



Greena Ecological Consultancy

BAT MITIGATION PLAN

OXFORD FLOOD ALLEVIATION SCHEME

IMSE500177-CH2-XX-00-RP-EN-0711

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With revisions added 3 December 2021

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Summary

The proposed scheme comprises the following:

- Construction of a new channel to the west of Oxford city centre, between the A34 to the west and the railway to the east.
- Provision of new flood defences (embankments and walls) to protect houses which would otherwise continue to flood even with the reduced river levels;
- Provision of new culverts and bridges to cross highways and footpaths to maintain access routes;
- Installation of flood gates for access (open under normal, non-flood, conditions) through the new defences noted above;
- Creation of new and/or improved habitat for flora, fauna and fisheries, where it does not compromise flood defence or other environmental receptors. This habitat creation/restoration forms part of the integrated design of the Scheme to help mitigate habitat losses, to meet Water Environment Regulations (WER) measures and support England Biodiversity 2020 habitat creation targets; and
- Removal of Towles Mill weir to allow fish migration via Hinksey Stream.

Greena Ecological Consultancy has been carrying out surveys specifically for bats in 2016 and 2017, 2018 & 2020 by a combination of tree inspection and bat detector activity surveys. A summary of surveys undertaken, results and mitigation is listed below:

- Trees to be removed or very close to works features bats could use have been physically examined or assessed by carrying out up to three activity surveys. Further bat activity surveys of trees and any new inspections required will be carried out in 2023 to cover up to date scheme amendments. All trees with potential bat features affected by the scheme will be resurveyed in 2023.
- Bridges and buildings either directly affected by works or in very close proximity have been assessed by bat activity surveys for use in 2017, 2018 & 2020. These will be resurveyed in 2023 by repeat activity survey.
- Static bat detector recording surveys have been repeated at nine work locations each month. These will be repeated before (2023) and after works.
- Monthly transect bat activity walking surveys covering the entire route on foot have been conducted as part of obtaining a full picture of bats use of the works area.
- In total 12 bat species were recorded from all surveys including individuals from two annex II species *Barbastella barbastellus* and Lesser horseshoe *Rhinolophus hipposideros* bats. Also recorded were small numbers of Alcathe *Myotis alcathoe* or Geoffroy's *Myotis emarginatus* bats both rare UK species.
- From the tree surveys two roosts were found of odd bats in the south of the scheme at Redbridge of Long eared *Plecotus* sp. and unknown bat species, and another lekking roost of a Common pipistrelle *Pipistrellus pipistrellus* at either tree 84 or 90 on Willow Walk.
- Up to six bat boxes have previously been installed on an island at Redbridge, these were located and inspected (no bat signs in them), and the Oxfordshire bat group report all have apparently been used by bats in the past. These boxes will be relocated to nearby area in 2023.

- In the bridge and building survey just one site Botley Road Bridge was found to be used in late summer as a lekking roost by a Common pipistrelle bat.
- The static recorders detected eight bat species.
- Mitigation for the loss of confirmed, high and moderate potential bat features in trees will be by replacement for each feature with a suitable bat box. In total 119 boxes will be installed plus relocation of up to six existing ones from Redbridge Island.
- An EPS bat licence will be obtained once planning permission has been granted to cover confirmed tree roost removal, translocation of existing bat boxes and disturbance to Botley Road and Willow Walk bridge roosts, plus including any other roosts found in 2023.
- Compounds with night lighting will need to shield light spill to watercourses, treelines and woodland.
- Temporary flight guides will be installed over the works on Willow Walk.
- Where possible retain trees with high potential bat roost features in temporary work areas, if any of these can be retained they can be removed from the resurvey list for 2023.

1. Background

Oxford has a large number properties at the one percent (%) or higher risk of flooding each year. This number could rise significantly by the year 2080 with the predicted effects of climate change. Major roads, the railway line, schools and businesses could also be affected by flooding.

The Oxford Flood Risk Management Strategy, published in 2009, produced a detailed study of the flood risk from rivers in Oxford. The Strategy described how flood risk can be managed in Oxford over the next 100 years, in 3 phases.

The first phase included asset repairs and maintenance was completed in 2012.

The principal components of the scheme, which is this second phase of the Strategy, are improvements to approximately 4.5 km of the floodplain to the west of Oxford to better manage flood water away from properties. This may also be augmented by improvements to approximately 1km of other channels.

The scheme has the potential to result in impacts to features used by bats. As bats are a European Protected Species (EPS), adverse impacts upon their status need to be avoided and/ or addressed.

This plan is to ensure:

- Any bats using bat roosts or possible bat roosts in trees are not harmed during tree removal works
- Any works to structures (bridges or culverts) will take account of bats using them, where necessary adjusting timings and work methods at or close to the sites
- Known tree roosting sites will be lost these will be mitigated for by installing replacements of bat boxes
- Sufficient replacement roosts will be installed to account for undiscerned bats use of features in trees
- Bat flight routes and foraging areas will be maintained by planting and by temporary flight guides during construction

- Any necessary timing restraints during the programme will be included
- Monitoring will be undertaken before, during and after the scheme works

2. Introduction

This Flood Prevention scheme will cover an area 4.5km long stretching between Seacourt stream north of Botley Road to Kennington in the south, concentrating on west Oxford with links eastwards into the River Cherwell in New Hinksey.

The proposed scheme comprises the following:

- Construction of a new channel, between the A34 to the west and the railway to the east, to the west of Oxford city centre. The channel will extend south-easterly from the confluence of the Botley and Seacourt Streams lying approximately 0.6km north of Botley Road, to just south of Kennington (approximately 0.3km south of the A423 ring road). The new channel will carry flood flow from the Seacourt Stream, Bulstake Stream and Hinksey Stream channels during a flood event, thereby reducing the water level in the main River Thames and so reducing the frequency of flooding in built-up areas. The channel will comprise two stages:
 - New stream – this will be the inner part of the channel which will be permanently wet and carry flowing water all of the time; and
 - Second (or 'two-stage') channel – this will be created by lowering the ground between 0.6m and 1.2m to one or both sides of the first stage channel. The second stage channel will be dry for most of the time but when river levels are sufficiently high, water will flow along the second stage channel. This may occur regularly during wetter periods, especially during the winter months. During large flood events, the fields in the existing floodplain around the new channel will also continue to be inundated.
- In some local areas, a second stage channel will be constructed without a first stage channel and vice versa;
- Provision of new flood defences (embankments and walls) to protect houses which would otherwise continue to flood even with the reduced river levels;
- Provision of new culverts and bridges to cross highways and footpaths to maintain access routes;
- Installation of flood gates for access (open under normal, non-flood, conditions) through the new defences noted above;
- Creation of new and/or improved habitat for flora, fauna and fisheries, where it does not compromise flood defence or other environmental receptors. This habitat creation/restoration forms part of the integrated design of the Scheme to help mitigate habitat losses, to meet WER measures and support England Biodiversity 2020 habitat creation targets e.g. new wetland habitat within the footprint of the second stage channel, new channel connecting the Bulstake and Hinksey Streams, in-channel habitat improvements including scrapes, ponds and backwaters. The wetland features in the second stage channel will incorporate a variety of profiles and gradients, to include marginal shelves, steep banks and undulating bed profiles to maximise wetland habitat diversity; and

- Removal of Towles Mill weir to allow fish migration via Hinksey Stream.

Jacobs, previously CH2M, have been carrying out extensive ecological surveys and assessment on behalf of Environment Agency. For this Greena Ecological Consultancy has been carrying out surveys specifically for bats in 2016, 2017, 2018 & 2020 by a combination of tree inspection and bat detector activity surveys.

- Trees to be removed or very close to works features bats could use have been physically examined or assessed by carrying out up to three activity surveys (mainly ivy covered trees).
- Structures and buildings to either be directly affected by works or in very close proximity have been assessed by bat activity surveys for their use.
- Between May and September static bat detector recording surveys have been repeated at nine locations each month, plus monthly transect bat detector walking surveys covering the entire route on foot have been conducted.

Separate reports on tree inspection results for bats in 2016 (CH2M January 2017) Greena report for 2018 (Rush February 2018) and 2020 (Billington December 2020) form the core data this mitigation plan is based on. A number of scheme maps and designs, arboriculture reports (Middlemarch May 2017, November 2017 and February 2018) plus an updated ARBORICULTURAL IMPACT ASSESSMENT by Jacobs (December 2021). These have been consulted, as well as extensive discussion with and information from Peter Sketch Jacobs lead Environmental Scientist.

This mitigation plan is to address the impacts to bats using trees and structures (bridges and culverts) as roosting sites, and to ensure bats are not harmed during works, where appropriate licenses obtained and mitigation put in place to replace any loss of known roosts or high potential possible roosts. To mitigate and maintain bat flight routes affected by the scheme.

All trees north of Old Abingdon Road are proposed be felled in the 2023/24 winter, the remaining trees will be removed in September and October 2024.

3. Aims and Objectives

This mitigation plan is to address any potential bat use of trees and bridges and immediately adjacent buildings, to ensure bats are not harmed or disturbed during the works.

- An appropriate licence will be obtained and mitigation put in place to replace any lost roosts or high potential possible roosts.
- To ensure bat flight routes and foraging areas are either maintained or mitigated for in work areas during and after construction.
- To monitor bat activity during works and after construction to determine any changes occurring.
- Overall to ensure biodiversity is maintained in the area.

4. Site and Works Description

The entire site consists of low lying relatively flat land around the western and south western side of Oxford extending over approximately 4.5 km north to south with numerous interconnected side sections.

The majority of the land is grazed pasture, areas of amenity grassland, nature reserves, small areas of woodland, gardens, allotments and urban areas, these include North Hinksey, South Hinksey and New Hinksey villages and the urban edge of Oxford city itself.

The scheme includes a number of watercourses the main ones being: The River Thames (Isis), Seacourt Stream, Hinksey stream, Bulstake Stream, Botley Stream, Weirs Mill Stream and Hogacre Ditch. No buildings are being demolished. West Way cycle bridge, south of the A420 Botley Road is the only bridge to be replaced.

Overall working hours will be 8am to 6pm the only exception being to works creating new culverts under Old Abingdon Road and Kennington Road that may involve a few months of 24hr working, 7 days a week working. This is to avoid a year of road closures which is likely to be opposed by the County Council.

With exception of a few other specialist activities the major excavations will be restricted to April to October due to the ground being too wet for earthworks in winter.

All trees north of Old Abingdon Road are proposed be felled in the 2023/24 winter, the remaining trees will be removed in September and October 2024.

Currently around 2000 trees will be removed including 361 individual trees, 78 groups of trees and 57 parts of groups of trees, a large proportion are pollard Willows.

The following scheme maps are for illustration as they cover such large areas and so much detail the resolution is low. Refer to specific design drawings for higher resolution details.

Overleaf in Figure 1 is the red line overall area of the scheme.

Overleaf in Figure 2 is the breakdown of different areas within the red line of: construction areas, compounds, soil storage areas, temporary access tracks, plus areas of habitat creation including MG4, shrub and tree planting.

Figures 3 – 22 show the results of a Tree categorisation and Tree Quality Assessment. Trees are categorised using guidance BS5837, which can be summarised as:

- A Category Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years;
- B Category Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years;
- C Category Trees of low quality and value currently in adequate condition able to remain until new planting can be established. These trees are expected to remain for a minimum of 10 years. It also includes young trees with a stem diameter less than 150mm measured at 1.5 metres above ground level; and
- U Category Trees in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural or forestry management.

In addition, BS5837 provides subcategories 1-3 within the category system outlined above which indicate the area(s) in which a tree or group retention value lies:

- 1. Mainly arboricultural.
- 2. Mainly landscape.
- 3. Mainly cultural, including conservation

This tree assessment can aid in the identification of trees which may be suitable for protected species, in particular bats.

