustrated in GREEN regardless of condition or retention category

The tree positions on this map are approximate, and are to be used as an indicator for locating trees for contractors.

There are no trees tagged as T858 or T868 as these tags were damaged, therefore they were omitted.

When it was not possible to tag trees, trees were listed as T1, T2, T3 etc, in numerical order.

Groups and Hedges are referenced as G1, G2,etc. and H1, H2 etc.

PHOTOS



Photo 1: group H1 with branches overhanging access way. crown lift and tip reduction pruning required on east side of overhanging branches, to create 6m clearance over access road



Photo 2: Hedge H2 Remove 8m section of hedge for access from the field to the access path.



Photo 3: Hedge H2



Photo 4: T1- multi stemmed willow- remove



Photo 5: T865- Situated on other side of fence. Crown lift pruning required- remove at least 4 branches on south side to create 6m clearance over access way, plus prune some lower epicormics around the base for clearance

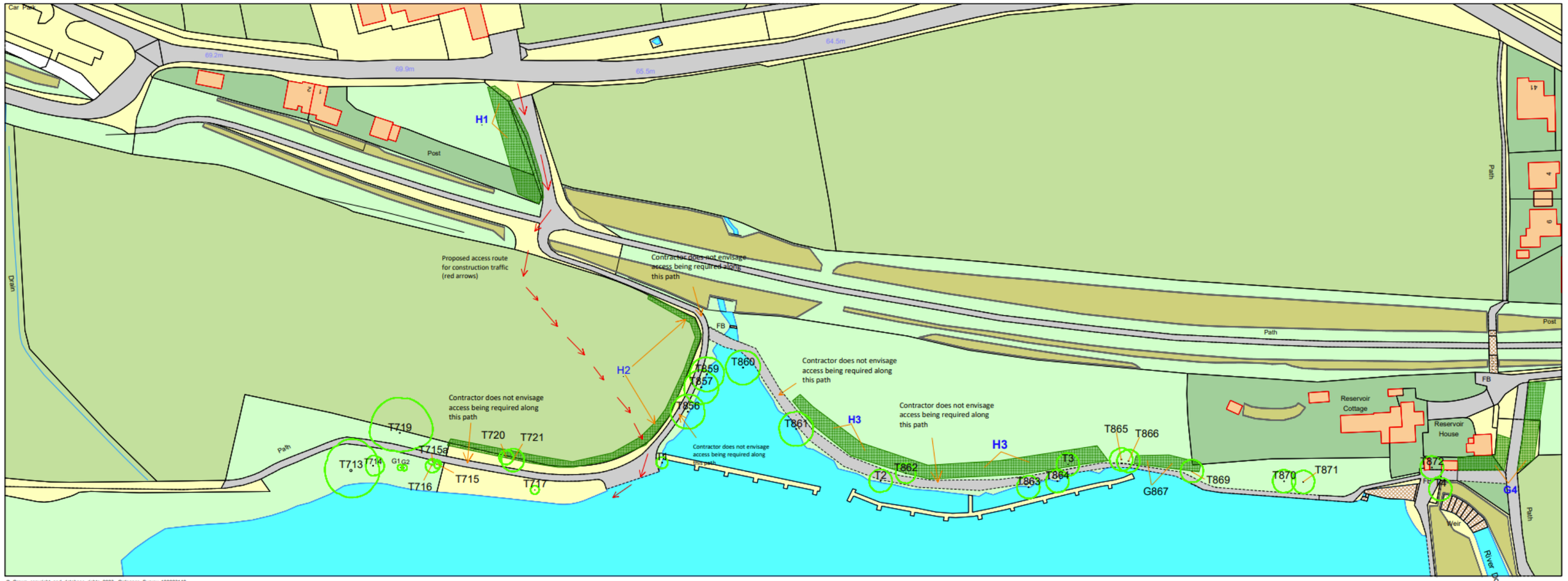


Photo 6: T866- Crown lift pruning- remove at least 2 main branches on south side, plus lower tip reduction pruning on lower pendulous branches over access way, to create 6m clearance over access way



Photo 7: Access way into the field (proposed to be used for facilitation access to the reservoir). No tree work required around this access

TREE LOCATION MAP PLAN (ALSO ATTACHED SEPARATELY)



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This is NOT a BS5837 Arboricultural Survey. This is NOT a TREE Constraints Plan or Tree Protection Plan

The canopy outlines shown on this map are for illustrative purposes only and DO NOT indicate the true crown spread of the trees, groups and hedges

Trees have NOT been assigned BS5837 retention Categories. All tree canopies are illustrated by a GREEN outline on this map regardless of condition or retention category

Trees were NOT measured

The tree positions on this map are approximate, and are to be used as an indicator for locating trees for contractors.

There are no T858 or T868 as these tags were damaged, therefore they were omitted

Where it was not possible to tag trees, trees were listed as T1, T2, T3 etc, in numerical order.

= Groups and Hedges

= Canopy outline (illustrative purposes only)

SELWYN TREES
30 Tickhill Road Doncaster South Yorkshire DN4 8QE
01302 816850
info@selwyntrees.co.uk

Tree Location map- North Bank Worsbrough Reservoir, Barnsley

SCALE : 1 : 675 @ A1
DATE : 14/03/2023
N
MAP FILENAME : Tree Location Mac- North Bank Worsbrough Reservoir

Map data shown may contain Ordnance Survey ® products supplied by Pear Technology Services Ltd. Email: info@peartechnology.co.uk
© Crown Copyright and database rights from date shown above
Ordnance Survey ® licence number 100023148

Risk ID No	Risk Detail	Initial probability	Initial impact	Initial score	Mitigating measures	Resultant probabilit	Resultant impact	Resultant score	Actions required
ER001	Lowering the water level for a prolonged period, including spring/summer, could impact aquatic life in the reservoir and down stream	Very Likely	Significant	High	In line with guidance from Environment Agency (EA), level to be lowered during December and January when aquatic activity is naturally low (outside spawning season). Lowering to be carried out gradually using side sluice channel. Process to be undetaken in conjunction with local angling society respresentatives. Gradual nature will reduce potential scour downstream. Use of deep draw off valve to be kept to an absolute minimum to reduce escape of silt. Visual monitoring of fish stocks (and other species) by local angling societies during works to determine if any distress is evident (eg from reduced oxygen levels). If noted, further EA advice to be sought on how to manage the situation.	Possible	Significant	Medium-High	Liaise with angling societies to address concerns and instigate water lowering activity in December 2022. Should use of the deep draw valve be deemed necessary, sand bags will be utililised along the wier to prevent silt escapng from the stilling pond into the river Dove. The canal feeder pipe from the stilling basin will be regularly checked for blockages and rodded/jetted as necessary. Key contact telephone numbers to be exchanged to support ongoing monitoring of conditions and early warning notification to the EA if required. A visual inspection of the river Dove immediately downstream of the reservoir will be undertaken to identify presence of redds.
ER002	Silt loss into River Dove causing scour of river bed and loss of spawning habitat	Possible	Moderate	Medium	Use of side sluice channel minimises silt outflow. Deep draw off valve to only be used should water level not be lowered sufficiently using side sluice. Silt outflows into stilling basin in first instance so silt should settle to base of that pond rather than flow into the river. Sand bags to be placed along weir at outfall point to ensure initial silt outlet is fully contained in stilling basin. Haybales to be inserted into river mouth to catch residual silt outfall. Local knowledge of the nearby River Dove indicates the habitat is not suitable for trout which would be spawning at the time of lowering.	Unlikely	Moderate	Low-Medium	A visual inspection of the river Dove immediately downstream of the reservoir will be undertaken to identify presence of redds. If required, installation of sandbags and hay bales to capture overflowing silt. Ongoing monitoring of the habitat in conjunction with the local angling societies.
ER003	Enabling works to create site access routes could impact birds and small mammals (inc. bats)	Possible	Significant	Medium	Ecology and arboriculture surveys carried out. Recommendations provided to minimise impact. Works to be completed in Feb to avoid nesting season. Removal of vegetation to be kept to an absolute minimum to enable movement of equipment and materials. Any lost hedgerows to be replanted once works completed. Project will result in an overall biodiversiy net gain. Ecolological Watching Brief prior to the laying of any track matting to ensure no species such as GCNs are present and then track matting laid to ensure no animals can get under it. The track matting will be regualrly monitored	Unlikely	Significant	Medium	Use ecology and arboriculture survey findings to identify suitable access routes to minimise impact. Confirm with above that proposed routes are in fact suitable before commencing works. Once replanting takes place, in the event of dry weather, manual watering of new plants to take place for a minimum of three months. Replacement hedges, trees, grasses and plants to be selected from species identified as suited to the local environment and to ensure invasive species are not introduced.
ER004	Haul road within reservoir perimeter could create an environment for unwanted predators (eg cormorants) to attack fish	Possible	Moderate	Medium	Site will be too active during construction to encourage such birds to settle. Haul road material to be removed once works completed.	Unlikely	Moderate	Low-Medium	Maintain communications with the local angling society to ensure any concerns can be addressed.
ER005	Lowering of portions of upper wall on south bank could create additional spillways in the event of a probable maximum flood event	Unlikely	Severe	Medium-High	Plans shared with all reservoirs panel inspecting engineer (ARPIE) for comment and direction. Contractors to revise planned approach to ensure any lowered sections are still higher than the other spillways. Works being undertaken in spring/summer so likelihood of significant, prolonged rainfall is lower than autumn/winter working. Weather conditions to be monitored and pre-emptive action to be taken to maintain low water level as far as possible, while considering mitigations included in ER001. Equipment and materials to be on hand to act swiftly to reinstate lowered banking should a flood event occur. Reinstatement of bank following works will cmply with highways regulations design standards and be approved by the ARPIE.	Very Unlikely	Severe	Medium	Contractors to produce a method statement with contingency plans and a drawing to illustrate the backfilling activity will meet with relevant standards specifications. ARPIE to assess and agree with statement prior to works taking place.

ER006	Sections of the site fall under SSSI status so additional measure may be needed to reduce impact here	Very Likely	Moderate	Medium-High	Assent has been received from Natural England to carry out works in these areas during the planned time period assuming reasonable steps are taken, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest. In agreement with the local angling society, works will cease before the main tree line begins so there will be no disturbance to their roots.	Possible	Moderate	Medium	Ensure contractors are aware of boundary of the works and do not encroach into tree line. Maintain a watching brief on the area during site set up and throughout the duration of the works to identify any potential issues. Where noted, NE and EA to be contacted for advice. Hedges, grasses and plants to be reinstated once works are completed.
ER007	Prolonged dry weather following completion of works will mean the reservoir takes longer to refill than should there be heavy rainfall	Possible	Minor	Low-Medium	Works are planned for completion late August/early September. This is moving into the autumn period which tends to involve increased rainfall. The reservoir is 'fed' by two main tributaries and also run off from neighbouring higher land so any rainfall within the catchment area will naturally flow into the reservoir, even if rainfall doesn't occur directly overhead.	Unlikely	Minor	Low-Medium	Ensure efforts are taken to begin raising water level as soon as practicably possible upon completion of works.
ER008	Temporary culverts will be in use across a stream running parallel to the south bank to enable plant and material access to the water's edge. This could impact flow in the stream and further downstream	Unlikely	Minor	Low-Medium	The installation of culverts is expected to actually improve flow through this stretch. In line with instructions from the All Reservoirs Panel Engineer, appointed under the Reservoirs Act 1975, the culverts will be removed and the natural stream flow reinstated upon completion of the works.	Very Unlikely	Minor	Low	Maintain a watching brief of the culverts throughout the project and address any blockages as necessary.
ER009	Birds which ordinarly nest around the edges of the reservoir will be unable to do so. This could impact the success of the breeding season.	Possible	Moderate	Medium	The site has access to floating beds which can be deployed into the water to create nesting space. There will still be some areas of undisturbed banking toward the north-east of the reservoir and there are banks around the stilling basins downstream from the main spillways on which birds can nest.	Unlikely	Moderate	Low-Medium	Work with the site team to ensure floating beds are deployed at the earliest practical opportunity. Consider whether additional beds could be made/procured and deployed. This would support future years' nesting activity too.
ER010	Himalayan balsam is known to be present along the banks of the mill stream. This is an INNS so must be managed to prevent further spread across and beyond the site	Very likely	Minor	Medium	Best practice on undertaking enabling works which would disturb the balsam are being carried out outside its flowering and seeding period. Plant, equipment and personnel hygiene measures will be in place to minimise risk of spread.	Unlikely	Minor	Low-Medium	Contractors to produce and adhere to a method statement which addresses site hygiene and INNS containment matters.
ER012	Working in and around trees and hedges	Likely	Significant	Medium-High	Site visit 10th Nov confirmed mill goit crossings with minimal tree loss (4/5 No.). Hedges removed for field access will be replaced on completion	Low	Low	Low	Replanting to take place once works are completed and, if event of dry weather, manual watering and monitoring of new plants to be undertaken for three months.
ER013	Working in close proximity to farm animals and livestock	Unlikely	Negligible	Low	Meeting held with farm manager - stock proof fencing will be erected to their requirements	Low	Negibile	Low	In conjunction with the farm manager, a method statement will be developed to mitigate risks to both humans and livestock. Emergency contact details will be shared across all parties in the event of an incident.
ER014	Working on the banks of a watercourse or other water body	Very Likely	Significant	High	Methods discussed between BMBC and contractors. BMBC have informed the relevant bodies about the work and the recommendatrions of those bodies will be taken into account	Very Likely	Moderate	Medium-High	EA, NE, anglers, heritage, ARPIE, ecologist and arboriculturalist advice has been taken into account in developing the designs and methods of work. Ongoing dialogue will be maintained with all parties as necessary thorughout the project to ensure statutory requirements are met.
ER015	Storage, handling and use of fuels, oils and chemicals	Very Likely	Moderate	Medium-High	BB policy and procedures will be in place - e.g. bunds, 110% bund capacity, environmental hydraulic oil, electric machinery where possible, plant "nappies"	Possible	Moderate	Medium	Method statement to include preventative measures and clean up actions in the unlikely event of an incident.
ER016	Generation, storage, handling and transfer of waste materials	Very Likely	Moderate	Medium-High	BB will comply with the relevant current leglisation to ensure wastes are managed effectively to minimise impact on the environment.	Likely	Minor	Medium-Low	Method statement to include containment measures and clean up actions in the unlikely event of an incident.
ER017	Working close to private residents	Very Unlikely	Negligible	Low	Contractors are obliged under the contract framework to liaise with stakeholders, to tell them what the intentions are, and adapt to their needs where possible. Works will take place within normal business hours wherever possible.	Very Unlikely	Negilible	Low	Communications plan to be compiled to manage stakeholder queries and requests.

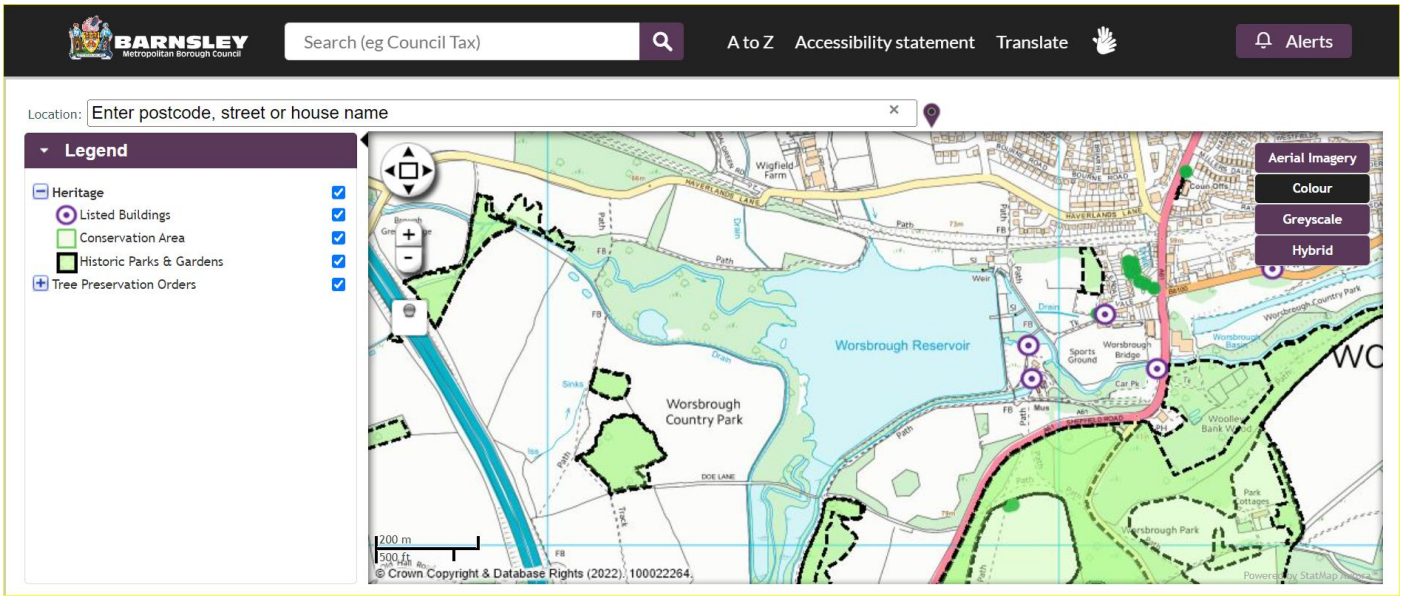
ER018	Lowering the water level for a prolonged period, including spring/summer, could impact grazing cattle in a down stream field as their stream is fed by the reservoir	Possible	Moderate	Medium	The field stream is fed via the stilling basin at the bottom of the spillway. Unless in extreme drought, the basin will contain sufficient water to flow into the stream. However, should it be necessary, a water bowser can be installed in the field as a drinking point for the cattle.	Very Unlikely	Moderate	Low-Medium	Watching brief to be maintained on the situation with actions implemented as necessary to ensure livestock have water.
ER019	Reducing the water level can encourage algal blooms which may impact oxygen levels in the reservoir	Unlikely	Moderate	Low-Medium	Water level to be lowered for minimum time necessary to undertake the works and abide by EA guidance on spawning. If necessary, specialists could be employed to treat algal blooms. Given the large expanse of the reservoir, even at reduced water levels, the EA have indicated this issue is unlikely to arise.	Very unlikely	Moderate	Low-Medium	Watching brief to be maintained on the situation with actions implemented as necessary to ensure excessive blooms are treated.

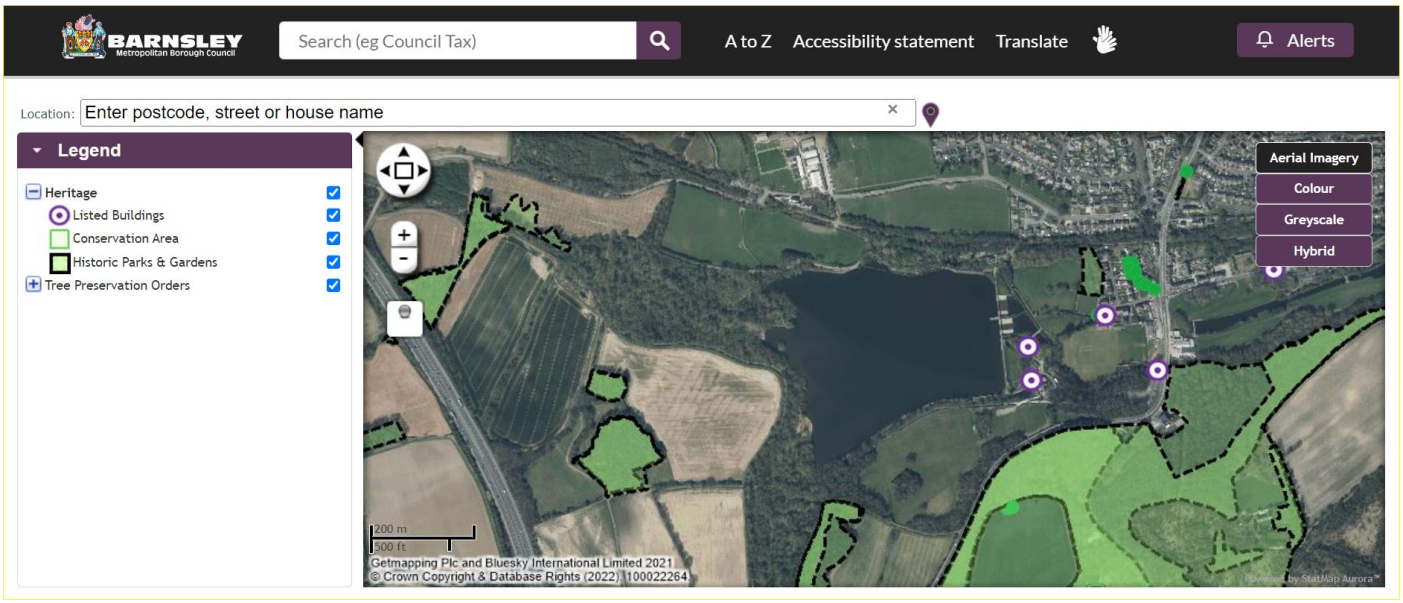
Find out if a tree is protected by a TPO

You can find out if a tree is protected by a TPO on the map below.

Start by searching for a location using a postcode or address, or zoom into an area of the map.