Oxford FAS Bat Mitigation Plan

Figure 1 Site Plan of work areas

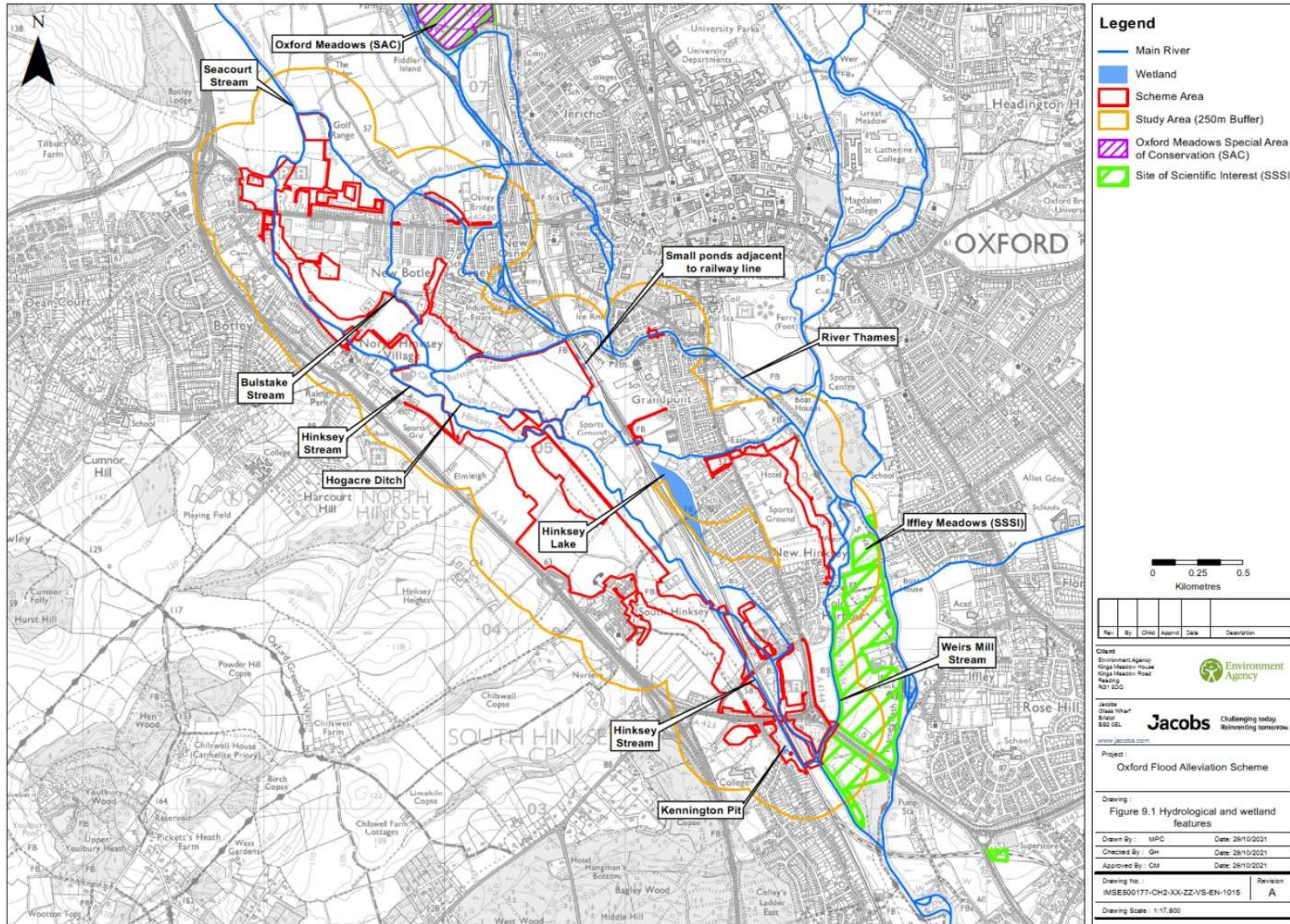


Figure 2 Breakdown of works and mitigation areas

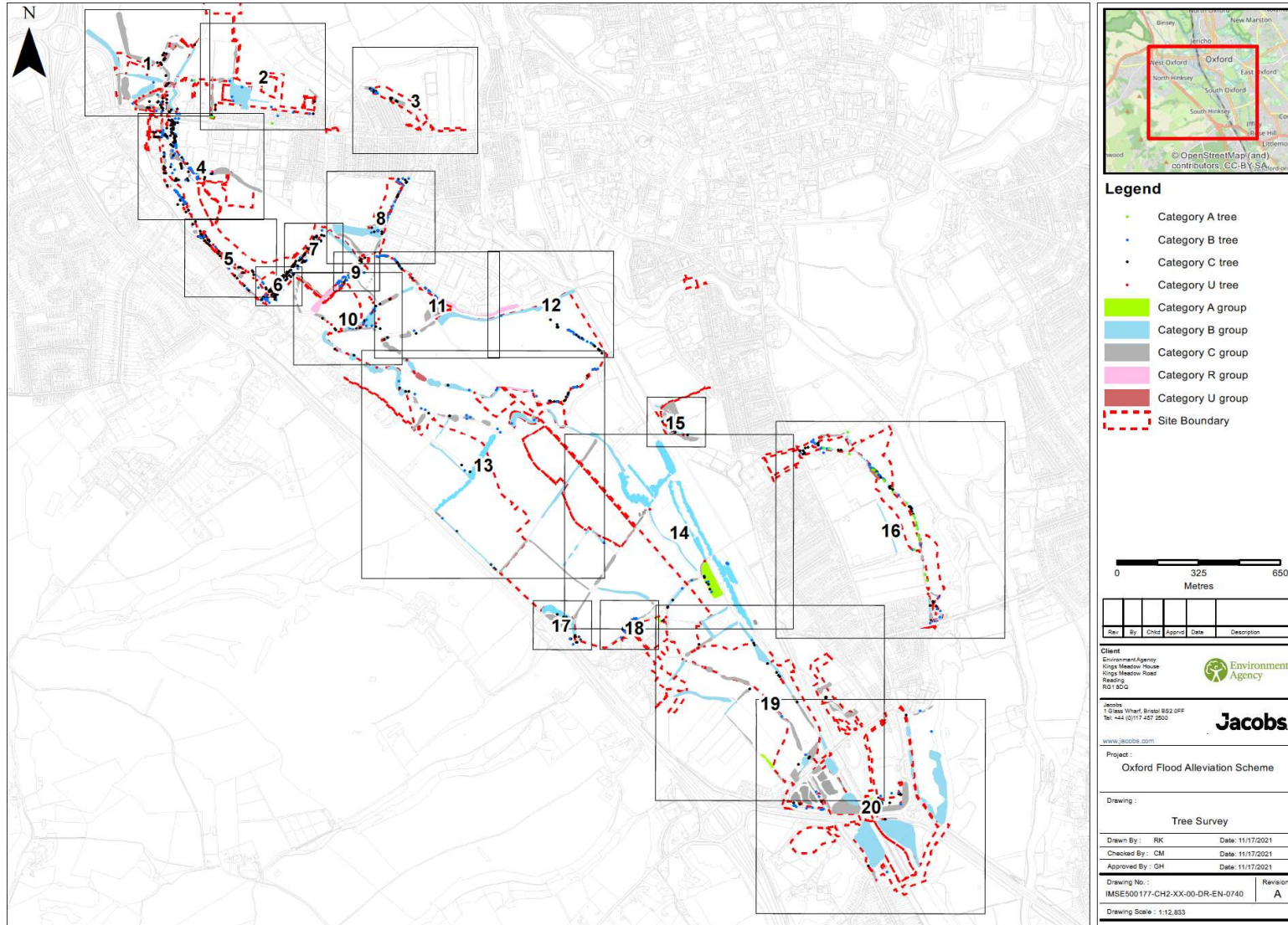
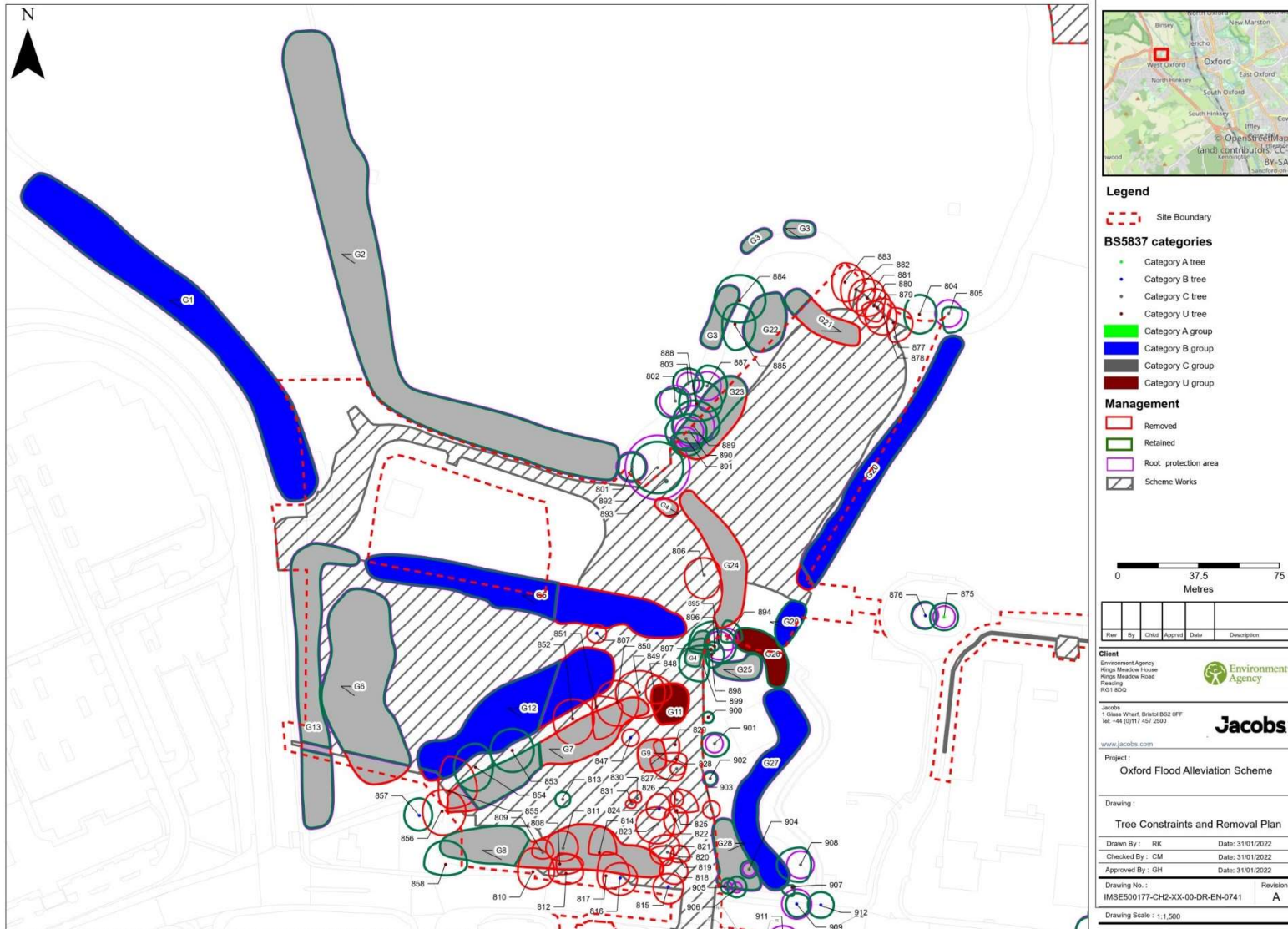


Figure 3 Area 1 west New Botley works areas



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Oxford FAS Bat Mitigation Plan

Figure 4 Area 2 east New Botley works areas

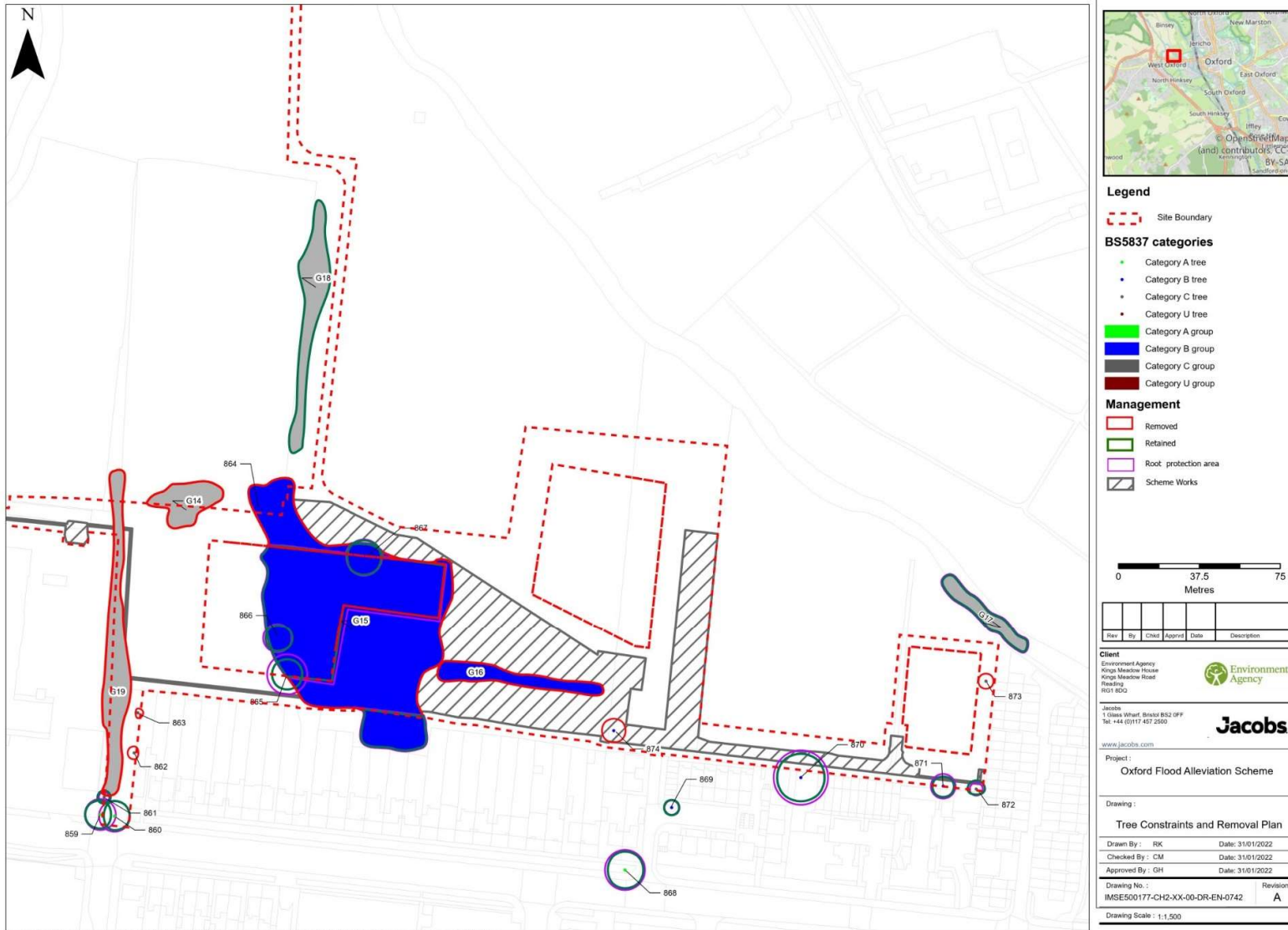
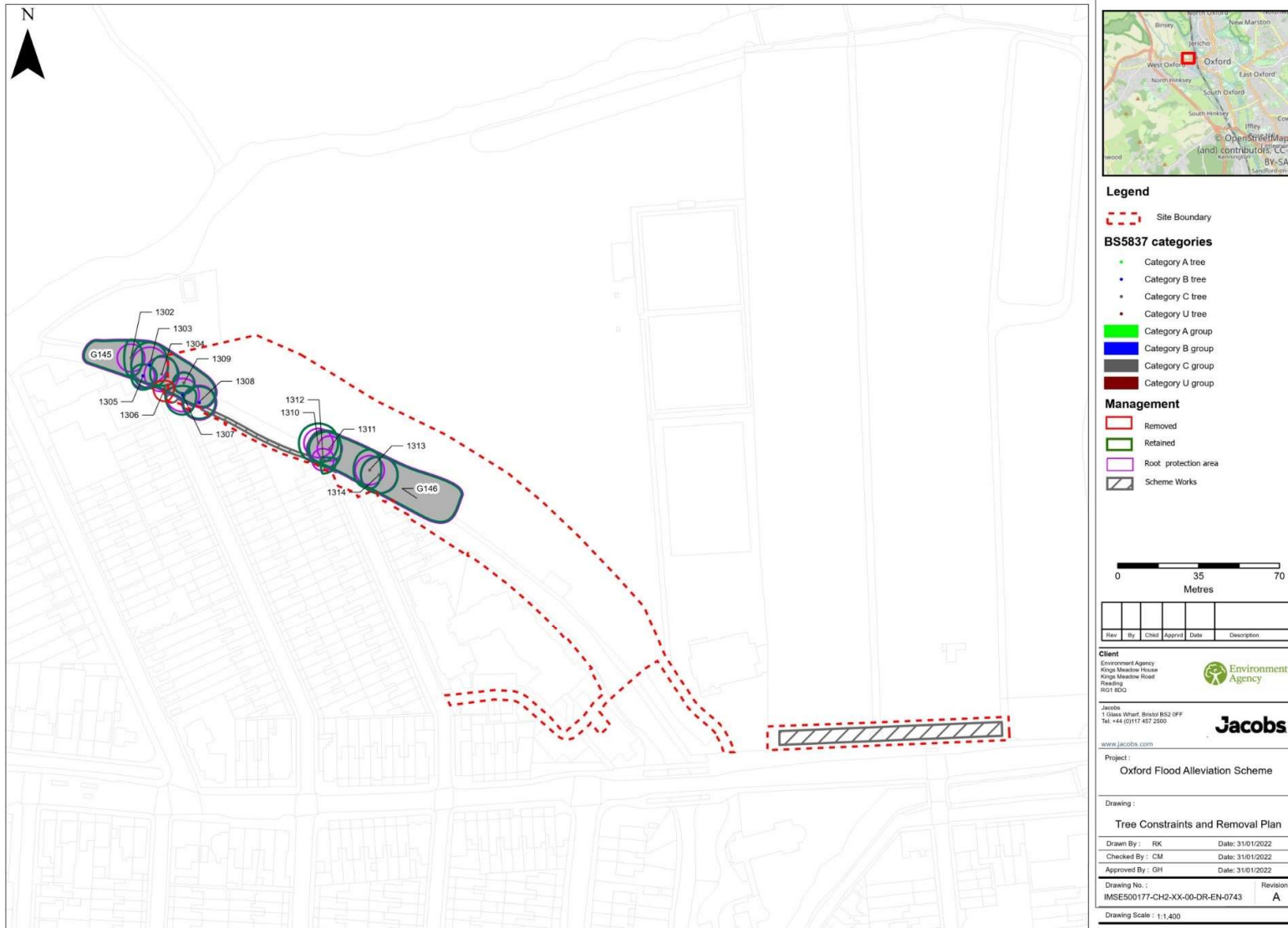


Figure 5 Area 3 north Osney Mead



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Figure 6 Area 4 south New Botley

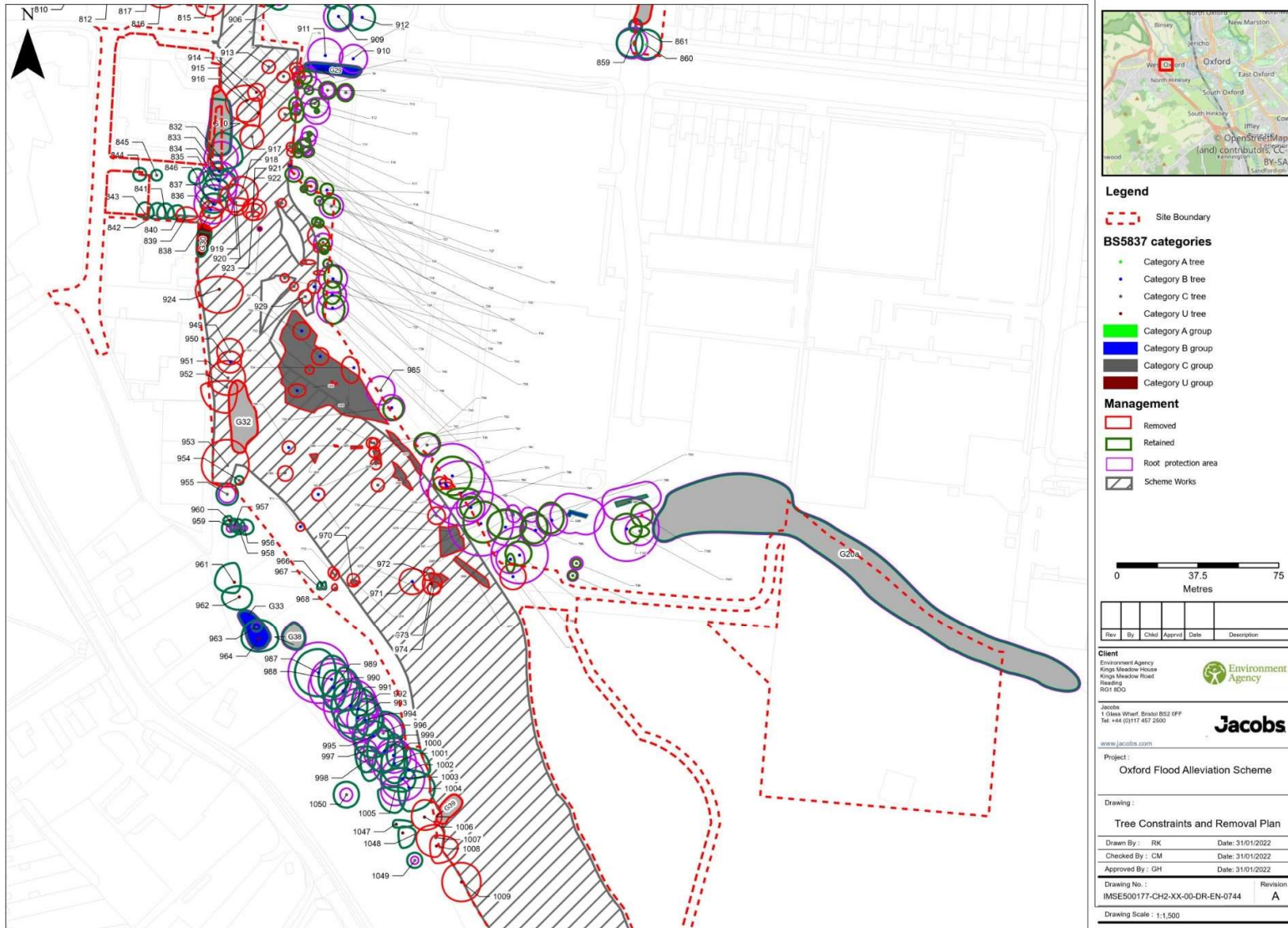


Figure 7 Area 5 north North Hinksey

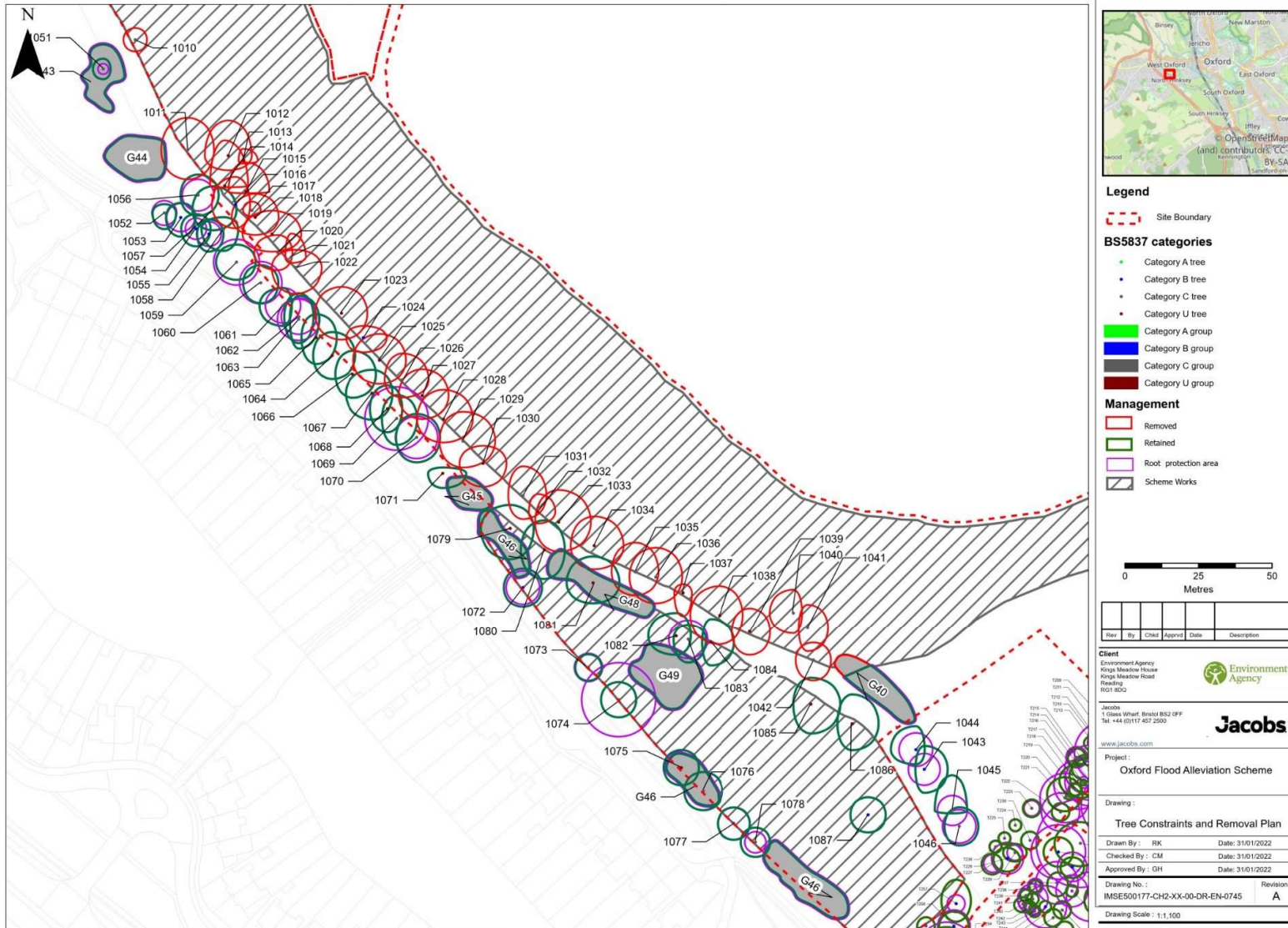


Figure 8 Area 6 west Willow Walk

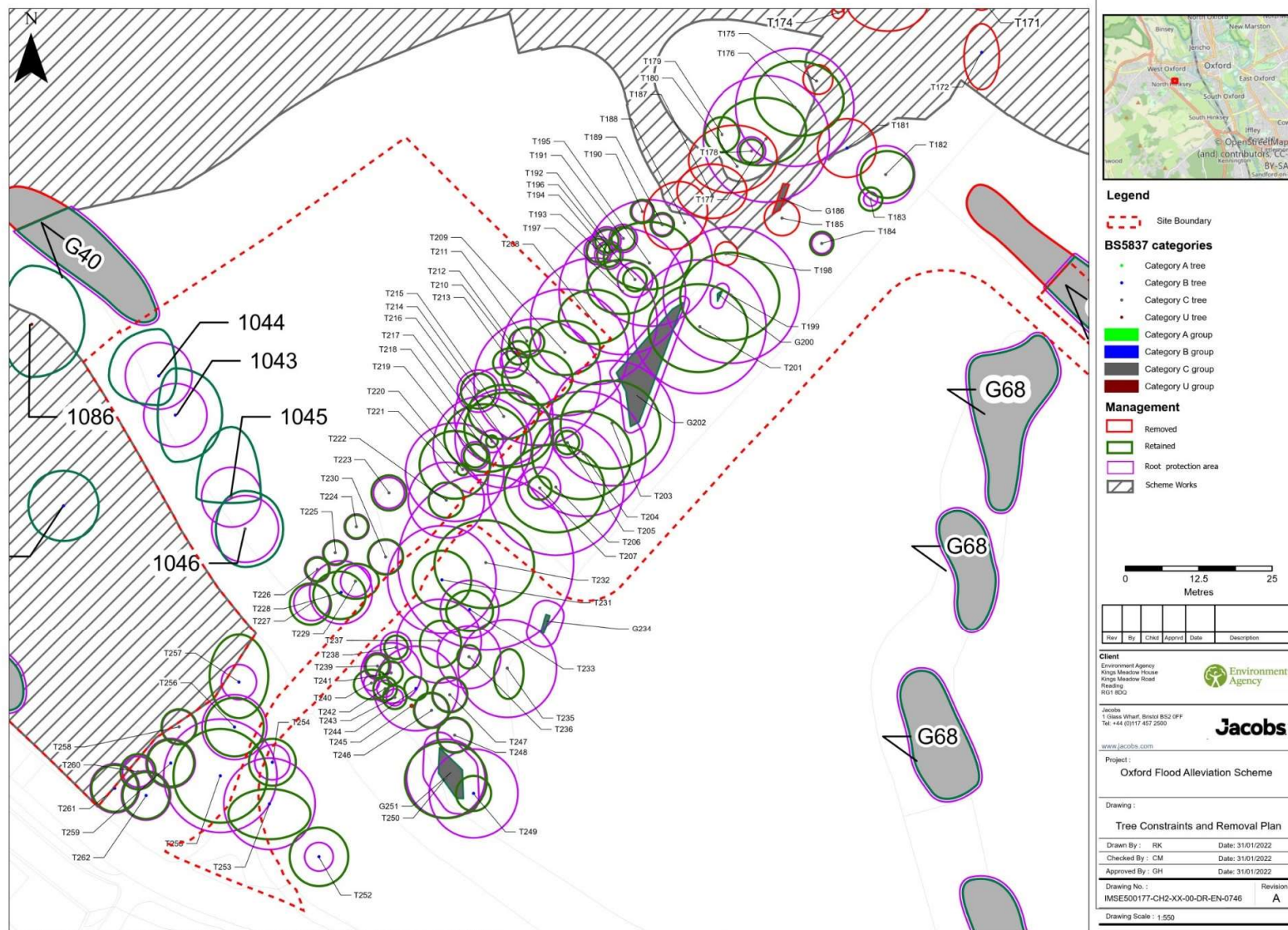


Figure 9 Area 7 east Willow Walk

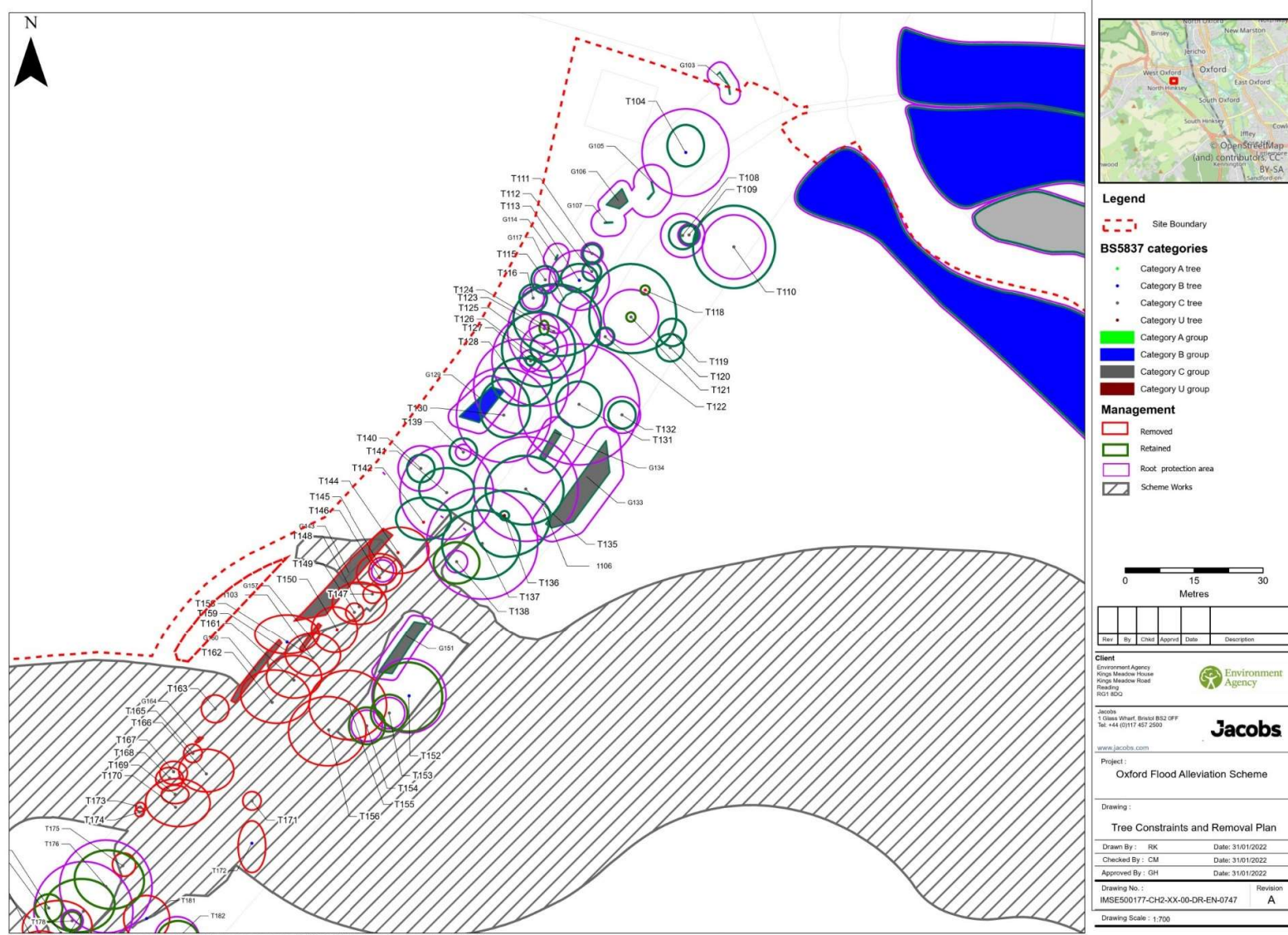


Figure 10 Area 8 central Osney Mead



Figure 11 Area 9 west Osney Mead

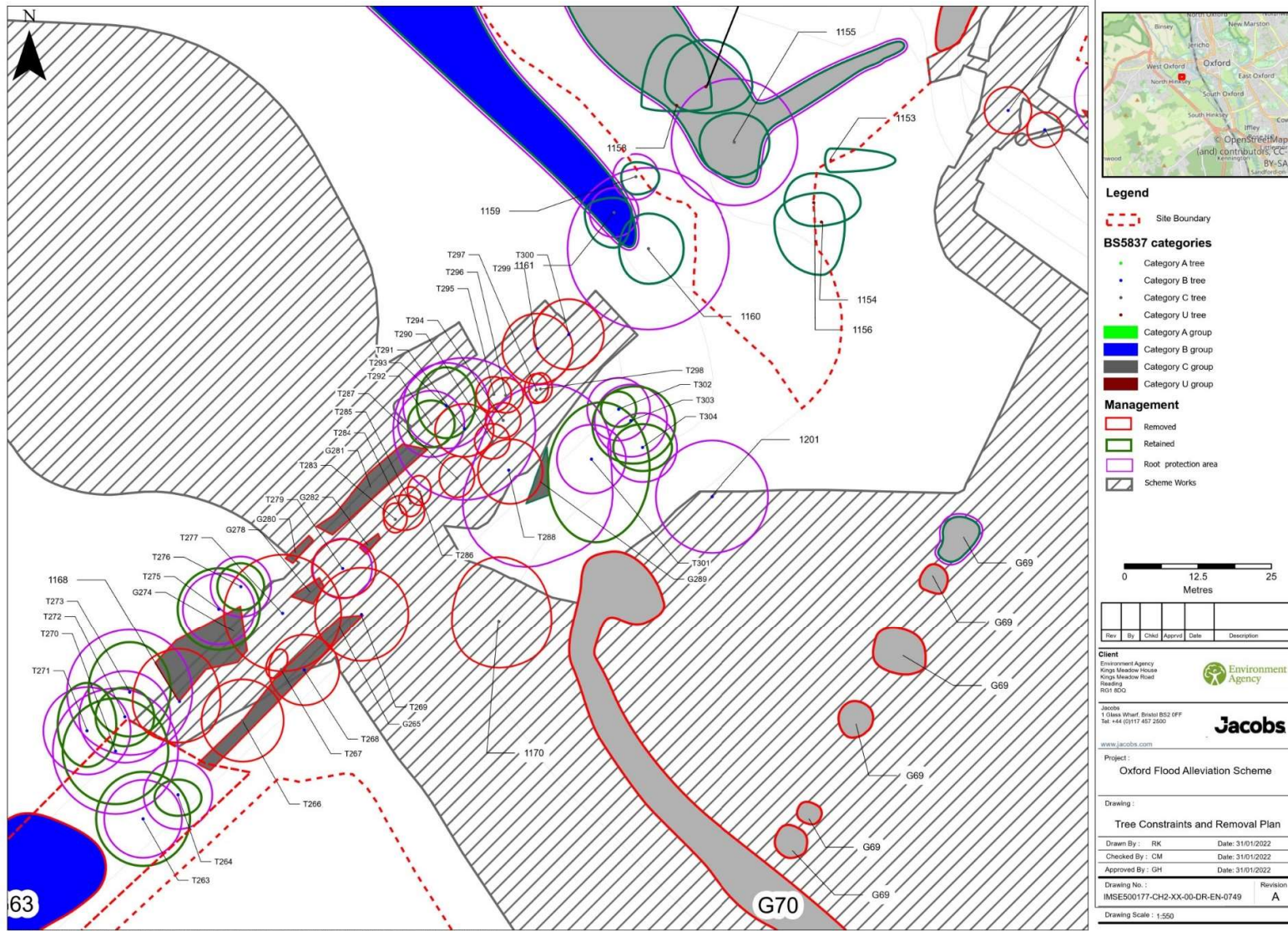


Figure 12 Area 10 south North Hinksey

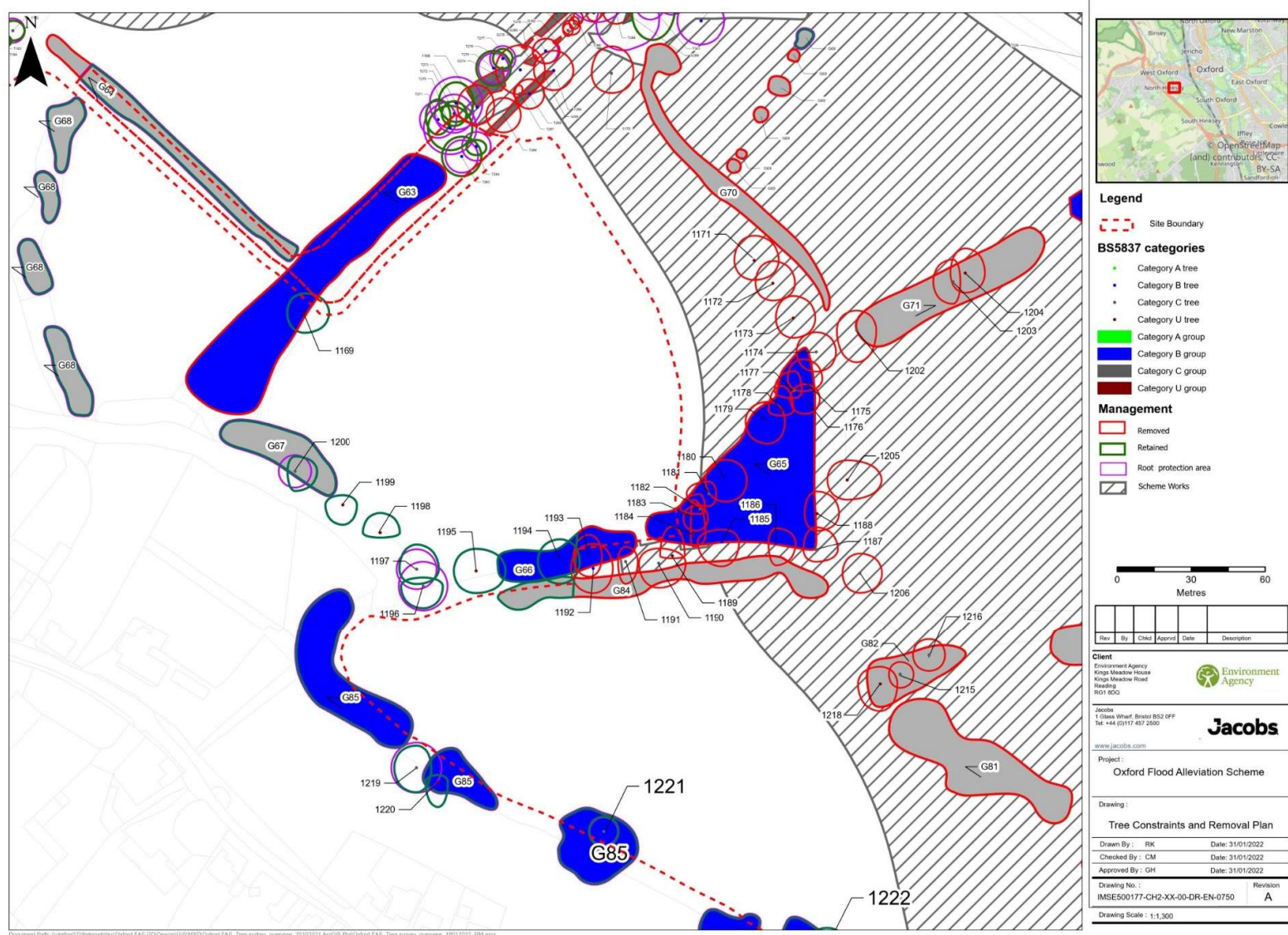


Figure 13 Area 11 south Osney Mead

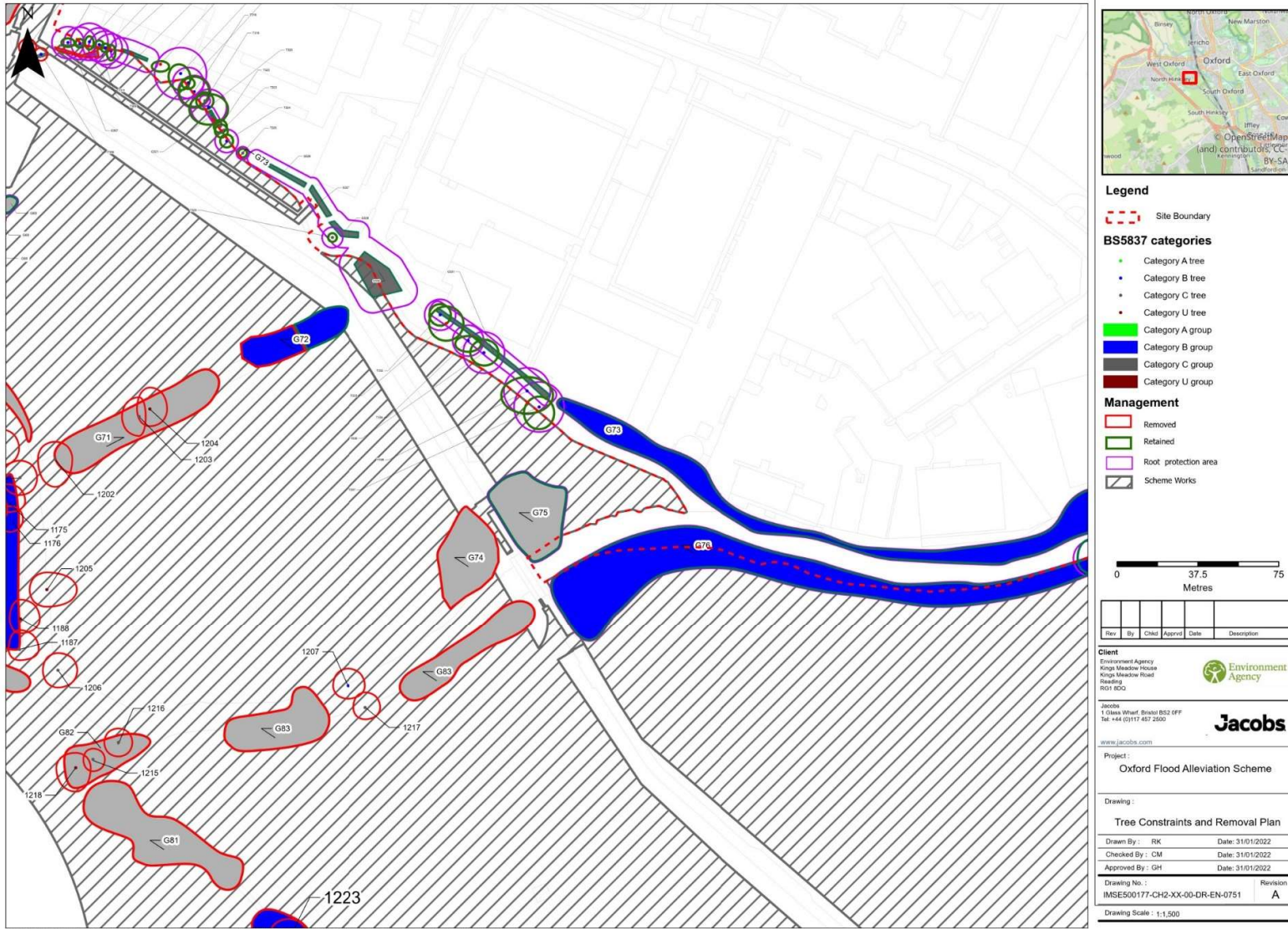


Figure 14 Area 12 east Osney Mead

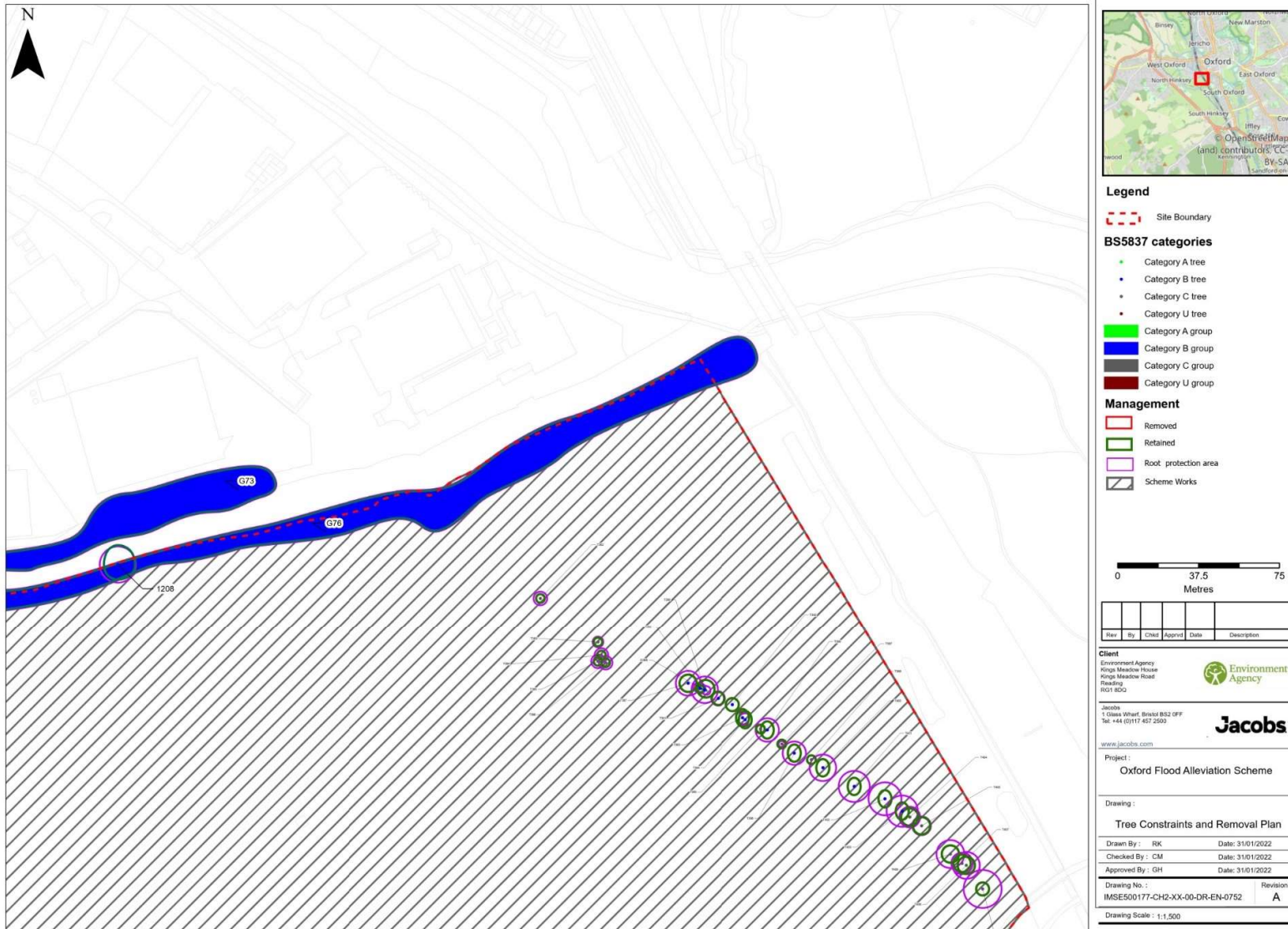


Figure 15 Area 13 Hinksey stream

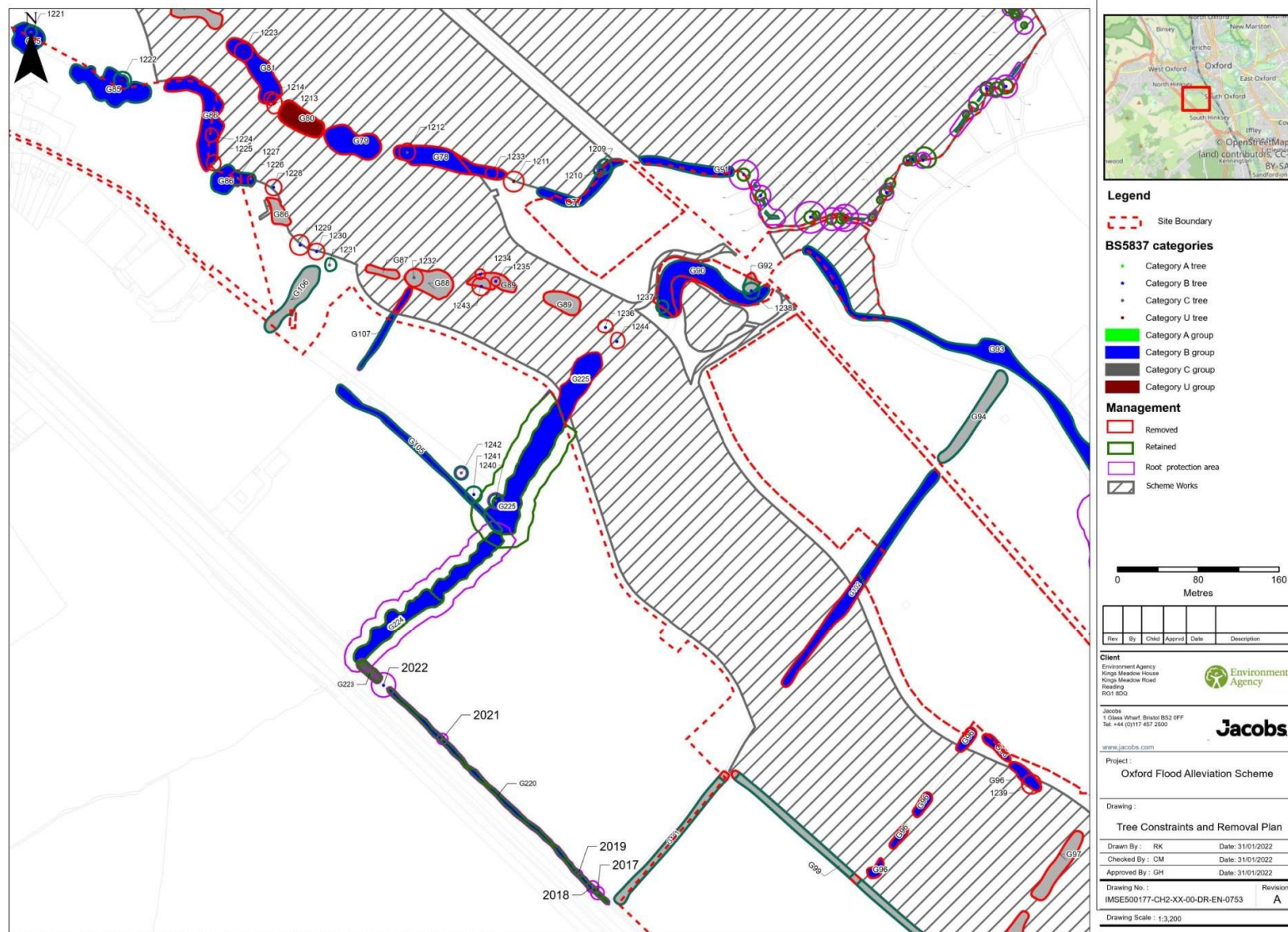


Figure 16 Area 14 south of Hinksey stream

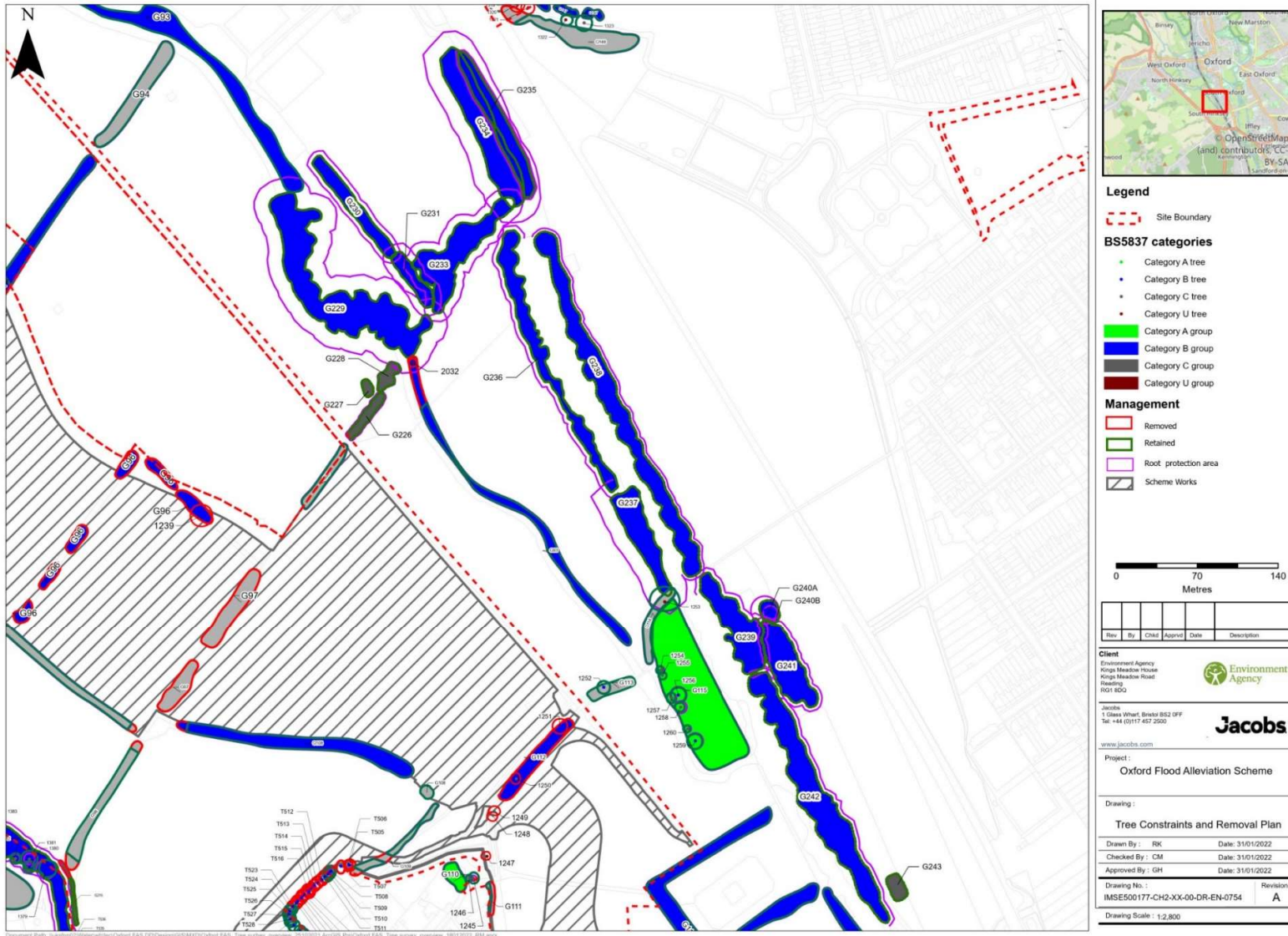


Figure 17 Area 15 Grandpont

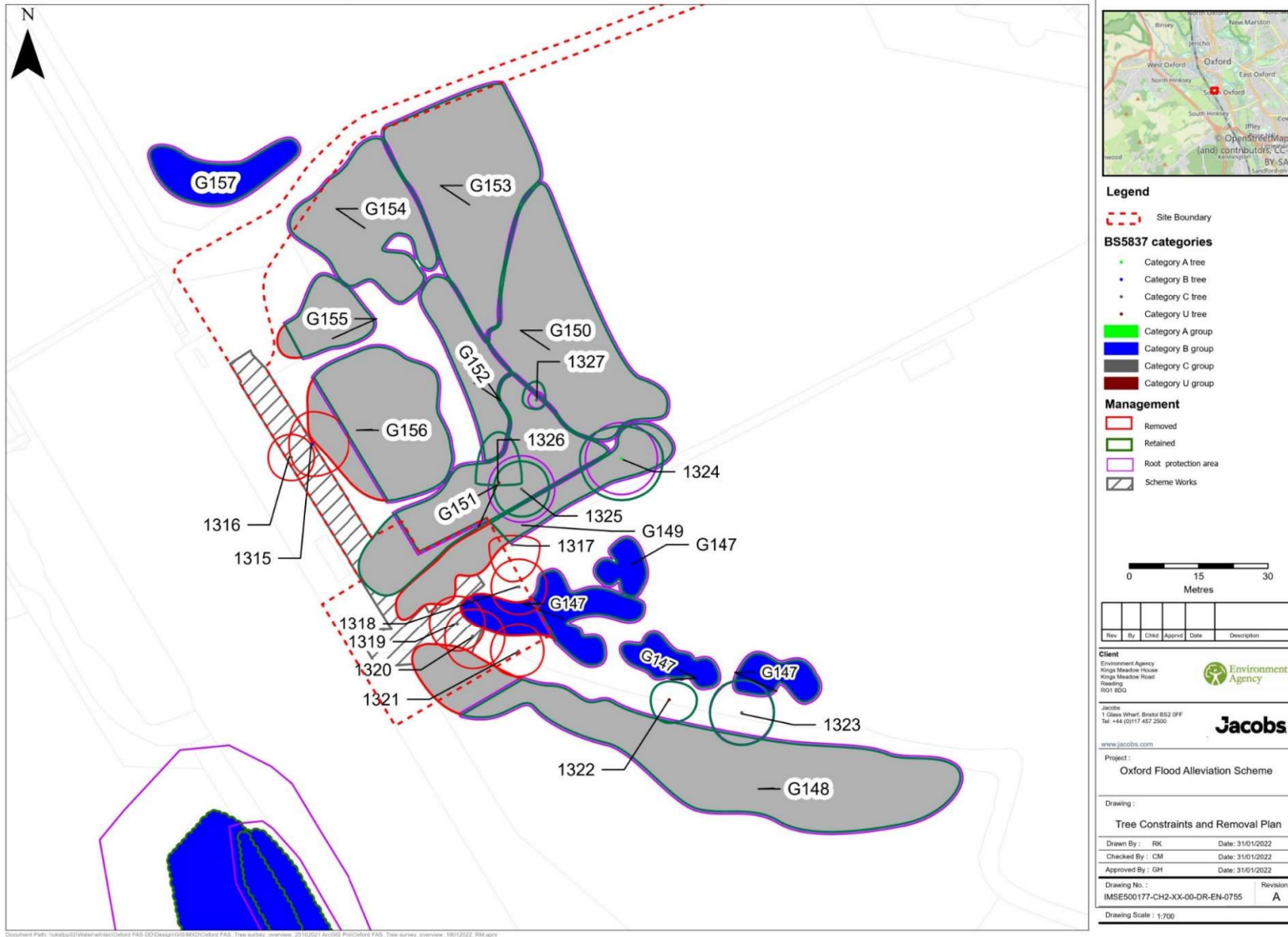


Figure 18 Area 16 New Hinksey

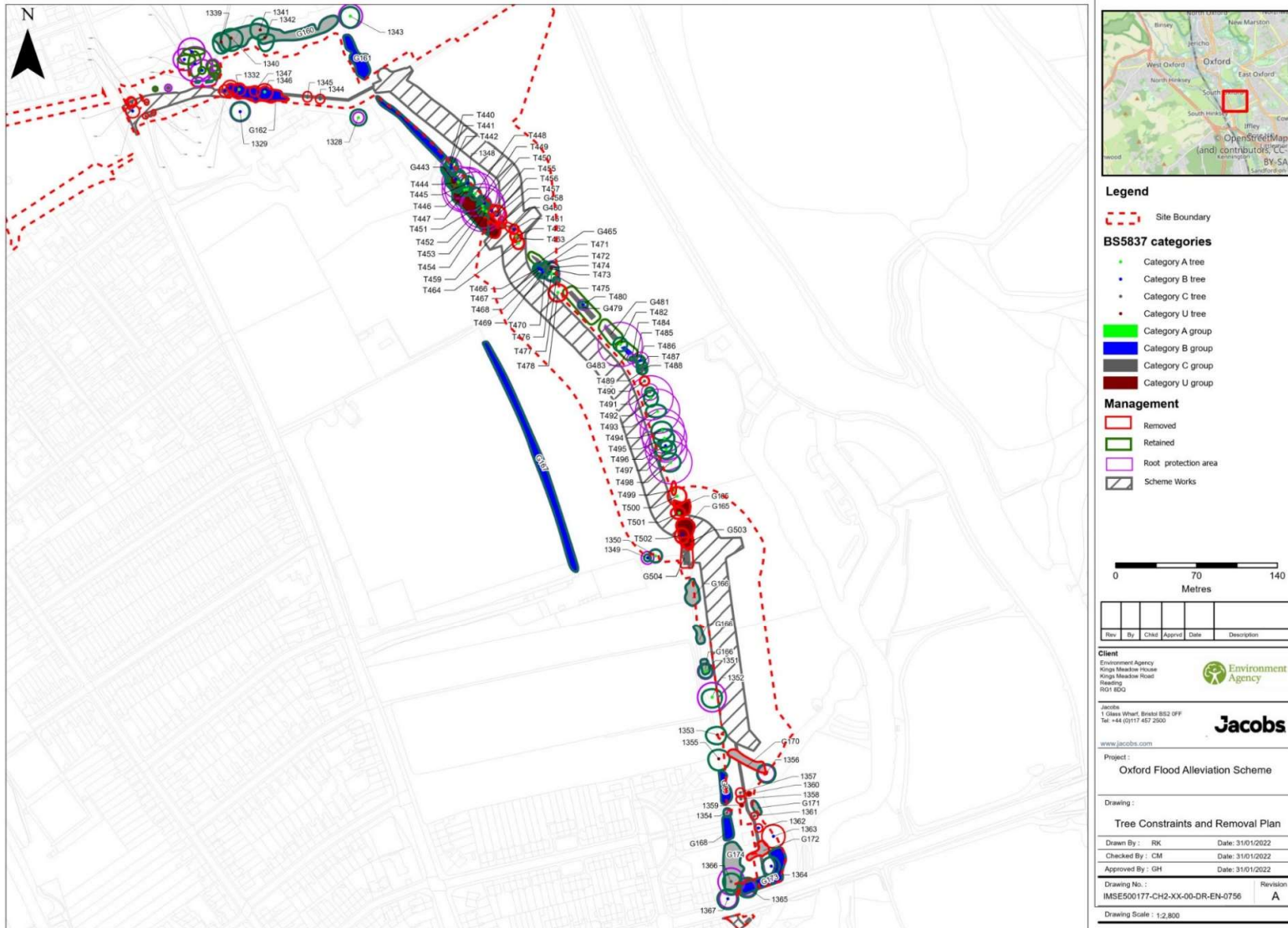


Figure 19 Area 17 A34 South Hinksey interchange

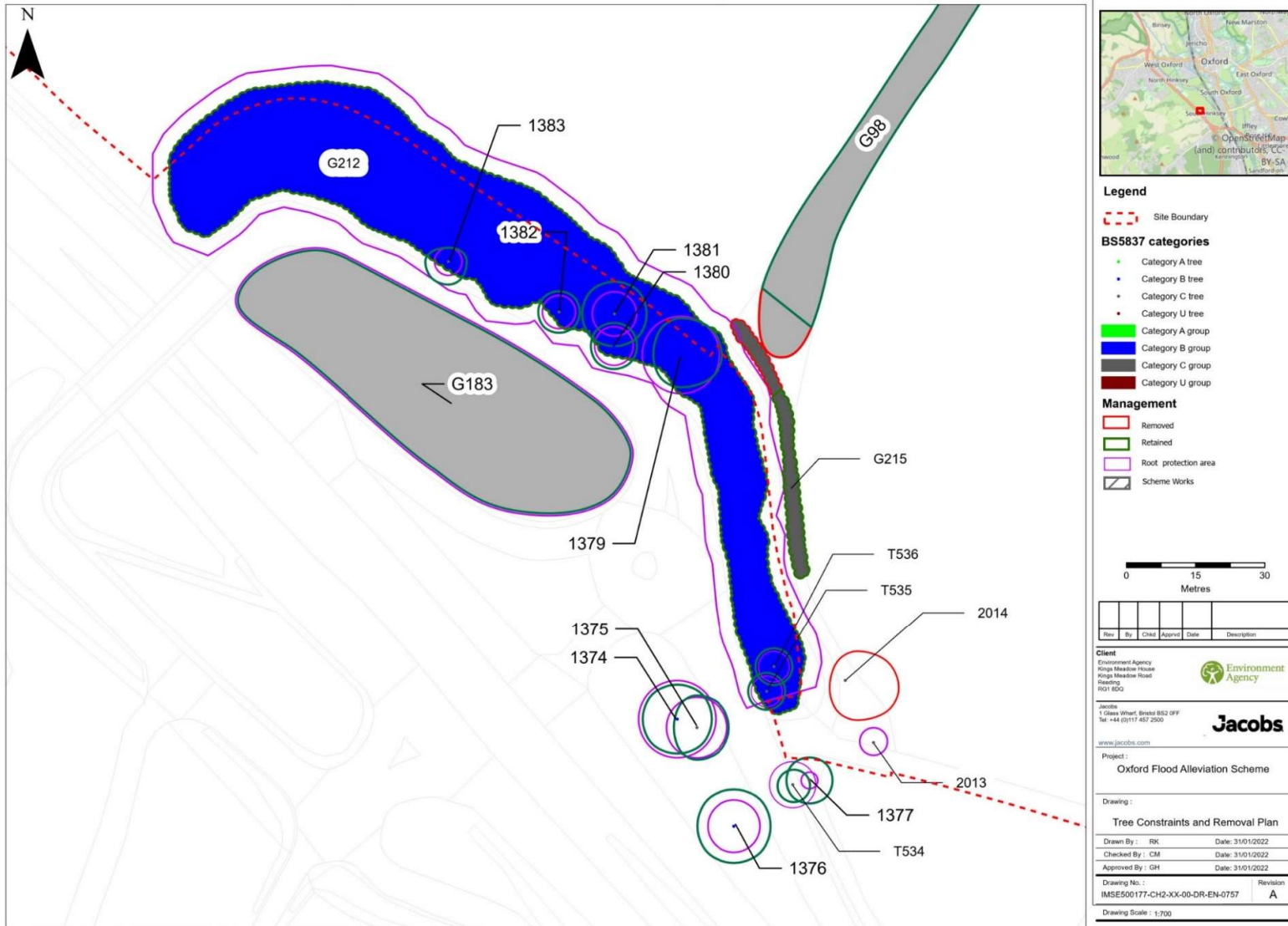


Figure 20 Area 18 north of South Hinksey

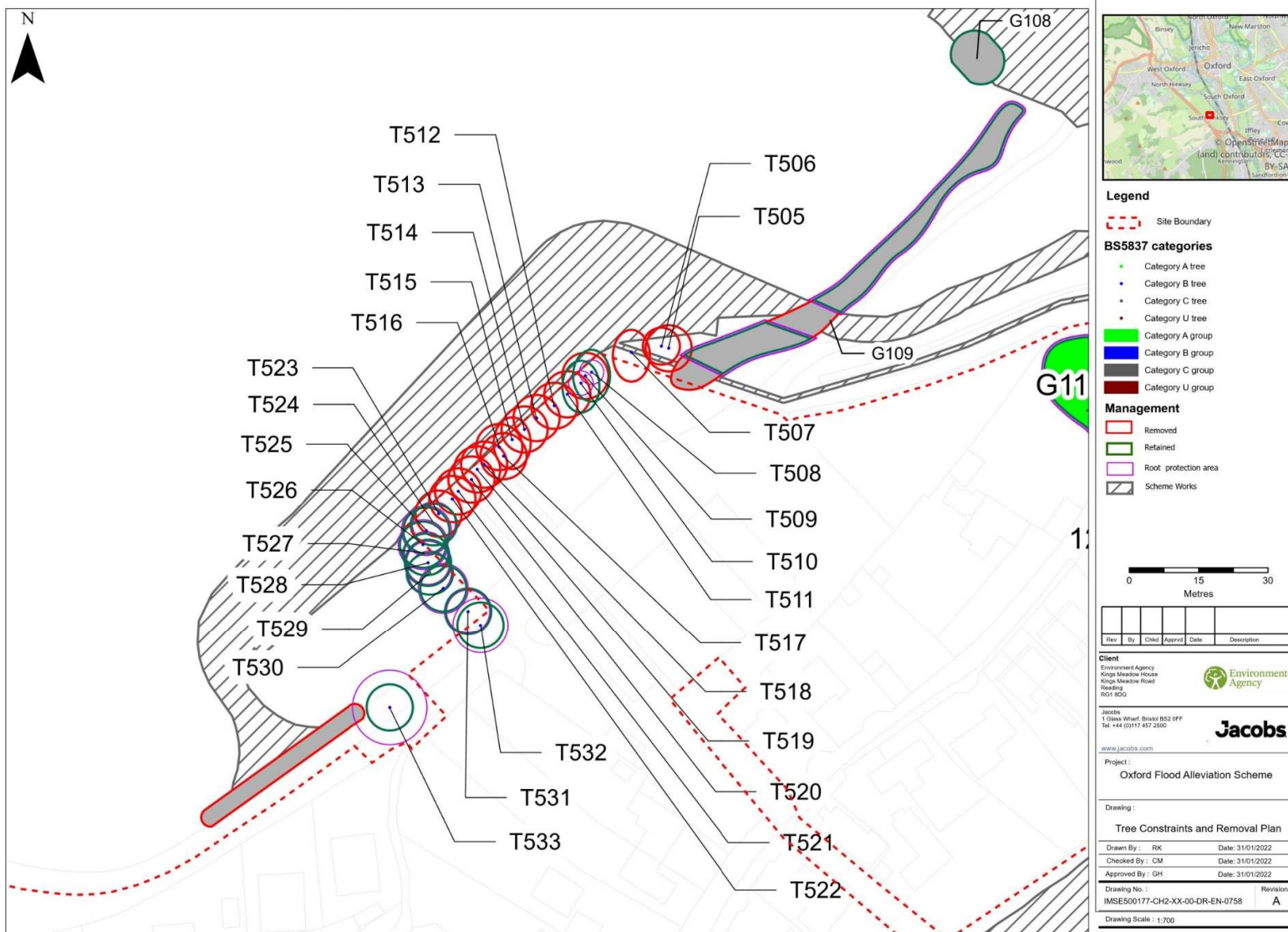


Figure 21 Area 19 South Hinksey

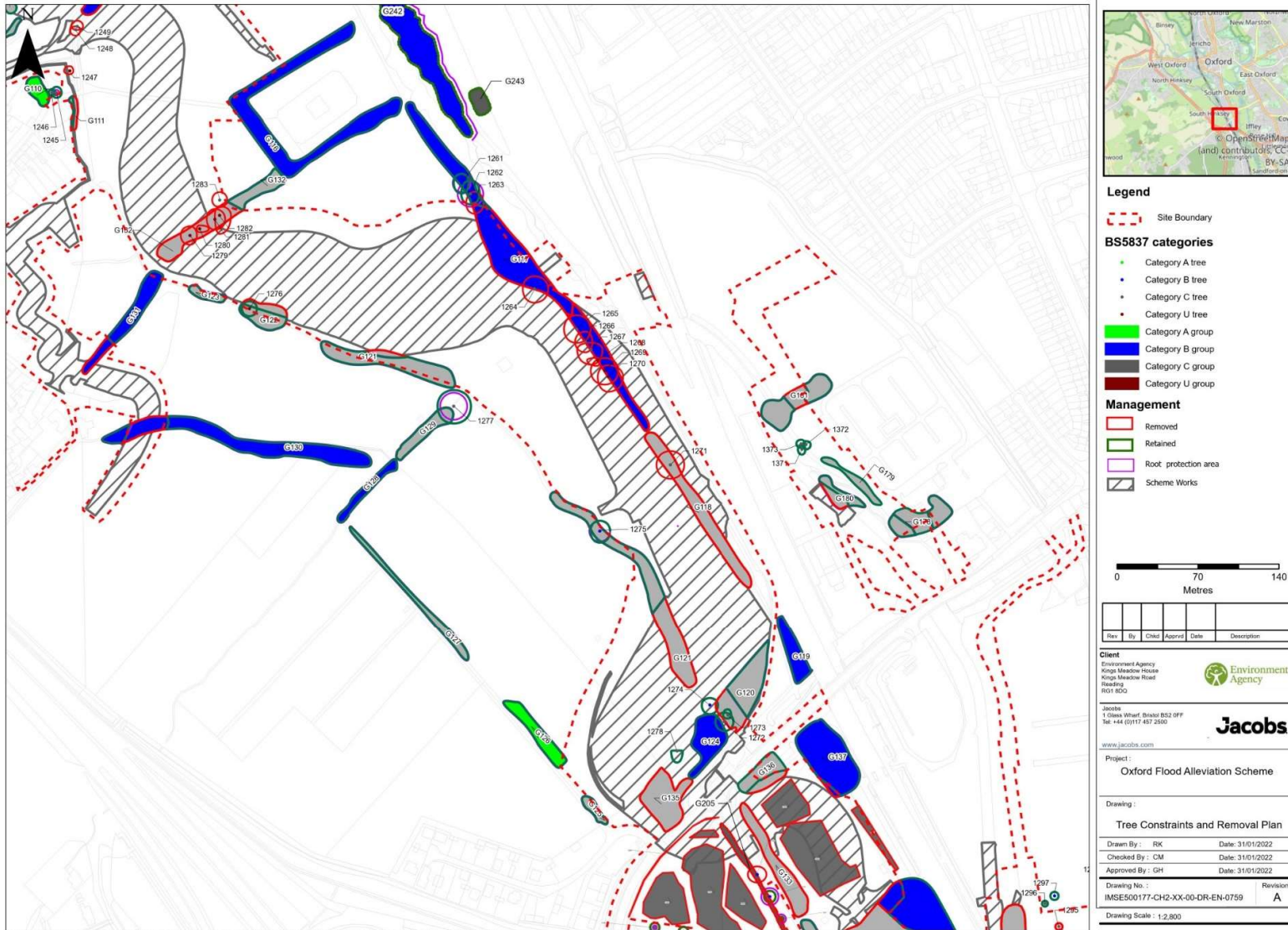
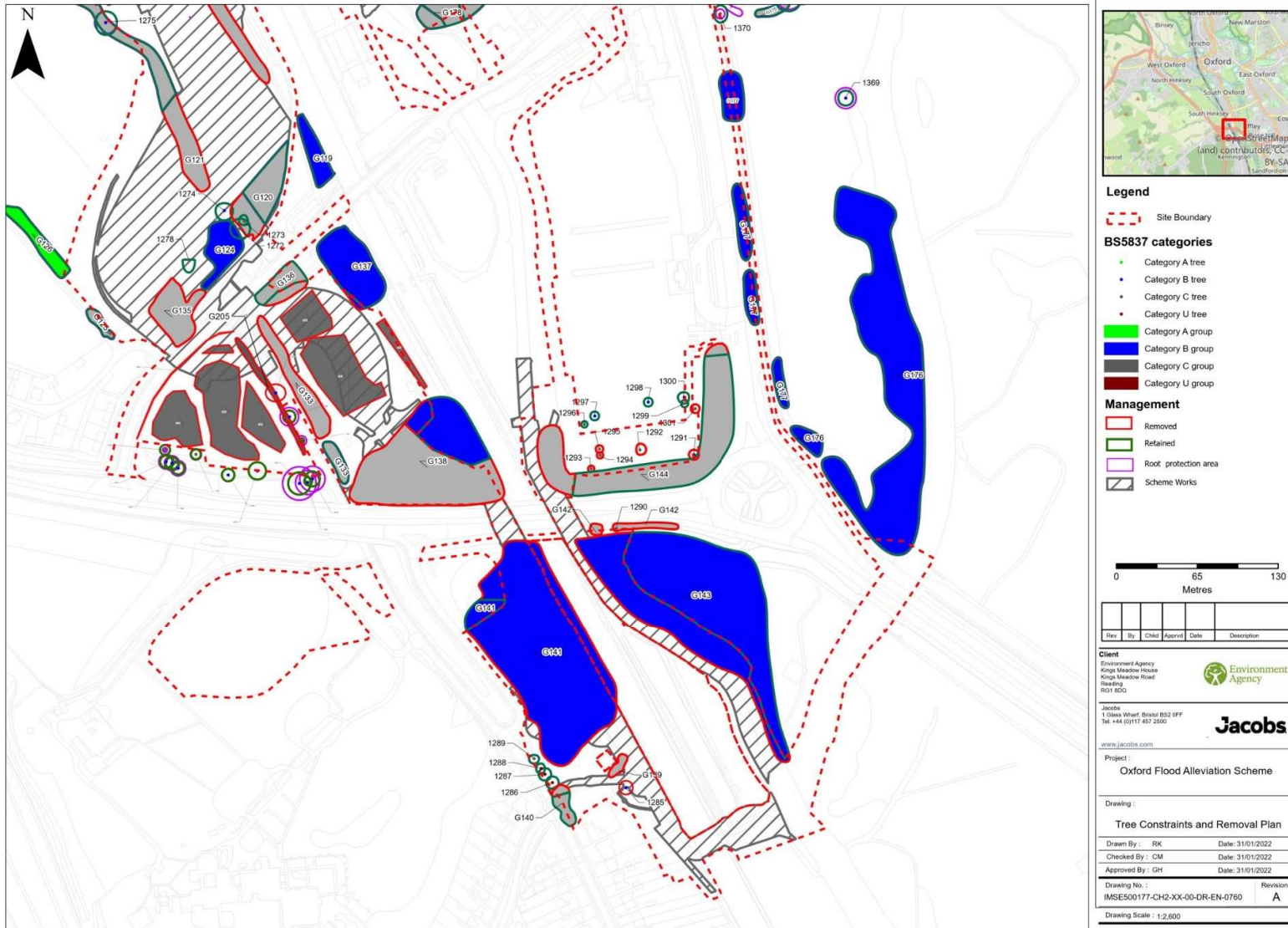


Figure 22 Area 20 Cold Harbour



5. Methods of Assessment

Greena Ecological Consultancy carried out surveys specifically for bats in 2016, 2017, 2018 & 2020 by a combination of tree inspection and bat detector activity surveys (Rush February 2018 & Billington 2020).

- Trees within or very close to works with features bats could use have either been physically examined or assessed by carrying out up to three activity surveys (mainly of ivy covered trees). This collection of trees is from a combination of phase I surveys by CH2M in 2016 and Greena in 2017, 2018 & 2020 identifying trees with potential features.
- Structures and buildings either directly affected by works or in very close proximity have been assessed by bat activity surveys for their use.