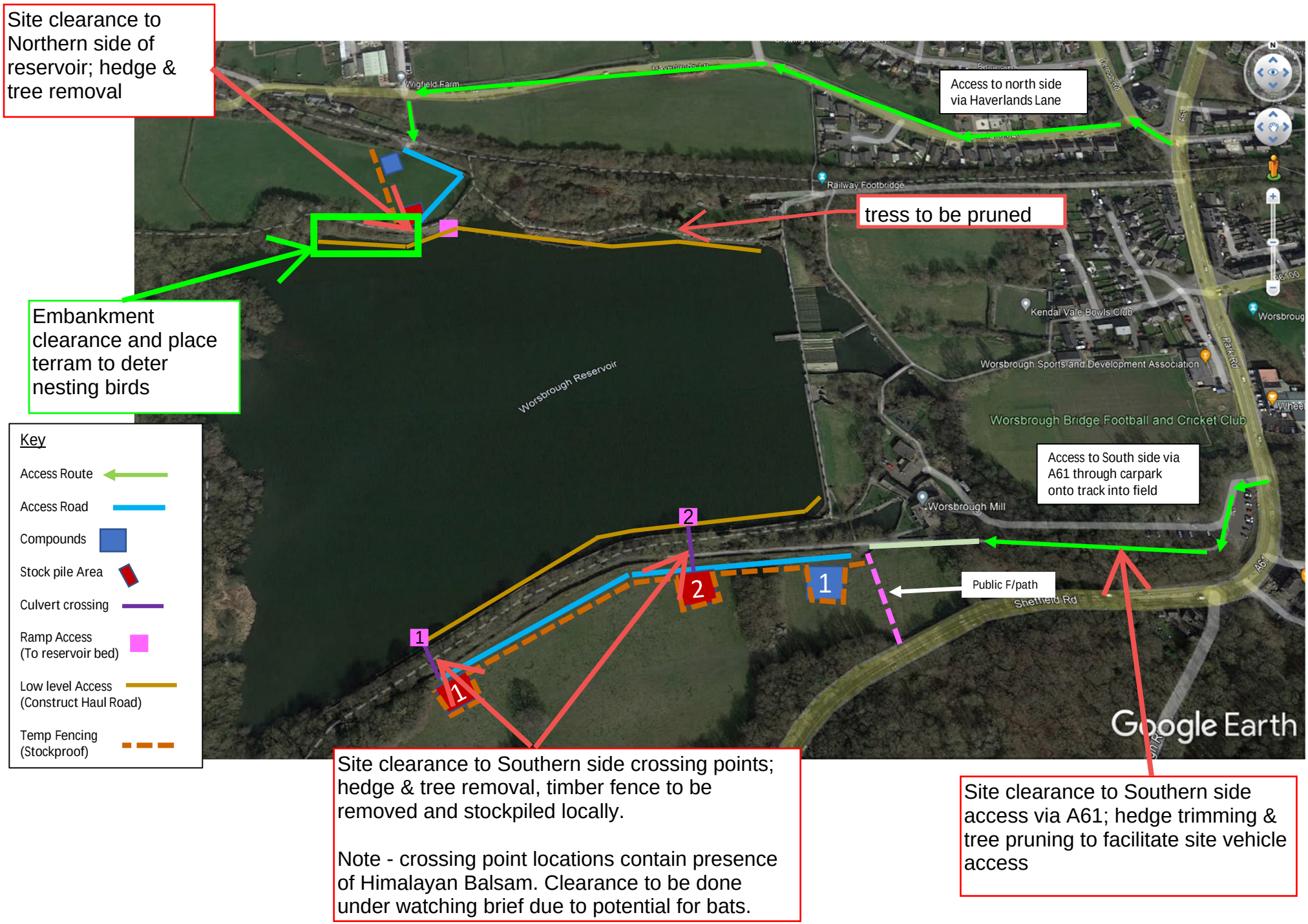
Trees protected by a TPO are shown as a green dot. You can select a dot to find out more about the TPO, including whether it covers a single tree/group of trees and a description.





ANNEXE 3

General Site Plan


Site clearance to Northern side of reservoir; hedge & tree removal
Access to north side via Haverlands Lane
Railway Footbridge
tress to be pruned
Embankment clearance and place terram to deter nesting birds
Worsbrough Reservoir
Kendal Vale Bowls Club
Worsbrough Sports and Development Association
Worsbrough Bridge Football and Cricket Club
Access to South side via A61 through carpark onto track into field
Worsbrough Mill
Public F/path
Sheffield Rd
Key
Access Route
Access Road
Compounds
Stock pile Area
Culvert crossing
Ramp Access (To reservoir bed)
Low level Access (Construct Haul Road)
Temp Fencing (Stockproof)
Site clearance to Southern side crossing points; hedge & tree removal, timber fence to be removed and stockpiled locally.
Note - crossing point locations contain presence of Himalayan Balsam. Clearance to be done under watching brief due to potential for bats.
Site clearance to Southern side access via A61; hedge trimming & tree pruning to facilitate site vehicle access
Google Earth

ANNEXE 4

Environmental Risks and Opportunities tool

Balfour Beatty UK

Project:	
Date Assessed:	
Risk Assessor:	

Pre Mitigation		
R	A	G
6	4	0

Post Mitigation		
R	A	G
0	0	0

Ref.	Environmental Aspect	Environmental Category	Environmental Impact	Pre Mitigation Severity: Legal	H&S	Env	Likelihood	Risk Factor	Trigger	All Options Considered to Mitigate Risk and Realise Opportunity for improvement	Post Mitigation Severity: Legal	H&S	Env	Likelihood	Risk Factor	Trigger		Responsibility
12	Vegetation clearance / stripping / management	Ecology & Biodiversity	Impact: Loss of biodiversity / loss of habitat / use of energy / generation of noise / use of chemicals / pollution to watercourses / releases to land / changes in physical appearance of sites / increasing coverage of invasive species through dispersal / disturbance and damage to protected species and their habitats / production of waste materials / soil erosion and runoff. Risks: insufficient measures taken to dissuade nesting bird species and terrestrial species e.g. reptiles, negative publicity, reputational damage, failure to fulfil compliance obligations, works stop, programme delays	1	1	3	3	9	A	ENV-RM-0016a Managing Normal / Abnormal: vegetation clearance and stripping to be kept to a minimum / potential for ecology to be assessed prior to works / vegetation clearance to take place before end of February and after end of September (start of nesting season) / any clearance undertaken during months of March to September to be dine with guidance on an ecologist / ecology survey may be required / fingertip searches / consult ecologist / consent for working in protected sites to be obtained prior to work / use only approved pesticides adjacent to watercourses / invasive species management plan / section 61 consents in place for night time works / replant trees where possible / install silt mitigation measures Emergency: Stop works	1	1	3		0			C. South
13	Working within or close to protected sites - SSSI, SPA, SAC, Ramsar, NNR, LNR, AONB	Ecology & Biodiversity	Impact: Damage to protected areas / loss of biodiversity / disturbance to protected species / visual impact on protected area / potential pollution to protected areas from litter and releases to water Risks: reputational damage, negative publicity, prosecution, fine, delay to works	4	1	4	3	12	R	ENV-RM-0016d Ecologically Normal / Abnormal: Contact Natural England / Scottish Natural Heritage / Natural Resources Wales or equivalents to obtain consent/assent for work and to agree working methods / consult ecologist / re-route works / site specific method statement / brief control measures to site teams / method statements / seek advice and guidance from local fisheries trust or specialist fisheries contractor if work may have potential impact on fisheries Emergency: Stop work Opportunities: build good working relationship with regulator through liaison during planning phase	4	1	4		0			
15	Working close to protected trees	Ecology & Biodiversity	Impact: Potential damage to tree - roots, canopy and trunk / loss of biodiversity / damage to root system affecting stability / disturbance or harm to nesting birds Risks: reputational damage, complaints, negative publicity, fines, delay to works	2	1	3	3	9	A	ENV-RM-0017a Tree Normal / Abnormal: fence off trees with TPO / if pruning or removal required consult Local Authority Tree Officer prior to works / don't place materials under tree Emergency: Stop work if damage caused or if unplanned work is required to the tree	2	1	3		0			

Balfour Beatty UK

Project:	
Date Assessed:	
Risk Assessor:	

Pre Mitigation		
R	A	G
6	4	0

Post Mitigation		
R	A	G
0	0	0

Ref.	Environmental Aspect	Environmental Category	Environmental Impact	Pre Mitigation						All Options Considered to Mitigate Risk and Realise Opportunity for improvement	Post Mitigation						Responsibility
				Severity			Likelihood	Risk Factor	Trigger		Severity			Likelihood	Risk Factor	Trigger	
				Legal	H&S	Env					Legal	H&S	Env				
18	Working in / around / through hedges	Ecology & Biodiversity	Impact: Loss of habitat / damage to ecology & biodiversity / disturbance to species / loss of biodiversity / increased risk of ground movement or erosion Risks: insufficient measures taken to dissuade nesting bird species and terrestrial species e.g. reptile, negative publicity, reputational damage, fines, prosecution, lack of or incomplete reinstatement, reduction in population of some species	2	1	3	3	9	A	ENV-TB-0016g Hedgerows Normal & Abnormal: Check with Local Authority whether hedge is protected / avoid works in bird nesting season or consult ecologist / obtain permission from landowner / avoid need to remove hedges where possible Emergency: Stop works Opportunities: Implement ecological enhancement measures	2	1	3		0			
19	Working in / around / through trees and woodland	Ecology & Biodiversity	Impact: Damage to woodland areas / impact on biodiversity, ecology and protected species / disturbance to protected species / damage to root system affecting stability of tree Risks: reputational damage, complaints, negative publicity, fines.	2	1	3	3	9	A	ENV-RM-0017a Tree Protection ENV-RM-0016a Managing Normal / Abnormal: Identify whether trees have a Tress Preservation Order / follow NJUG 4 guidelines/ identify root protection areas / any tree trimming or felling to be carried out by a specialist contractor Emergency: Stop work if damage caused or if unplanned work is required to the tree	2	1	3		0			
24	Working near protected species	Ecology & Biodiversity	Impact: Disturbance or damage to protected species and their habitats / loss of biodiversity Risks: possible fine, prosecution, reputational damage, delay to works	3	1	4	3	12	R	ENV-RM-0016e Protected ENV-RM-0016a Managing Normal / Abnormal: Consult with Client to establish whether ecology survey has been carried out / preconstruction ecology survey is carried out / species specific surveys carried out / fingertip searches / apply for protected species licence and follow conditions / controls such as translocation, watching brief or other suitable mitigation measures to be included in method statements / teams to be briefed on controls / mitigation measures to be implemented / support to be provided by environmental advisor or specialist ecological resource where required Emergency: Stop work and inform team leader / site manager. Consult environmental advisor / specialist.	3	1	4		0			

Balfour Beatty UK

Project:	
Date Assessed:	
Risk Assessor:	

Pre Mitigation		
R	A	G
6	4	0

Post Mitigation		
R	A	G
0	0	0

Ref.	Environmental Aspect	Environmental Category	Environmental Impact	Pre Mitigation Severity: Legal	H&S	Env	Likelihood	Risk Factor	Trigger	All Options Considered to Mitigate Risk and Realise Opportunity for improvement	Post Mitigation Severity: Legal	H&S	Env	Likelihood	Risk Factor	Trigger		Responsibility
31	Works near nesting birds	Ecology & Biodiversity	Impact: Harm or disturbance to nesting birds and their habitat, loss of biodiversity Risks: reputational damage, negative publicity, prosecution, fines, delay to works	3	1	4	4	16	R	ENV-RM-0016a Managing Normal / Abnormal: Avoid works in nesting season / pre-construction nesting bird survey / net hedges prior to nesting season / check structures prior to nesting season and remove nests / use bird deterrents / consult ecologist if works unavoidable to agree working methods and mitigation measures / obtain appropriate licences from regulator (Scottish Natural Heritage / Natural England / CADW) for disturbance or relocation Emergency: Utilise warning signs to warn project team of nesting birds / stop work if nests are identified and contact environmental advisor or ecological specialist	3	1	4		0			
100	Refuelling of plant and vehicles	Operations	Impact: Depletion of natural resources / global warming/ climate change / contamination to watercourses / contamination to land / impact on ecology Risks: cost of fuel, cost to the business, prosecution, clean up costs	2	3	4	4	16	R	HSF-PR-0046 Plant ENV-RM-0018a Spill Normal & Abnormal: never leave plant/vehicles unattended when refuelling / use of drip trays or plant nappies / availability of spill kits / clean up any spills or leaks / report spills and leaks into iSMS regular inspections of refuelling areas / availability of spill kit materials to deal with large spills Emergency: In the event of a significant spill which can't be dealt with in-house, utilise emergency response contractor. Opportunities: Use of electric vehicles and battery operated plant / install telematics technology on plant and equipment to determine consumption and use patterns / use alternative low carbon fuel where possible	2	3	4		0			
116	Use of COSHH substances	Operations	Impact: Spill or leaks polluting surface water drains, watercourses and ground / production of waste materials including hazardous waste Risks: clean up costs, reputational damage, prosecution, fines	2	4	2	3	12	R	ENV-RM-0007a Storage of Normal / Abnormal: secure COSHH storage / implementation of procedures for using COSHH Emergency: Stop work	2	4	2		0			