- Between May and September static bat detector recording surveys have been repeated once a month June – September 2017 at nine locations each month.

Monthly transect bat activity walking surveys covering the entire route on foot have been conducted twice a month from late May until the end of September 2017.

These surveys give a detailed picture of bat activity through the active season across the works area. In addition, the tree inspections and assessment by activity surveys of trees, bridges and building give a robust evaluation of whether they contain features bats could use and those actually occupied by bats during surveys.

Trees surveyed in 2017 requiring further activity survey to complete their assessment were surveyed in 2018, a repeat of inspections and activity surveys was carried out in 2020. In the summer before tree felling is carried out (currently 2023) all affected trees with bat potential will be re-inspected and repeat activity surveys, plus static monitoring of overall scheme area will be repeated.

Where any confirmed bat roosts are to be lost or subject to disturbance above licence threshold, an EPS licence will be obtained from Natural England.

TREES

Trees to be removed, at risk of removal or very close to works areas have been identified by CH2M (CH2M November 2016) and by Greena in 2017, 2018 & 2020. These have all been subject to ground level assessment and then where necessary they have been inspected from ground level (when they have actual or potential bat roost features), by ladder or by tree climbing techniques by Greena Ecological Consultancy. All trees that have been inspected with the exception of ivy covered trees that are not practical to examine and odd features that cannot safely be inspected due to tree instability, no ladder or rope anchor points or hanging dangerous limbs.

Table i Trees identified from phase I surveys within the scheme with potential bat features for detailed assessment or multiple activity survey

Year	No. with features detailed inspection	Multiple activity surveys
2016	14 trees	-
2017	81 trees	32 trees originating from 2016
2018	47 trees Re-inspection of all inspectable trees with bat potential from 2016 & 2017 Plus any new trees arising from scheme changes in 2018	26 trees 19 from initial inspection survey in 2017 and 7 others re-survey of those already surveyed in 2017 originated from 2016
2020	Re-inspection of all inspectable trees with bat potential from 2016, 2017 & 2018 Plus re-inspection of trees and any new trees arising from scheme changes in 2020 in total 110 trees	27 trees

The actual trees being removed or trimmed has been refined as the detail of works has progressed. If more trees are added these will be assessed and where necessary surveyed in 2023.

Trees being removed are listed in an Arboricultural Impact Assessment report (Middlemarch November 2017); full tree details are contained in a detailed Pre-development Arboricultural Survey (Middlemarch May 2017) and updated Arboricultural Survey (Jacobs December 2021).

All trees listed for felling or being trimmed were re-inspected or had repeat activity surveys in 2018 & 2020; a few from 2017 are having their first activity surveys carried out in 2018.

BRIDGES & BUILDINGS

No buildings are being removed. West Way cycle bridge, south of the A420 Botley Road is to be replaced, with works around, under or next to other bridges taking place. Several of these bridges and buildings were identified as possible bat roosts by CH2M in 2016 (CH2M November 2016).

Table ii below shows the bridges and one building where surveys were conducted.

Initially seven bridges and one building were selected for repeat activity survey. This was reduced to five bridges and one building due to one bridge being determined to have no bat potential and another not being impacted by works.

Repeat surveys by multiple surveyors were carried out in 2017 these were repeated in 2018 & 2020.

Table ii Bridges and Building identified from phase I surveys as having bat potential subject to repeat activity survey

Year	Bridge or building	Location
2017	Richer Sounds sound equipment outlet, building	Adjacent to Seacourt Stream and Botley Road bridge, in Botley
	Botley Road bridge	Over Seacourt Stream, in Botley