ANNEXE 5

Tree clearance environmental impact RAMS

Project Name:	**Worsbrough Reservoir**	
TBS Ref:	001	**Rev No:00**
Title:	**Tree Clearance environmental impact**	
Location(s):	North West, South	
Task Programme Dates:	**Start: 20/03/23**	**Finish: 31/03/23**
WPP Ref:	N/A	
ITP Ref:	001	
Name of Principal Contractor:	Balfour Beatty	
Name of Responsible Contractor:	Nimrod	
Prepared by (Signed):	*C. South*	**Date: 06/03/23**
Checked by (Signed):		**Date:**

TASK DETAILS

Description and Sequence of Work

1. The contractor will arrange to meet a representative from Balfour Beatty and members of both whitcher wildlife and Selwyn trees prior to any work happening.
2. The ecologist/arboriculturist (from whitcher wildlife and Selwyn trees) will inspect every tree/hedge prior to works commence and provide the watching brief. The planned works to each tree/hedge will not go ahead unless approval is given and no protected species are present.
3. Areas will be access along existing tracks. Travel into adjacent fields will not be permitted
4. Exclusion zones will be set up around each tree prior to felling/trimming.
5. Trees will be climbed and felled in sections and with felled sections stored in the vicinity of the tree
6. Tree sections will then be removed from site
7. Hedges wills be cut utilising chainsaws and will be stored with the felled tree sections ready for removal.
8. Works will be done within daylight hours

Control of Risks

Hazardous Activity: Tree felling/pruning and hedge removal
Associated Risk:
protected species and wildlife disruption
Controls:
All works will be inspected by a competent ecologist **From both Selwyn trees and whitcher wildlife prior to commencement.** **Tree clearance and hedge removal will only take place with the express permission of these 2 bodies** **Operatives will keep an eye open for nesting birds and bats and will stop work immediately if either of these are found and report it to Balfour Beatty, Selwyn Trees and Whitcher Wildlife** **All operatives will be briefed on the above prior to starting work**
Hazardous Activity: Tree felling/pruning and hedge removal
Associated Risk:
Wildlife disturbance
Controls:
Works will only take place in the areas identified in the arboricultural method statement **Felled vegetation will be stored adjacent to the felled location and removed as soon as reasonably practicable** **Works will only take place during daylight hours** **Exclusion zones will be erected around the works to prevent unauthorised access**

Resources

Personnel

The Supervisor* for this activity is:	
Title	**Specific Requirements**
Watching brief	Appropriate training and qualifications
Tree felling operative	

Plant and Equipment

Item	Type	Specific Requirements
N/A		

Materials and Tools

Item	Type	Specific Requirements
Chainsaw		

Additional PPE

Item	Activity
Chainsaw rated overalls	Tree felling
Face visor	Tree felling
Heading protection	

Design Documentation

Document Number	Title
N/A	TPP area south of worsbrough reservoir

Permits

The Responsible Person/Duty Holder for Permits is:		
Safe System of Work/Procedure	**Permit**	**Additional Information**
N/A		

SITE DETAILS RELEVANT TO TASK

Access, Plant and Machinery Movements

Access is to be via the designated access roads and footpaths only. No access through the adjacent fields will be permited

Task Location (Site Specific Layout/Constraints)

Site wide as per trees and hedges identified in theseign documentation

Protection and Exclusion

Area	Protection/Exclusion Measures
Northwest	SSSI. This area is protected and only works mentioned in the assent may be carried out here

Communication and Contact Details

Name	Company	Title	Contact Details
Chris South	Balfour Beatty	Site Lead	078175702525
Darren Brelsford	Balfour Beatty	Works Manager	07970235207
TBC	Nimrod	Supervisor	TBC
TBC	Whitcher wildlife	Ecologist	TBC
TBC	Selwyn Trees	Ecologist	TBC

Emergency Arrangements

Nearest A&E:
Barnsley Hospital
Gawber Road
Barnsley, S75 2EP

Interfaces

Public interface. All works to be segregated from the public utilising pedestrian barrier

Emergency Location (What3words)

Motion.Cycles. Lunch

Sign-on Sheet

Briefing Conducted By:			
Translator name & declaration of language translated to (where applicable)			
Name:	**Company:**	**Signature:**	**Date:**

ANNEXE 6

Whitcher Wildlife Preliminary Ecological Appraisal Revision one Feb 2023

Whitcher Wildlife Ltd.
Ecological Consultants.

WORSBROUGH RESERVOIR BANK MAINTENANCE.

OS REF: SE 34678 03400.

PRELIMINARY ECOLOGICAL APPRAISAL.

Ref No: **220905/2022/1.**

Date: **9th November 2022.**

Revision: **17th February 2023.**

Cliff Edge, Cliff Road, Darfield, Barnsley, S73 9HR.
Tel. 01226 753271. Fax. 01226 270993.
info@whitcher-wildlife.co.uk www.whitcher-wildlife.co.uk
Company No. 4401613.

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1. INTRODUCTION.

1.1. There are plans to replace and repair numerous existing reservoir retaining walls due to structural failures.

1.2. Whitcher Wildlife Ltd has therefore been commissioned to carry out an updated Preliminary Ecological Appraisal of the site to establish whether there are any issues that may affect the proposed works.

1.3. The site surveys were carried out on 27th September and 1st October 2022 and this report outlines the findings of that survey and makes appropriate recommendations.

1.4. Appendices I to V of this report provide additional information on specific species and are designed to assist the reader in understanding the contents of this report.

****

2. SURVEY METHODOLOGY.

2.1. Prior to visiting the site, the survey area was cross referenced to maps and aerial photographs to give a general idea of the habitats and potential issues within the area and to identify potential access and walking routes.

2.2. The survey area was walked where access was agreed and public rights of way were used where no access was agreed. All habitats within and immediately around the survey area were documented and the dominant species within that habitat listed in line with the JNCC Handbook for Phase 1 Habitat surveys.

2.3. The survey area and immediate surrounding area was thoroughly searched for evidence of badger (*Meles meles*) activity by looking for the following signs in line with Harris S, Cresswell P and Jefferies D (1989). *Surveying Badgers*. Mammal Society: -

* Badger setts.
* Badger latrines or dung pits.
* Badger snuffle holes and evidence of foraging.
* Badger paths.
* Badger prints in areas of soft mud.
* Badger hairs caught on fencing.

2.4. The survey area was searched for watercourses and where found all watercourses within the survey area and for approximately 50m in each direction were thoroughly searched for evidence of water vole (*Arvicola amphibius*) activity by looking for the following signs, in line with Rob Strachan, Tom Moorhouse and Merryl Gelling (2011). *Water Vole Handbook: Third Edition*: -

* Water vole burrows.
* Water vole faeces and latrines.
* Water vole feeding stations.
* Water vole runs.
* Water vole prints in areas of soft mud.
* Water vole lawns.
* Predator field signs.

2.5. The survey area was searched for watercourses and where found all watercourses within the survey area and for approximately 50m in each direction were thoroughly searched for evidence of otter (*Lutra lutra*) activity by looking for the following signs in line with the P Chanin (2003). *Monitoring the Otter* and *Conserving Natura 2000 Rivers: Monitoring Series No10 Guidelines: -*

* Otter prints in soft mud.
* Otter spraints.
* Otter Holts.

2.6. The survey area was searched for watercourses and waterbodies. Where found, and where safe to enter the water, all were thoroughly searched for the presence of crayfish, for approximately 50m in each direction of the site, by searching under rocks and logs. Where stated, crayfish traps were also deployed into the watercourse. All survey work was carried out in accordance with the *Conserving Natural 2000 Rivers Monitoring Series No 1, Protocol for Monitoring the White Clawed Crayfish*.

2.7. The survey area was searched for mature trees and derelict buildings and where found these were checked for potential bat roosting sites in line with Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)* by looking for the following signs: -

* Holes, cracks or crevices.
* Bat Droppings.

2.8. The land immediately adjacent to the survey area was assessed for bat roosting potential and bat foraging potential. Connective routes and flight lines were also assessed whilst on site and using maps of the area.

2.9. The area within 500m of the survey site was cross referenced to maps to highlight all ponds close to the site. Where possible, all ponds identified were accessed using agreed access or public rights of way to assess the potential for great crested newts (*Triturus cristatus*) to be present.

2.10. The survey area was assessed for the potential for reptiles and suitable reptile habitats. Where applicable the area was also searched for the presence of reptiles.

2.11. Where appropriate, the habitat within and surrounding the survey area was searched for species such as hazel, oak, honeysuckle, bramble and other species which may provide potential habitat for hazel dormice (*Muscardinus avellanarius*). Field signs such as feeding remains and nests were also searched for where possible, in line with P Bright, P Morris and T Mitchell-Jones *the Dormouse Conservation Handbook 2nd Edition*.

2.12. Where appropriate, the area within and surrounding the survey area was assessed for its potential to house habitat for red squirrels. Field signs of red squirrels

were searched for at least every 50m, looking for any dreys, feeding signs or sightings of red squirrels.

2.13. All surveys were carried out in line with the Chartered Institute of Ecological and Environmental Management (CIEEM) survey standards and advice.

2.14. This document is prepared in line with The National Planning Policy Framework (NPPF). This sets out the government policy on biodiversity and nature conservation and places a duty on Planning Authorities to give material consideration to the effect of a development on legally protected species when considering planning applications. The NPPF and the Planning Practice Guidance on "Natural Environment" also promote sustainable development by ensuring that developments take account of the role and value of biodiversity and that it is conserved and enhanced within the development.

2.15. This report is prepared in line with the Natural Environment and Rural Communities (NERC) Act that came into force on 1st Oct 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.

2.16. The survey was undertaken by Mitchel Greenhalgh, a wildlife consultant with an array of experience in conducting ecological surveys on a variety of flora and fauna in a professional capacity. Mitchel holds a Natural England survey licence in respect of bats and has attended courses run by CIEEM and the FSC. Mitchel also holds a BSc in environmental science attained from the University of Leeds and he is an associate member of CIEEM.

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3. SURVEY RESULTS.

3.1. Data Search Results.

3.1.1. A desktop data searches were requested from Sheffield Biological Records Centre, South Yorkshire Bat Group and South Yorkshire Badger Group for records of protected species and designated sites within 2km of the survey area.

3.1.2. ***Sheffield Biological Records Centre.***

3.1.2.1. There are no records of protected species specific to the survey area.

3.1.2.2. The nearest records are two records of otter 145m to the east of the site, one record of a dead otter from 1981 and one field record from 2015.

3.1.2.3. There are records of water vole within 2km, although all records are over 25 years old and over 500m from the site.