	Stone bridge on Willow Walk	North Hinksey
	Red bridge, Old Abingdon Road	Redbridge
	A423 southern bypass bridge	Redbridge

	Rail bridge	Kennington, 0.28km south of A423
2018	All above repeat surveys	All
2020	All above repeat surveys	All

BAT TRANSECT & STATIC ACTIVITY SURVEYS

Static bat detector surveys were conducted at nine locations to get a detailed picture of bat activity. Surveys were carried out every month, from June to September in 2018. As well as discerning activity levels of different species the repeat surveys facilitate seasonal changes in species occurrence and allow repeat monitoring to be done during and after construction.

This will be repeated 2023 before works start.

To cover the overall works areas fully transect surveys at night were carried out by two surveyors in 2018. These were walked along most boundaries within the works area, beside treelines, hedges, watercourses, pathways, twice a month June to September and also once in May.

No further transect surveys are proposed before, during or after works.

6. Summary Results

Full details of results are contained in the main 2018 & 2020 reports (Rush February 2018 & Billington 2020).

A summary of species recorded during different types of survey is shown in table iii below. In total 12 species were recorded over all types of surveys.

Table iii Species recorded

Transects	Emergence surveys	Static detectors
<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pipistrellus</i>
<i>Pipistrellus pygmaeus</i>	<i>Pipistrellus pygmaeus</i>	<i>Pipistrellus pygmaeus</i>
<i>Nyctalus noctula</i>	<i>Pipistrellus nathusii</i>	<i>Pipistrellus nathusii</i>
<i>Plecotus sp.</i>	<i>Nyctalus noctula</i>	<i>Nyctalus noctula</i>
<i>Myotis sp.</i>	<i>Eptesicus serotinus</i>	<i>Myotis daubentonii</i>
<i>Myotis nattereri</i>	<i>Plecotus sp.</i>	<i>Myotis nattereri</i>
<i>Myotis daubentonii</i>	<i>Myotis sp.</i>	<i>Myotis mystacinus / brandtii</i>
<i>Myotis alcaethoe / emarginatus</i>	<i>Myotis nattereri</i>	<i>Myotis alcaethoe</i>
<i>Rhinolophus hipposideros</i>	<i>Myotis daubentonii</i>	
<i>Barbastella barbastellus</i>	<i>Myotis mystacinus / brandtii</i>	
	<i>Rhinolophus hipposideros</i>	

Alcaethoe bat can be reliably identified by Batcorder static recorder auto identification software but manual identification results cannot always differentiate between Alcaethoe bat and Geoffroy's bat. Both species are regularly recorded in the south of England. Alcaethoe bat are breeding in the south east, though Geoffroy's bat have only been recorded sparsely.

Two species, Barbastelle and Lesser horseshoe bat, were recorded which are protected under Annex II of the Conservation of Habitats and Species Regulations 2017. This means that populations require special protection measures and designation of Special Areas of Conservation within the Natura 2000 network.

TREES

110 trees were inspected in 2020. Of these, 44 trees have moderate, high or confirmed bat potential due to be removed or trimmed.

Two trees have been confirmed to be bat roosts: tree no. 81 two Long-eared bats roosted there both on 2nd August & 15th September 2017, and tree no. 94 bat droppings were found in a cavity (Rush February 2018). Both trees are in the south of Redbridge close on the edge of Hinksey Stream in area 4.

Also one of two trees either tree 84 (T199) or 90 (T184) on Willow Walk were used as a lekking roost by a Common pipistrelle bat in 2018, in the current proposals in December 2021 these will be retained.

Bat activity surveys were carried out of 27 trees in 2020.

BRIDGES & BUILDINGS

Repeat activity surveys were carried out at five bridges and a building in 2020.

Bats roosts were found in three bridges: Kennington Rail Bridge (2x Common pipistrelle Aug 2020), Willow Walk packhorse bridge (droppings July 2020), Southern bypass bridge (1x Soprano pipistrelle Pipistrellus pygmaeus in 2020), also Botley Road Bridge is a probable lekking roost (of Common pipistrelle bats).

BAT TRANSECT & STATIC ACTIVITY SURVEYS

Bat transects recorded ten species. Results are shown in Figures 12 & 13 above.

Greatest concentrations of records occurred along Seacourt and Hinksey streams, Willow Walk and treelines around it, watercourses and treelines around South Hinksey and treelines and ditches in New Hinksey.