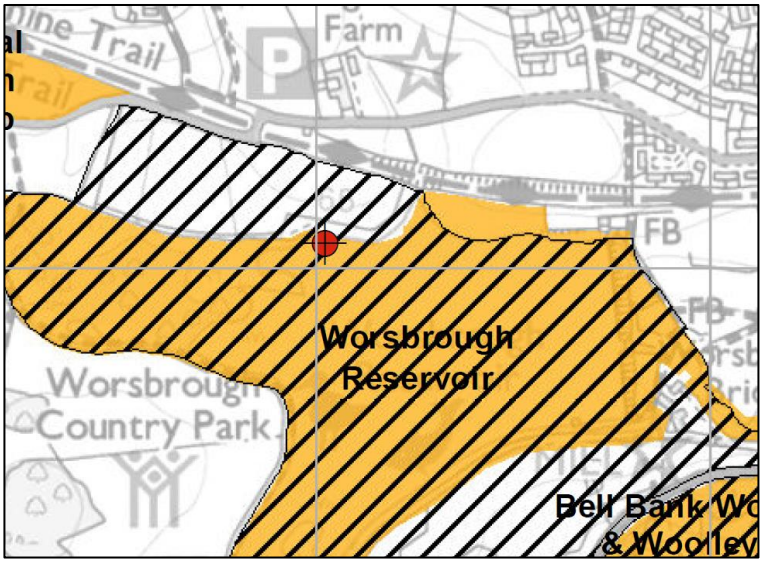
3.1.2.4. There are records of various species of bat within 2km, although the closest record lies over 150m from the site and most of the records are over 30 years old.

3.1.2.5. There are records of grass snake within 2km, although the nearest records lie over 650m from the site.

3.1.2.6. There are six records of great crested newt within 2km, although all records lie over 1.6km to the north.

3.1.2.7. Signal Crayfish are known to be present within Worsborough Reservoir.

3.1.2.8. Worsborough Reservoir is a Barnsley Wildlife Site and a Local Nature Reserve. The surveyed wall lies within both sites. The map below shows the Barnsley Wildlife Site in orange and the Local Nature Reserve as black hatching with an example location of the site shown as a red dot.



3.1.3. ***South Yorkshire Badger Group.***

Worsborough Reservoir is located to the east of the M1 motorway. The M1 is a natural barrier between the mainly urban areas of Barnsley to the east and the open rural farmland on the western side of the motorway. There are no records of badgers in the area around the reservoir but there are abundant records to the west of the motorway.

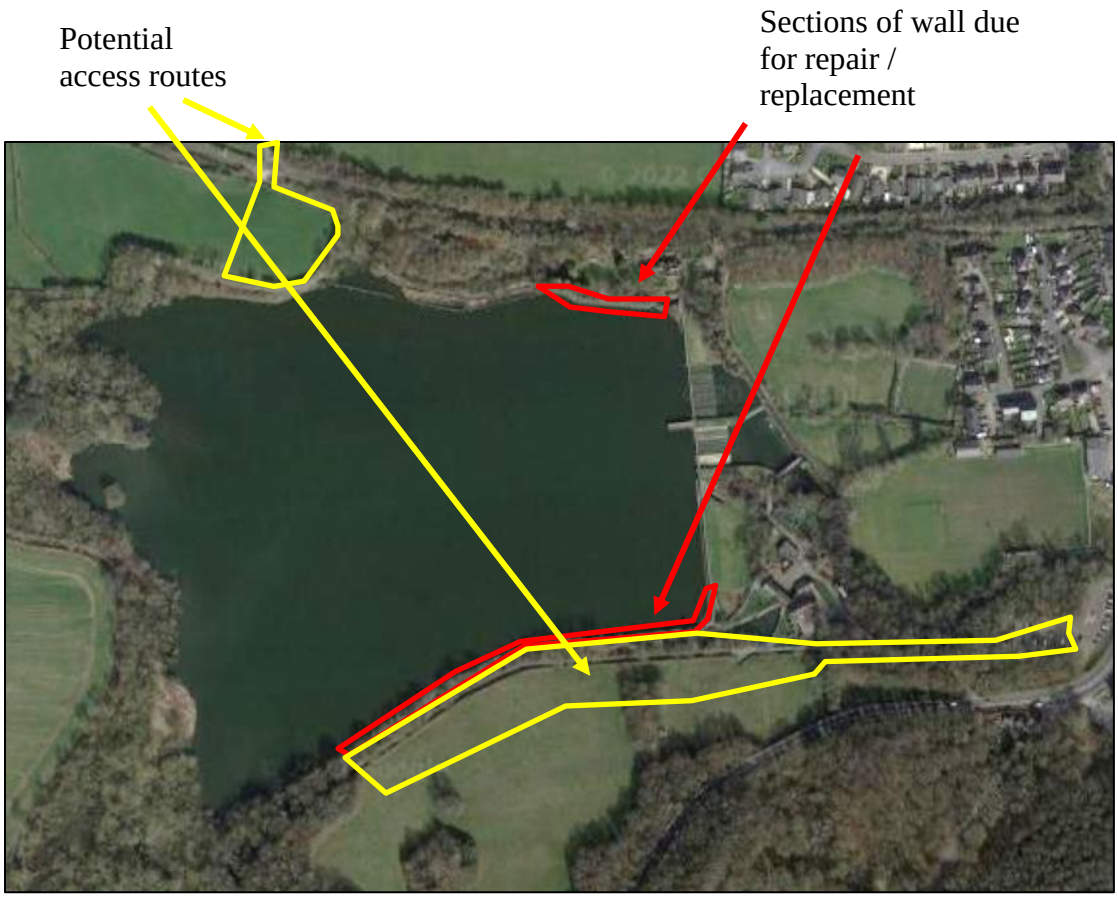
3.1.4. ***South Yorkshire Bat Group.***

There are a large number of records of bats and bat roosts within 2km of the survey area. However, the nearest relevant records are historic records within Worsborough Country Park, recorded over 100m from the survey area. The nearest roost record is 250m from the survey area, recorded in 1997. All other roost records are over 750m from the survey area.

3.1.5. The full data searches are available to the client on request but must not be placed in the public domain.

3.2. The Survey Area.

The survey area comprises numerous sections of land to both the north and south of the reservoir. These are shown on the aerial imagery below, highlighted by the red (works area) and yellow (potential access routes) shapes.



3.3.1. Description of Habitats.

3.3.1.1. Appendix VI of this report contain annotated maps marked up with the varying habitats that are cross referenced to target notes in Appendix VII of this report. The habitats on and adjacent to the site are: -

- Wall
- Standing Water
- Improved Grassland
- Neutral, Semi-improved Grassland
- Species-rich Hedgerow
- Species-poor Hedgerow
- Dense Scrub
- Scattered Trees
- Broadleaved Woodland
- Running Water
- Marshy Grassland
- Scattered Scrub
- Bare Ground
- Fence

3.3.2. Wall.

The works areas are centred and focused on the stone retaining walls of the reservoir. These are currently mostly submerged with only the top 200mm visible. A further stone retaining wall is also present behind the ones of the reservoir, supporting the elevated footpaths around the site.



3.3.3. Standing Water.

The works are taking place around the perimeter of Worsborough Reservoir, which is an approximately twelve-hectare body of standing water.



3.3.4. Improved Grassland.

3.3.4.1. There are two distinctly different areas of what is classified as improved grassland within the area. Shown below are descriptions of each, although it should be noted that the surveys were undertaken at the end of September and beginning of October, which is a sub-optimal time of year to survey grasslands.

3.3.4.1.1. The first of these is the grassland which is situated atop the retaining walls of the reservoir. These are short sward sections of grassland which are pedestrianised by fishermen. These sections comprise numerous species although most are common and infrequently distributed. Species include cocksfoot (*Dactylis glomerata*), perennial rye grass (*Lolium perenne*), red fescue (*Festuca rubra*), false oat grass (*Arrhenatherum elatius*), ribwort plantain (*Plantago lanceolata*), nettle (*Urtica dioica*), white dead nettle (*Lamium album*), ox eye daisy (*Leucanthemum vulgare*), ragwort (*Senecio jacobeae*), gypsywort (*Lycopus europaeus*), dandelion (*Taraxacum officinale*), cow parsley (*Anthriscus sylvestris*), dock (*Rumex spp*.), broadleaved plantain (*Plantago major*), great willowherb (*Epilobium hirsutum*), fringed willowherb (*Epilobium ciliatum*), rosebay willowherb (*Chamerion angustifolium*), spear thistle (*Cirsium vulgare*), creeping thistle (*Cirsium arvense*), burdock (*Arctium lappa*), hogweed (*Heracleum sphondylium*), angelica (*Angelica sylvestris*), vetch (*Vicia spp*.), purple dead nettle (Lamiun purpureum), creeping buttercup (*Ranunculus repens*), bittersweet (*Solanum dulcamara*), coltsfoot (*Tussilago farfara*), herb Robert (*Geranium robertianum*), knapweed (*Centaurea nigra*) and hedge woundwort (*Stachys sylvatica*).



3.3.4.1.2. The second of these sections is the field to the north of the site. This is currently grazed by cattle and therefore access was limited. It is heavily trodden by the cattle with a short sward as expected of a grazed field. Species seen within the

field from the fence line include cocksfoot (*Dactylis glomerata*), perennial rye grass (*Lolium perenne*), barren brome (*Bromus sterilis*), dock (*Rumex spp*.) nettle (*Urtica dioica*), broadleaved plantain (*Plantago major*) and white clover (*Trifolium repens*).





3.3.4.1.3. Some other, much smaller areas of improved grassland are present within the survey area, such as the track verges to the north of the survey area. The species composition of these are generally poor and similar to the above.



3.3.5. Semi-improved, Neutral Grassland.

3.3.5.1. The largest section of grassland within the survey area, is the section to the south. This has a short sward and is managed likely through sheep or cattle grazing, although no animals were present during the survey. Species present during the survey included cocksfoot (*Dactylis glomerata*), perennial rye grass (*Lolium perenne*), red fescue (*Festuca rubra*), common bent (*Agrostis capillaris*), broadleaved

plantain (*Plantago major*), ribwort plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), dandelion (*Taraxacum officinale*), vetch (*Vicia spp*.), creeping thistle (*Cirsium arvense*), lady's mantle (*Alchemilla spp*.) and common daisy (*Bellis perennis*).



3.3.5.2. A more comprehensive description of this grassland is provided in the Worsbrough Country Park 'Biodiversity Management Plan', produced by Baker Consultants in August of 2021. Their description is as follows:

"*Two fields located on the west side of Sheffield Road support a sward that was short at the time of the survey with a sparse thatch layer and no obvious bryophytes. The grassland is cut for hay and aftermath grazed. Species include perennial rye-grass, white clover, black knapweed (Centaurea nigra), creeping thistle, ribwort plantain, Yorkshire fog, yarrow (Achillea millefolium), common sorrel (Rumex acetosa), dandelion, pignut (Conopdium majus), quaking grass (Briza media), sweet vernal grass (Anthoxanthum odoratum), germander speedwell (Veronica chamaedrys), red fescue, common bent grass, meadow buttercup (Ranunculus acris) and creeping buttercup. The field to the east (9a) is much more species-rich than the field to the west (9b) and is less agriculturally improved*."

3.3.6. Species-rich Hedgerow.

3.3.6.1. There are two main hedgerows within the survey area that are categorised as species rich.

3.3.6.1.1. The first of these is a large mature hedgerow approximately 35m in length located to the west of the access track at the north of the site, across from Wigfield Farm. Species within this hedgerow comprise hazel (*Corylus avellana*), field maple

(*Acer campestre*), ash (*Fraxinus excelsior*), dog rose (*Rosa canina*), dogwood (*Cornus spp*.), and goat willow (*Salix caprea*).



3.3.6.1.2. The second of these is the hedgerow which separates the southernmost surveyed grassland field with the section of woodland south of the mill stream. This hedgerow is much longer at just short of 300m, although lacks the maturity of the first. Species within this hedgerow include hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), bramble (*Rubus fruticosus*), dog rose (*Rosa canina*), dogwood (*Cornus spp*.), elder (*Sambucus nigra*), and guelder rose (*Viburnum opulus*).



3.3.7. Species-poor Hedgerow

Around the grazed field to the north of the survey area, there is a planted hedgerow comprising predominantly of hawthorn *(Crataegus monogyna)*, with small amounts of plum *(Prunus spp.)* and bramble *(Rubus fruticosus)* also within. Midland hawthorn (*Crataegus laevigata*) has also been previously recorded around this area of Worsbrough Reservoir at the northern edge of its range, although none was identified within this hedgerow.



3.3.8. Dense Scrub.

The habitat along the mill stream is difficult to classify and realistically could be placed into either category of scrub, woodland or hedgerow. It has been classified as dense scrub here due to its lack of width and low density of mature trees, although many are still present throughout. This is likely the highest value habitat within the survey area and species within it include crack willow *(Salix fragilis)*, hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), alder (*Alnus glutinosa*), blackthorn (*Prunus spinosa*), field elm (*Ulmus minor*), elder (*Sambucus nigra*), crab apple (*Malus spp*.), guelder rose (*Viburnum opulus*), dog rose (*Rosa canina*), bramble (*Rubus fruticosus*), bracken (*Pteridium aquilinum*), nettle (*Urtica dioica*), white dead nettle (*Lamium album*), cow parsley (*Anthriscus sylvestris*), dock (*Rumex sp*.), vetch (*Vicia spp.*) and ivy (*Hedera helix*). Himalayan balsam (*Impatiens glandulifera*) is also sporadically present along the watercourse.

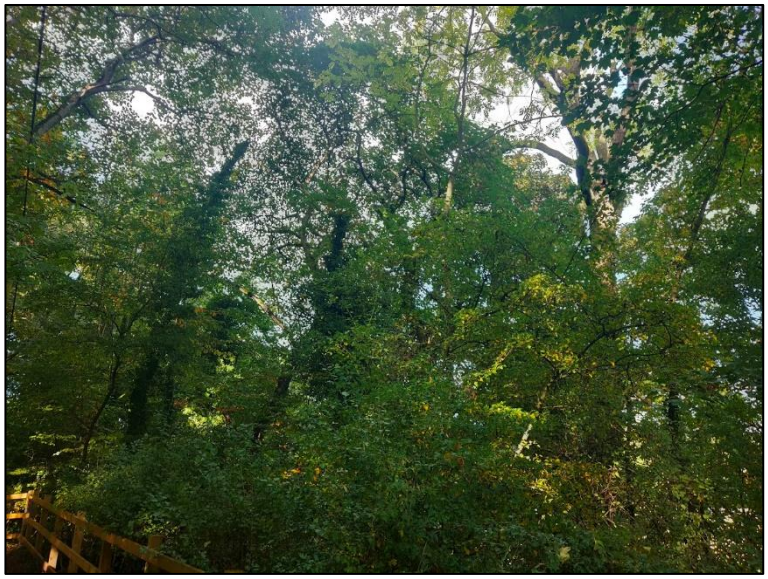


3.3.9. Broadleaved Woodland.

3.3.9.1. Within the grassland to the south of the survey area, there is a section of woodland. Tree species present within this section of woodland comprise Norway maple (*Acer platanoides*), oak (*Quercus robur*), hazel (*Corylus avellana*), ash (*Fraxinus excelsior*) and spindle (*Euonymus europaeus*) with an understory of bramble (*Rubus fruticosus*), cocksfoot (*Dactylis glomerata*), Portuguese laurel (*Prunus lusitanica*), dogwood (*Cornus spp*.), nightshade (*Circaea lutetiana*), nettle *(Urtica dioica)* and ivy (*Hedera helix*).



3.3.9.2. The access trackway from the public car park to the east of the site runs through a section of very mature broadleaved woodland. Tree species within this section include beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*) and holly (*Ilex aquifolium*) with a sparse ivy (*Hedera helix*) understory.



3.3.10. Running Water.

The mill stream runs through the dense scrub habitat described above. During the survey, this was a very shallow stream approximately 100mm in depth with a moderate flow.



3.3.11. Marshy Grassland.

Between the woodland coppice and hedgerow at the south of the area, there is a small opening which is very boggy due to an accumulation of water coming from a small stream within the woodland. This has been categorised as marshy grassland. Species present within this habitat include soft rush (*Juncus effusus*), cocksfoot (*Dactylis*

glomerata), creeping thistle (*Cirsium arvense*), ribwort plantain (*Plantago lanceolata*), hogweed (*Heracleum sphondylium*), creeping bent (*Agrostis stolonifera*), hemlock (*Conium maculatum*), nettle (*Urtica dioica*), great willowherb (*Epilobium hirsutum*) and dock (*Rumex sp.*).



3.3.12. Scattered Scrub.

A small section of scattered scrub is present around the fenceline to at the south side of the grazed field. Species here include bramble (*Rubus fruticosus*), elder (S*ambucus nigra*), nettle (*Urtica dioica*), hogweed (*Heracleum sphondylium*), cocksfoot (*Dactylis glomerata*) and red campion (*Silene dioica*).



3.3.13. Scattered Trees.

Large numbers of trees are present within the survey area and nearby. Most of these are within the woodland or the habitat classified as dense scrub, although there are a small number of standalone trees around the site too. These are predominantly present along the access track near to the mill pond and comprise sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*) and crack willow (*Salix fragilis*).



3.3.14. Bare Ground.

Various footpaths are present around the survey area. These comprise a mixture of gravel, concrete and bare earth but are all classified as bare ground.



3.3.15. Fence.

Various fences are present throughout the survey area.



3.4. Description of Fauna.

3.4.1. No badger sett or other field signs were identified within the survey area.

3.4.2. Riparian mammals.

3.4.2.1. There are two main watercourses / waterbodies within the survey area, with the largest of these being the reservoir. The banks of the reservoir make it unsuitable for water vole, although otter may use the reservoir. However, no otter holts or other field signs were identified.

3.4.2.2. The other watercourse is the mill stream. This offers much more suitable habitat for water vole but is still largely unsuitable due to the lack of grassy vegetation and high disturbance as the mill stream runs between two heavily trafficked footpaths. The depth of the mill stream makes it largely unsuitable for otter. No field signs of either species were identified.

3.4.3. Signal crayfish are known to be present within the reservoir which therefore makes the presence of white-clawed crayfish extremely unlikely. The mill stream provides slightly better habitat but still very poor for white-clawed crayfish. Furthermore, there are no records of the species within a 2km radius of the survey area.

3.4.4. There are no buildings within the survey area to provide features which may be suitable for roosting bats and the walls due to be worked on are mostly underwater. The retaining walls which hold the footpath do have some defects which could be used by opportunistic bats but this is considered unlikely and the works will not impact this wall.

3.4.5. There are numerous mature trees, especially the large crack willows, within and around the survey area, which have potential to host roosting bats. A small number of trees will need to be removed or cut back to facilitate the culverting of the ditch, although numerous visits have been made to ensure the route does not affect any trees with bat roost potential.

3.4.6. The habitat within the survey area offers good suitability for foraging and commuting bats due to the mosaic of water, woodland, hedgerows and grassland.

3.4.7. The reservoir is considered to be extremely poor habitat for great crested newts due to the abundant wildfowl, fish and walled banks making access in and out impossible for amphibians within the survey area. There is one pond to the west at a distance of approximately 450m and the woodland to the west is frequently wet. However, no records of great crested newts have ever been recorded close to the site and considered this is a local wildlife site and SSSI, their presence would almost certainly be known.

3.4.8. The vegetation on and around the site provides excellent habitat for nesting birds during the nesting season, which extends from March to August inclusive. Gulls, wildfowl and other waders are also likely to nest on the banks of the reservoir within this time.

3.4.9. The habitat within the survey area offers some suitability for reptiles due to the mosaic of habitats provided. However, the survey areas are highly trafficked by pedestrians limiting the suitability of the site and making it unlikely that any reptiles would use it in large numbers.

3.4.10. The habitat within the survey area lies outside of the known natural home range of red squirrel and hazel dormouse. As such, neither species were considered during the survey.

3.4.11. Himalayan balsam is sporadically present in numerous places along the mill stream. Himalayan balsam is an invasive, non-native plant species listed on schedule 9 of the Wildlife and Countryside Act (1981).

4. EVALUATION OF FINDINGS.

4.1. The survey area is located within Worsbrough Country Park Local Wildlife Site and Local Nature Reserve and within close distance to the Dearne Valley Wetlands Site of Special Scientific Interest. Therefore, the works may have a short-term negative impact on designated sites.

4.2. No badger setts or other field signs were found within the survey area. Therefore, the works will have no impact on badger.

4.3. Otters may use the reservoir but are very unlikely to be present within the survey area, especially during the day when works are being carried out. They are even less likely to use the mill stream due to its narrow depth and frequent disturbance. No holts or other field signs were identified throughout the survey area and therefore, the works will have no impact on otter.

4.4. The reservoir is completely unsuitable habitat for water vole and they are unlikely to use the mill stream due to frequent disturbance and poor food sources. No water vole field signs were identified throughout the survey area and therefore, the works will have no impact on water vole.

4.5. Neither the reservoir nor the mill stream were assessed as suitable for white-clawed crayfish and signal crayfish are also known to be present within the reservoir. Therefore, the works will have no impact on white-clawed crayfish.

4.6. There are large numbers of trees within the survey area which may provide suitable features for roosting bats. As a small number of trees will need to be removed, several visits were made to site to agree upon an access route that has no impact on trees with bat roost potential. This route is situated between the root protection areas of trees T360 and T399. Provided this route is used, there will be no impact on bats roosting in trees.

4.7. There are no buildings within the survey area to provide suitable habitat for roosting bats and the reservoir walls are mostly underwater. The retaining walls holding the footpath do have some defects which could be used by opportunistic bats, but these will not be affected by the works. Therefore, the works will have no impact on bats roosting within structures.

4.8. The survey area is assessed as providing high value habitat for foraging and commuting bats. However, any areas of vegetation to be removed will be kept to a minimum and will not permanently fragment the habitat. Therefore, with suitable precautions in place, the works will have no impact on foraging or commuting bats.

4.9. The reservoir is considered extremely poor value habitat for great crested newts and no great crested newts have been recorded close to the site. Therefore, the works will have no impact on great crested newts.

4.10. The site offers good habitat for nesting birds within the nesting season, which extends from March to August inclusive each year. Therefore, any vegetation clearance done within this time may have a negative impact upon nesting birds.

4.11. The survey area offers some suitability for reptiles due to its basking and refugia opportunities. However, the frequent disturbance makes it unlikely that the site will be used by reptiles in large numbers. Therefore, with due care, the works will have no impact on reptiles.

4.12. The site lies outside of the natural home range of red squirrel and hazel dormouse. Therefore, the works will have no impact on either of these species.

4.13. Himalayan balsam is present along the banks of the mill stream. However, provided suitable precautions are put in place, there should be no spread of the plant to the further environment.

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5. RECOMMENDATIONS.

5.1. As the site lies within a Local Nature Reserve and Local Wildlife Site, it is recommended that permission be sought from the local authority prior to works commencing. It is understood that the Environment Agency and Natural England have already confirmed the works can take place.

5.2. It is also recommended that permission from the local authority is sought to remove any hedgerows necessary to get machinery to the edge of the reservoir. Any hedgerows removed should be replanted post works and then checked monthly for three months to confirm their survival. If the hedgerow fails, it should be replaced on a like-for-like basis and monitored to ensure its success.

5.3. It is recommended that the agreed upon route between the root protection areas of T360 AND T399 be used to get machinery bankside. If for any reason this route changes, then it is recommended that further inspections be made to ensure that no trees with bat roost potential are impacted.

5.4. Mixed deciduous woodland is a habitat of principal importance listed on schedule 41 of the NERC Act (2006) and a priority habitat of Barnsley's Biodiversity Action Plan (BAP) and the UK's BAP. It is therefore recommended that this habitat remain unimpacted by the proposed works.

5.5. Semi-improved Neutral Grassland is a priority habitat of Barnsley's Biodiversity Action Plan (BAP) and the UK's BAP. It is therefore recommended that all impacts on the grassland to the south be minimised where, and a mitigation plan be put in place to ensure that the grassland is restored to its original state once works have been completed.

5.6. Himalayan balsam is present along the mill stream. It is therefore recommended that a precautionary method of working is in place to prevent the spread of the plant to the further environment. Ideally, the works will be done outside of the seeding season of the plant, which extends between June and November.

5.7. It is recommended that works be undertaken outside of the nesting bird season, which extends from March to August inclusive each year. If works must be done within this time, it is recommended that they are immediately preceded by a nesting bird survey undertaken by a suitably experienced ecologist.

5.8. It is recommended that in the unlikely event that reptiles are found, they should be left undisturbed and allowed to move from the survey area of their own accord. Should any hibernating reptiles or large numbers (5+) of reptiles be found, then works should cease and Whitcher Wildlife be contacted for advice.

5.9. Signal Crayfish are a non-native, invasive species. Therefore, if any are found during the works, they should be humanely dispatched and disposed of in a biosecure manner. They should not be released back into any waterbodies. A toolbox talk is attached to aid on-site personnel with identification.

5.10. A singular freshwater swan mussel shell was identified within the mill stream. It is therefore recommended that a check of any section of the mill stream due to be impacted by the works be carried out prior to the works, and any mussels seen should be moved away from the works site.

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Revision checked by:	
Ruth Georgiou. BSc, MCIEEM.	Date: 17th February 2023.

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Appendix I. NESTING BIRD INFORMATION.

Ecology

The nesting season will vary according to the weather each year but generally commences in March, peaks during May and June and continues until September. It is also worth remembering that some birds nest in trees and scrub, but others are ground nesting or prefer man- made structures or buildings.

Surveys

Nesting bird surveys search for potential nest sites in vegetation, buildings etc. Potential nesting sites are observed over a suitable period of time for bird movements or calling male birds that would indicate the presence of a nest. The presence of a nest can be identified from the field signs without the necessity to see the nest itself, thereby avoiding any disturbance of the nests. The best way to avoid this issue is to plan for vegetation clearance to be carried out outside the bird-nesting season.

Legislation

Nesting birds are protected under The Wildlife and Countryside Act 1981.

Part 1. -(1) Of the Act states that: - If any person intentionally: - kills, injures or takes any wild bird; takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or takes or destroys an egg of any wild bird, he shall be guilty of an offence.

Part 1.-(5) of the Act states that:- If any person intentionally:- disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on, or near a nest containing eggs or young; or disturbs young of such a bird, he shall be guilty of an offence and liable to a special penalty.

The Countryside and Rights of Way Act 2000 amends the above by inserting after “intentionally” the words “or recklessly”.

Appendix II. BAT INFORMATION.

Ecology

There are currently 18 species of bat residing in Britain, 17 of which of which are known to breed here. They are extremely difficult to identify in the hand and even more so in flight.

All appear to be diminishing in numbers, probably due to habitat change and shortage of food, caused by pesticides, as insects are their sole diet.

As their diet consists solely of insects, bats hibernate during the winter when their food source is at its most scarce. They will spend the winter in hollow trees, caves, mines and the roofs of buildings.

Certain species, particularly the pipistrelle (the commonest and most widespread British bat) can quickly adapt to man-made structures and will readily use these to roost and to rear their young.

Surveys

During walkover surveys, bat roosts can be identified by looking for:

- Suitable holes, cracks and crevices within any building, tree or other structure.
- Bat droppings along walls, window cills, or on the ground.
- Prey remains, such as insect wings.

Further investigations can be made using endoscopes, by carrying out aerial inspections of trees or by conducting bat activity surveys during dusk and dawn over summer months.

Legislation

Bats are protected under Appendix II and III of the Bern Convention (1982), Schedule 5 and 6 of the Wildlife and Countryside Act (1981), Annex IV of the Habitats Directive (some species under Annex II), Annex II of the Conservation of Habitats and Species Regulations (2010) and EUROBATS agreement. Numerous species are

also listed under section 41 of the Natural Environment and Rural Communities Act (2006) making them species of principal importance.

All bats and their roosts are therefore protected in the UK. This makes it an offence to kill, injure or take any bat, to interfere with any place used for shelter or protection, or to intentionally disturb any animal occupying such a place.

The UK has designated maternity and hibernacula areas as Special Areas of Conservation (SAC's) under the Habitats Directive. Implementation of the UK Biodiversity Action Plan also includes action for a number bat species and the habitats which support them.

Where development proposals are likely to affect a bat roost site, a licence is required from Natural England.

Appendix III. REPTILE INFORMATION.

Ecology

There are five main species of reptile that reside in the UK; Common or Viviparous Lizard (*Lacerta vivipara*); Sand Lizard (*Lacerta agilis*); Slow Worm *(Anguis fragilis*); Grass Snake (*Natrix natrix*) and Adder (*Vipera berus*). The Adder is the only native species that is venomous although this is rarely harmful to humans.

Reptiles occupy a wide range of habitats including woodland, marshes, heathland, moors, sand dunes, hedgerows and bogs. Sand Lizards are confined to moorland and coastal sand dunes where they lay their eggs in the warm sand. The range of the Sand Lizard in the UK is therefore very limited. Slow Worms can be found in a wide variety of habitats throughout Britain and is the most likely reptile to be found in urban and suburban environments.

Maintaining the right body temperature is vital to reptiles' survival. In the morning, they find a warm basking site to heat up their bodies, then later they may move back into the shade because they do not sweat and have to be careful not to overheat. During hot summers, Adders will try to move to damper, cooler sites.

Over winter reptiles will hibernate in burrows or under longs where they are protected from the cold and predators, emerging from February onwards as the weather warms up.

Reptiles generally begin to mate April to May with young born in late July to September. The Common Lizard gives birth to live young, hence the term viviparous, meaning live bearing.

Surveys

Reptile surveys involve the searching of refuge such as logs and stones for any animal sheltering below. Artificial refuge may be laid out on site for the purpose of reptile surveys.

Legislation

Reptiles are protected under Appendix II (sand lizards) and Appendix III (common lizard, slow worms, smooth snake, grass snake and adders) of the BERN Convention (1982), partially protected under Schedule 5 of the Wildlife and Countryside Act (1981), Annex IV of the Habitats Directive and are all listed under section 41 of the Natural Environment and Communities Act (2006) making them a species of principal importance.

This makes it an offence to disturb any reptile while it is occupying a structure or place it uses for shelter or protection or to obstruct access to such a place.

Appendix IV. CRAYFISH INFORMATION.

Ecology

Crayfish are the largest and most mobile freshwater invertebrate. The White Clawed Crayfish *(Austropotamobius pallipes)* is the only native crayfish and this is protected under European and UK legislation.

White Clawed Crayfish are generally found in areas with relatively hard, mineral rich waters on calcareous and rapidly weathering rocks. They can be found in a wide variety of environments including canals, streams, rivers, lakes reservoirs and water-filled quarries.

White Clawed Crayfish are typically found in water between 0.75 and 1.25m deep but can occur in very shallow streams with as little water as 50mm and in deeper, slow flowing rivers. They are typically found under rocks and submerged logs, among tree roots and in river-banks. White Clawed Crayfish are omnivorous but primarily carnivorous eating macro invertebrates and carrion when available. They will also eat worms, insect larvae, snails, small fish, macrophytes, algae and calcified plants.

Crayfish can live for up to ten years and generally reach sexual maturity after three to four years. Breeding takes place between September and November when the water temperature drops consistently to below ten degrees centigrade. Over winter females will hold a clutch of eggs (between twenty and one hundred and twenty) beneath their tail. The juveniles are released from the mother from June in the south to August in the north.

The main threat to the indigenous White Clawed Crayfish is the spread of introduced non-indigenous species, particularly the larger, faster growing and aggressive North American Signal Crayfish *(Pacifastacus leniusculus).* They are also vulnerable to disease, particularly porcelain disease and crayfish plague, and the latter carried by the Signal Crayfish.

Crayfish are also extremely vulnerable to pollution incidents, particularly those involving biocides, silage and sheep dip.

As a result, White Clawed Crayfish are endangered across most of its range and has been given protection under both European and UK legislation.

Surveys

Walkover surveys will assess the potential habitat within a watercourse for Crayfish. If safe to do so and within the correct time of year, surveys can be conducted which involves the invasive search of the watercourse bed and banks for Crayfish. Torch surveys can also be conducted at dusk which will identify any active Crayfish at that time.

Trapping surveys can be carried out but require permission being sought to place traps in the watercourse.

Legislation

White Clawed Crayfish are protected under Appendix III of the BERN Convention (1982), Schedule 5 of the Wildlife and Countryside Act (1981), Annex II and V of the Habitats Directive, Annex II of the Conservation of Habitats and Species Regulations (2010) and are listed under Section 41 of the Natural Environment and Rural Communities Act (2006) making them a species of principal importance. White Clawed Crayfish are considered to be Endangered by the IUCN red list.

This makes it an offence to kill, injure or take any White Clawed Crayfish, to interfere with any place used for shelter or protection, or to intentionally disturb any animal occupying such a place.

It is an offence to release or allow to escape any Crayfish species which is not ordinarily resident in the UK, or is listed on Schedule 9 of the Wildlife and Countryside Act (1981). These include North American Signal Crayfish, Noble Crayfish and Turkish Crayfish.

Licenses are available from Natural England to allow the taking of White Clawed Crayfish for certain specified purposes, including scientific or educational purposes and for conservation purposes. A Natural England Conservation License is also required for the purpose of conserving White Clawed Crayfish or introducing them to particular areas.

Appendix V. INVASIVE PLANT SPECIES INFORMATION.

Ecology

The Government has acknowledged the problems that can be caused by non-native invasive species. In 2008 the Government launched "The Invasive Non-Native Species Framework Strategy for Great Britain". The strategy provides a framework for a more co-ordinated approach to invasive species management. It seeks to create a stronger sense of shared responsibility across government, key organisations, land managers and the public.

The Non-Native Species Secretariat has been established to oversee the implementation of the strategy. Details of the secretariat including risk assessments and action plans for some species are available at www.nonnativespecies.org.

In general, there are four basic methods of controlling weeds; mechanical, chemical, natural and environmental.

- ***Mechanical control*** *includes cultivation, hoeing, pulling, cutting, raking, dredging or other methods to uproot or cut weeds.*
  Where this method is used all plant material must be considered "controlled waste" and must be disposed of properly.
- ***Chemical control*** *uses approved herbicides.*
- ***Natural control*** *uses pests and diseases of the target weed to weaken it and prevent it from becoming a nuisance.*
- ***Environmental control*** *works by altering the environment to make it less suitable for weed growth, for example by increasing or decreasing water velocity.*

Surveys

A site will be searched for invasive plant species growing on site, from mature plants to new shoots. A site will also be searched for dead stems indicating that plants that may have seasonally died back are present.

Legislation

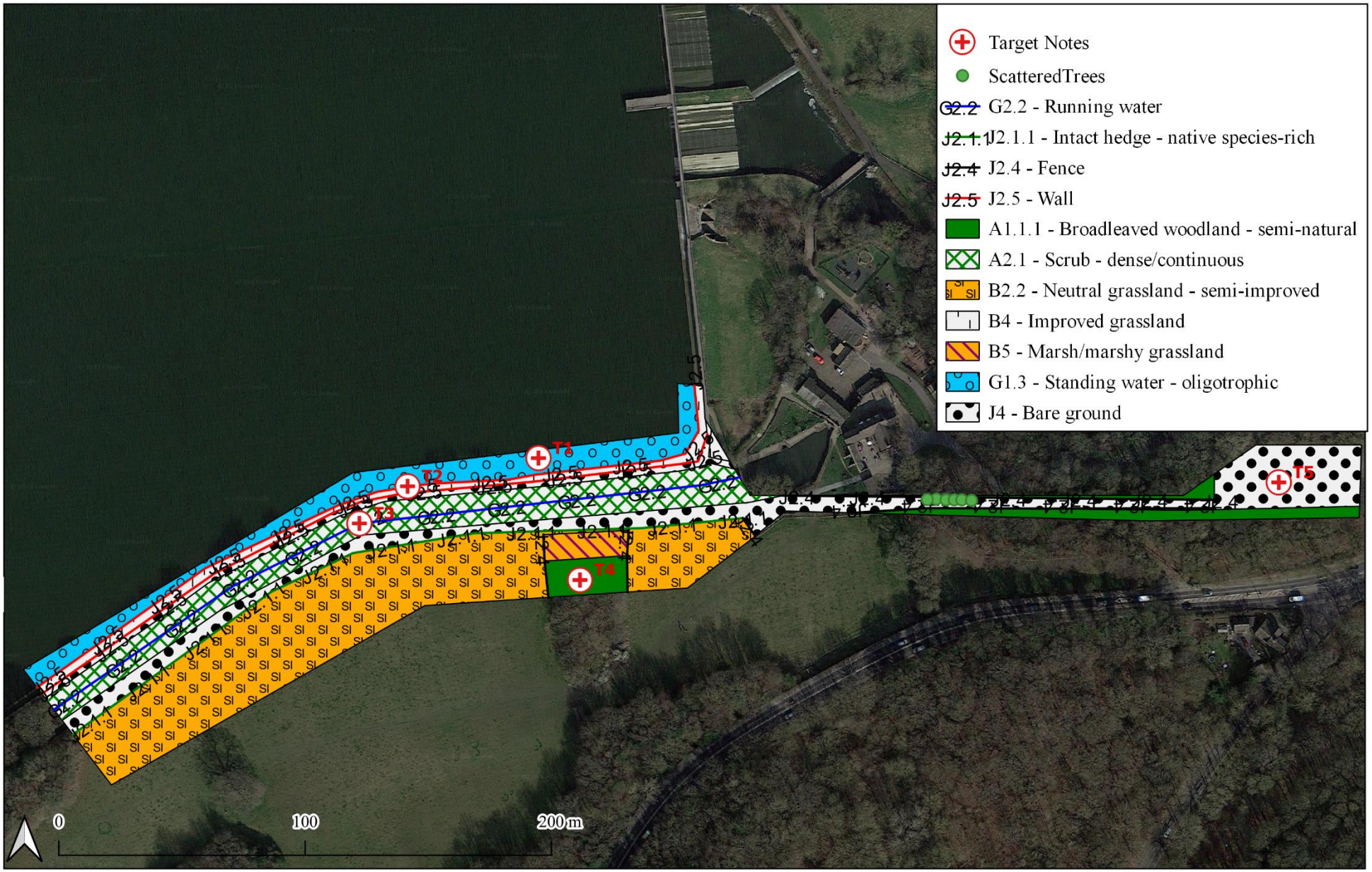
Invasive species listed under Schedule 9 are prohibited from release into the wild. Schedule 9, Section 14(2) prohibits 'planting' or 'causing to grow' in the wild of any plant listed in Part 2 of Schedule 9.

The following is a list of all the species of plant listed under Schedule 9 of The Wildlife and Countryside Act 1981.

Common Name	**Scientific Name**	**England & Wales**	**Scotland**
Alexanders, Perfoliate	*Smyrnium perfoliatum*	✓	
Algae, Red	*Grateloupia luxurians*	✓	
Archangel, Variegated Yellow	*Lamiastrum galeobdolon subsp. Argentatum*	✓	
Azalea, Yellow	*Rhododendron luteum*	✓	
Balsam, Himalayan	*Impatiens glandulifera*	✓	
Cotoneaster	*Cotoneaster horizontalis*	✓	
Cotoneaster, Entire Leaved	*Cotoneaster integrifolius*	✓	
Cotoneaster, Himalayan	*Cotoneaster simonsii*	✓	
Cotoneaster, Hollyberry	*Cotoneaster bullatus*	✓	
Cotoneaster, Small Leaved	*Cotoneaster microphyllus*	✓	
Creeper, False Virginia	*Parthenocissus inserta*	✓	
Creeper, Virginia	*Parthenocissus quinquefolia*	✓	
Dewplant, Purple	*Disphyma crassifolium*	✓	
False-acacia	*Robinia pseudoacacia*		✓
Fanwort	*Cabomba caroliniana*	✓	✓
Fern, Water	*Azolla filiculoides*	✓	✓
Fig, Hottentot	*Carpobrotus edulis*	✓	✓
Garlic, Three-Cornered	*Allium triquetrum*	✓	
Hogweed, Giant	*Heracleum mantegazzianum*	✓	✓
Hyacinth, water	*Eichhornia crassipes*	✓	✓
Kelp, Giant	*Macrocystis angustifolia*	✓	✓
Kelp, Giant	*Macrocystis integrifolia*	✓	✓
Kelp, Giant	*Macrocystis laevis*	✓	✓
Kelp, Giant	*Macrocystis pyrifera*	✓	✓
Kelp, Japanese	*Laminaria japonica*	✓	✓
Knotweed, Giant	*Fallopia sachalinensis*	✓	

Knotweed, Hybrid	*Fallopia japonica x Fallopia sachalinensis*	✓	
Knotweed, Japanese	*Fallopia japonica*	✓	
Knotweed, Japanese	*Polygonum cuspidatum*		✓
Leek, Few-flowered	*Allium paradoxum*	✓	✓
Lettuce, water	*Pistia stratiotes*	✓	✓
Montbretia	*Crocosmia x crocosmiiflora*	✓	
Parrot's-feather	*Myriophyllum aquaticum*	✓	
Pennywort, Floating	*Hydrocotyle ranunculoides*	✓	
Potato, Duck	*Sagittaria latifolia*	✓	
Primrose, Floating Water	*Ludwigia peploides*	✓	
Primrose, Water	*Ludwigia grandiflora*	✓	
Rhododendron	*Rhododendron ponticum*	✓	
Rhubarb, Giant	*Gunnera tinctorial*	✓	
Rose, Japanese	*Rosa rugosa*	✓	
Salvinia, Giant	*Salvinia molesta*	✓	✓
Seafingers, Green	*Codium fragile*	✓	
Seafingers, Green	*Codium fragile tomentosoides*		✓
Seaweed, Californian Red	*Pikea californica*	✓	✓
Seaweed, Hooked Asparagus	*Asparagopsis armata*	✓	✓
Seaweed, Japanese	*Sargassum muticum*	✓	✓
Seaweeds, Laver (except native species)	*Porphyra sp. except -* *P. amethystea* *P. leucosticta* *P. linearis* *P. miniata* *P. purpurea* *P. umbilicalis*	✓	✓
Shallon	*Gaultheria shallon*		✓
Stonecrop, Australian swamp	*Crassula helmsii*	✓	✓
Wakame	*Undaria pinnatifida*	✓	✓
Waterweed, Curly	*Lagarosiphon major*	✓	✓
Waterweeds	*All species of the genus Elodea*	✓	

Appendix VI. ANNOTATED MAPS OF THE SURVEY AREA.



Site:

Reference:

Date: 17.02.2023

Produced by: Mitchel Greenhalgh

Appendix VI. ANNOTATED MAPS OF THE SURVEY AREA.



Site: Worsbrough Reservoir

Reference: 211146/2022

Date: 10.11.2022

Produced by: Mitchel Greenhalgh

Appendix VII. TARGET NOTES.

T1. Worsbrough Reservoir.

T2. Example location of wall for removal.

T3. Mill stream.

T4. Section of Broadleaved Woodland.

T5. Access point from Sheffield Road.

T6. Access point from Haverlands Lane.

Toolbox Talk: Crayfish

Whitcher Wildlife Ltd

Ecological Consultants

The White Clawed Crayfish is the UK's only native freshwater crayfish. The White Clawed Crayfish has suffered a severe decline in numbers due to pollution incidents within their habitat and also from the introduction of the larger non-native Signal Crayfish.

Identification: White Clawed Crayfish

White Clawed Crayfish are usually quite small, up to 12cm in length. They are brown to olive in colour with the underside of the cheliped (claw) showing a dirty pink or white. A distinct way of identifying White Clawed Crayfish is the presence of sharp spines on the shoulder of the thorax.





Identification: Signal Crayfish

Signal Crayfish are larger than the native White Clawed Crayfish, around 15cm in length. They are reddy brown with the underside of the cheliped (claw) being red. There is also a distinct white patch on the upper side of the claw joint.





Habitat

White Clawed Crayfish habitats are watercourses or waterbodies containing fresh, well oxygenated and preferably slightly alkaline water. They will live in watercourses of all sizes as long as the watercourse provides, rocks, submerged plants or roots for shelter from predators.

They are bottom feeders and will feed on all kinds of live or dead matter from rotting vegetation to small fish or even other crayfish.





Legislation

The White Clawed Crayfish is endangered across most of its range and has been given protection under both European and UK legislation.
The White Clawed Crayfish is listed on Annex V of the Habitats Directive (EEC 1992), which means that Member States should take measures to ensure that the taking of White Clawed Crayfish in the wild is compatible with their being maintained at a favourable status.

In 1998, the White Clawed Crayfish was added to Schedule 5 of the Wildlife and Countryside Act giving it partial protection in relation to Section 9(1) as far as it relates to taking and in respect of Schedule 9(5). It is therefore an offence to intentionally take any White Clawed Crayfish from the wild and an offence to sell wild crayfish.

Non indigenous crayfish species are also covered under the Wildlife and Countryside Act 1981. Section 14 makes it an offence for any person to (a) release or allow to escape, any wild animal which is of a kind not ordinarily resident in or a regular visitor to Great Britain in a wild state or; (b) is included in Schedule 9 of the Wildlife and Countryside Act.

If crayfish are identified during works, stop all works and contact Whitcher Wildlife Ltd directly on 01226 753271 or at info@whitcher-wildlife.co.uk