Figure 23 North half of scheme transect results from all seven surveys

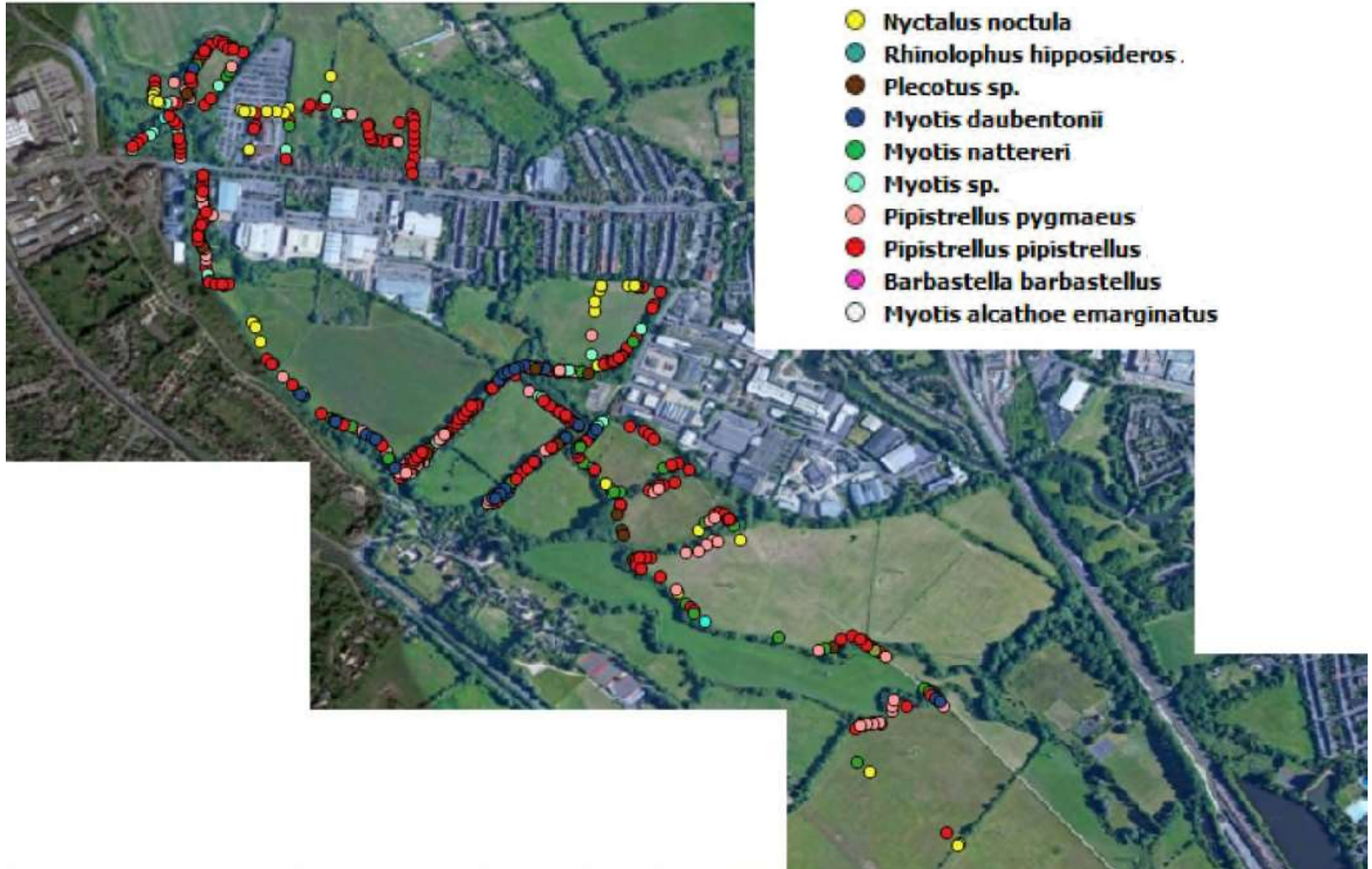


Figure 24 South half of scheme transect results from all seven surveys



STATIC ACTIVITY SURVEYS

Static bat detectors recording was carried out for a week at a time once a month May – September 2017 running simultaneously at nine locations. These are shown on Figure 25 below.

Counts at different locations are shown below.

Table iv static point A1

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	173	128	57	123	20
<i>Pipistrellus pygmaeus</i>	89	26	29	148	18
<i>Pipistrellus nathusii</i>	7	0	0	8	0
<i>Pipistrellus sp.</i>	114	213	5	42	21
<i>Myotis daubentonii</i>	6	51	31	76	7
<i>Myotis nattereri</i>	2	14	5	20	3
<i>Myotis mystacinus / brandtii</i>	2	0	4	23	3
<i>Myotis sp.</i>	0	0	0	111	9
<i>Nyctalus noctula</i>	6	27	34	17	5
unidentified	7	164	43	86	0
Total No.	406	623	208	654	86

Table v static point A2

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	64	32	56	77	19
<i>Pipistrellus pygmaeus</i>	98	101	48	49	30
<i>Pipistrellus nathusii</i>	13	0	0	10	17
<i>Pipistrellus sp.</i>	2	0	32	27	23
<i>Myotis sp.</i>	47	12	19	56	24
<i>Myotis alcaethoe</i>	3	0	1	0	0
unidentified	35	44	91	83	0
Total No.	262	199	247	302	113

Table vi static point A3

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	2073	992	230	2592	81
<i>Pipistrellus pygmaeus</i>	119	74	1369	118	259
<i>Pipistrellus sp.</i>	1176	12	715	167	86
<i>Myotis sp.</i>	288	32	212	403	70
<i>Myotis mystacinus / brandtii</i>	139	0	23	29	26
unidentified	332	35	249	1082	200
Total No.	4127	1145	2798	4391	722

Table vii static point B1

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	6	34	12	6	3
<i>Pipistrellus pygmaeus</i>	0	6	0	13	29
<i>Pipistrellus sp.</i>	12	17	0	4	0
<i>Myotis sp.</i>	7	8	0	2	12
unidentified	5	8	0	3	5
Total No.	30	73	12	28	49

Table viii static point B2

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	27	2	19	7	6
<i>Pipistrellus pygmaeus</i>	105	4	7	32	3
<i>Pipistrellus sp.</i>	14	4	25	25	12
<i>Myotis daubentonii</i>	0	0	0	0	3
<i>Myotis mystacinus / brandtii</i>	12	6	0	7	11
<i>Myotis sp.</i>	0	17	4	0	8
<i>Nyctalus noctula</i>	3	1	0	11	11
unidentified	11	0	1	0	0
Total No.	172	34	56	82	54

Table ix static point B3

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	0	11	6	0	0
<i>Pipistrellus pygmaeus</i>	12	13	0	4	0
<i>Pipistrellus sp.</i>	0	0	0	0	4
<i>Myotis nattereri</i>	9	0	0	0	12
<i>Myotis sp.</i>	3	17	19	0	0
unidentified	0	8	2	0	0
Total No.	24	49	27	4	16

Table x static point C1

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	0	13	2	5	0
<i>Pipistrellus pygmaeus</i>	8	6	0	21	6
<i>Pipistrellus sp.</i>	4	9	7	3	9
<i>Myotis sp.</i>	0	1	3	6	4
unidentified	0	0	4	10	1
Total No.	12	29	16	45	20

Table xi static point C2

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	6	2	2	0	0
<i>Pipistrellus pygmaeus</i>	0	16	7	1	0
<i>Pipistrellus sp.</i>	1	10	21	10	0
<i>Myotis sp.</i>	0	11	0	0	2
unidentified	0	0	3	6	0
Total No.	7	39	33	17	2

Table xii static point C3

Bat Species	May	June	July	Aug	Sep
<i>Pipistrellus pipistrellus</i>	8	16	21	2	0
<i>Pipistrellus pygmaeus</i>	11	13	3	9	0
<i>Pipistrellus nathusii</i>	10	0	7	2	0
<i>Pipistrellus sp.</i>	2	26	16	14	25
<i>Myotis alcaethoe</i>	2	1	0	0	0
<i>Myotis nattereri</i>	7	3	9	0	7
<i>Myotis sp.</i>	12	41	29	4	4
<i>Nyctalus noctula</i>	2	10	0	0	4
unidentified	0	0	2	3	0
Total No.	54	110	87	34	40

Without doubt the most significant records are from A3 on Hinksey stream near Willow Walk, next to that with over 300 counts per month are A1 and A2 both in Botley north and south of Botley road.

The highest diversity with at least six species occurs at A1 and A3.

Static surveys will be repeated in 2023.

Figure 25 Static recorder locations



7. Mitigation Requirements

Overall site

To ensure bat roost provision is maintained throughout the works area each roost feature of either: confirmed use, high potential or moderate potential will have a bat box of suitable types installed for the species recorded in the area, detailed in table xiii below. In total this will be 117 boxes for the entire scheme (plus including up to six boxes on the island in Redbridge that will also be relocated).

Table xiii bat box requirements

Arboricultural map	No. boxes required by scheme	Translocation of existing bat boxes	Minimum no. of boxes to install before works start
1	40		3
2	2		2
3	21		3
4	15		3
6	3		3
8	9	Up to 6 (once EPS licence obtained)	3
9	8		3
10	19		3
TOTAL	117	Up to 6	23

Where possible trees with high potential bat roost features should be retained where they lie within temporary work areas, where any are retained these can be removed from inspection or activity survey list.

The following activities will be undertaken (all dates are subject to change dependent on actual construction dates):

- **2022/2023**
 - Planning permission granted, apply and obtain EPS bat licence.
- **2023 pre works**
 - Resurvey of all 71 trees with bat potential being removed by re-inspection of 44 trees and activity surveys (May – September) of 27 trees, plus surveys of any new trees not already listed to be felled. If trees listed for felling are not going to be removed they may be taken off the survey programme.
 - Resurvey of five bridges and one building by repeat activity surveys.
 - Bat boxes should be installed as soon as possible but certainly all of them should be installed before the end of the scheme and some must be installed before tree felling starts. The distribution should follow the loss of features in each map area. At least the minimum number of boxes specified in table xiii should be installed before works start. The boxes should be installed in dark or semi dark locations, where possible facing southwest, south or southeast, at heights that are accessible for checking but out of reach from the public i.e. 4-5m above ground level.
 - Resurvey of static monitoring at nine points in 2023 May -September.

- **December 2023 – February 2024**
 - Removal of the trees north of Old Abingdon Road.
 - A licensed bat handler will move the existing bat boxes on the island.
 - A watching brief (licensed bat handler) attend whilst the 69 trees with bat potential features are being removed (and any others identified).
 - The confirmed/probable bat roost trees (81 & 94) and island trees with bat boxes must be retained until EPS bat licence has been obtained, so this will be in autumn 2023.

- **September – October 2024**
 - Removal of remaining trees.

- **May - September 2025**
 - Repeat static monitoring at nine points, one week per month at each of the points.

- **September or October 2025**
 - Single check of all bat boxes.

- **December 2025**
 - Report on static monitoring to be circulated including to Natural England. Should alert trigger levels be reached, Natural England should be informed within a month of the discovery for their comment.

Table xiv trigger levels from static recording results

No. species	Overall count levels at each point for all species
6 or less recorded	Decrease from 2017 results by 25% or more

- **May-September 2027**
 - Repeat static monitoring at nine points, one week per month at each of the points May - September.
 - Single check of all bat boxes.

- **December 2027**
 - Report on static monitoring to be circulated including to Natural England. Should alert trigger levels (as table xiv) be reached, Natural England should be informed within a month of the discovery for their comment.

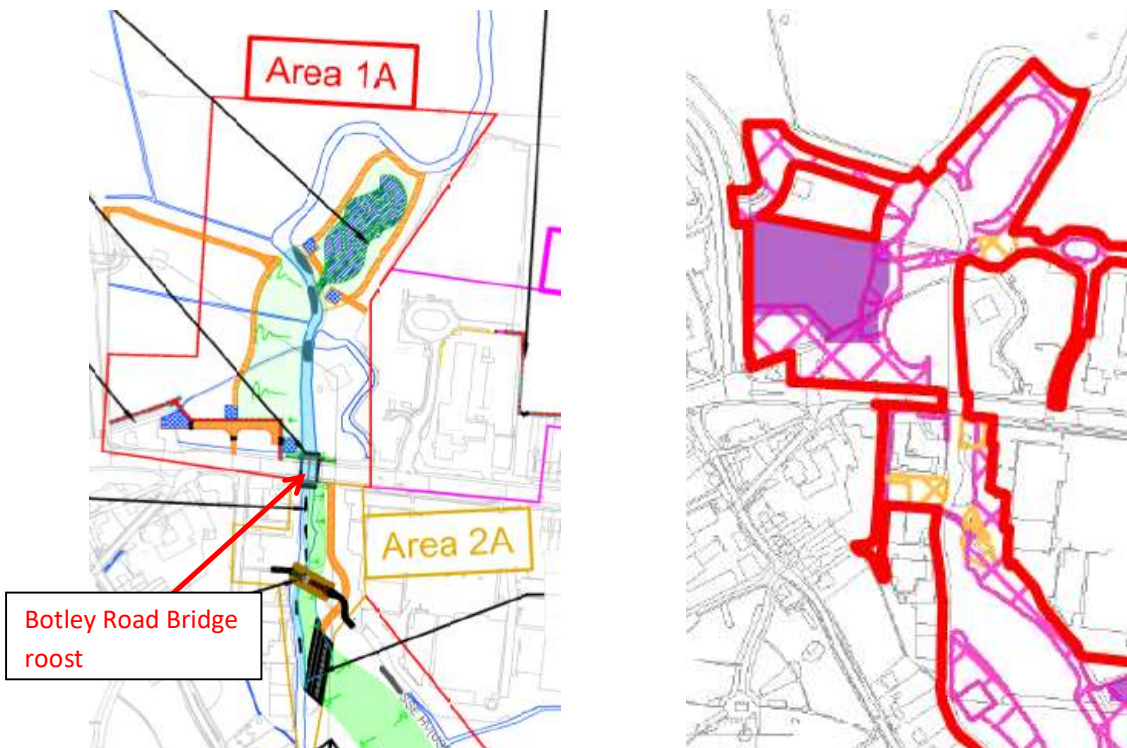
- **May-September 2029**
 - Repeat static monitoring at nine points, one week per month at each of the points.
 - Single check of all bat boxes.
- **December 2029**
 - Report on static monitoring to be circulated including to Natural England. Should alert trigger levels (as table xiv) be reached, Natural England should be informed within a month of the discovery for their comment.
- **May-September 2031**
 - Repeat static monitoring at nine points, one week per month at each of the points.
 - Single check of all bat boxes
- **December 2031**
 - Report on static monitoring to be circulated including to Natural England. Should alert trigger levels (as table xiv) be reached, Natural England should be informed within a month of the discovery for their comment.

Specific site requirements

For the key to the right hand side work area refer to Figure 3.

Areas 1A & 2A, arb map 1

Figure 26 Areas 1 & 2 work areas



Botley Road Bridge is a bat roost in late summer. If any of the four compounds require 24hr lighting they should avoid night lighting spilling both towards either side of the bridge and towards Seacourt Stream. If necessary, install light shielding of the stream corridor below 3m above bank top level.

Area 3A, arboricultural map 3

Figure 27 Areas 3A work areas



Area 3A is the most significant bat activity area, trees will be retained along the one side of Hinksey stream close to Willow Walk but there will be significant tree loss along Willow Walk.

During construction a single set of three temporary flight guide straps will be installed. Each group of straps should be set around 1m apart (vertically) installed above works level where no trees remain. Installed along the line of Willow Walk SW – NE to aid bats crossing the gap formed by the works as illustrated below in Figure 19 above.

Figure 28 Illustration of Bat flight guides

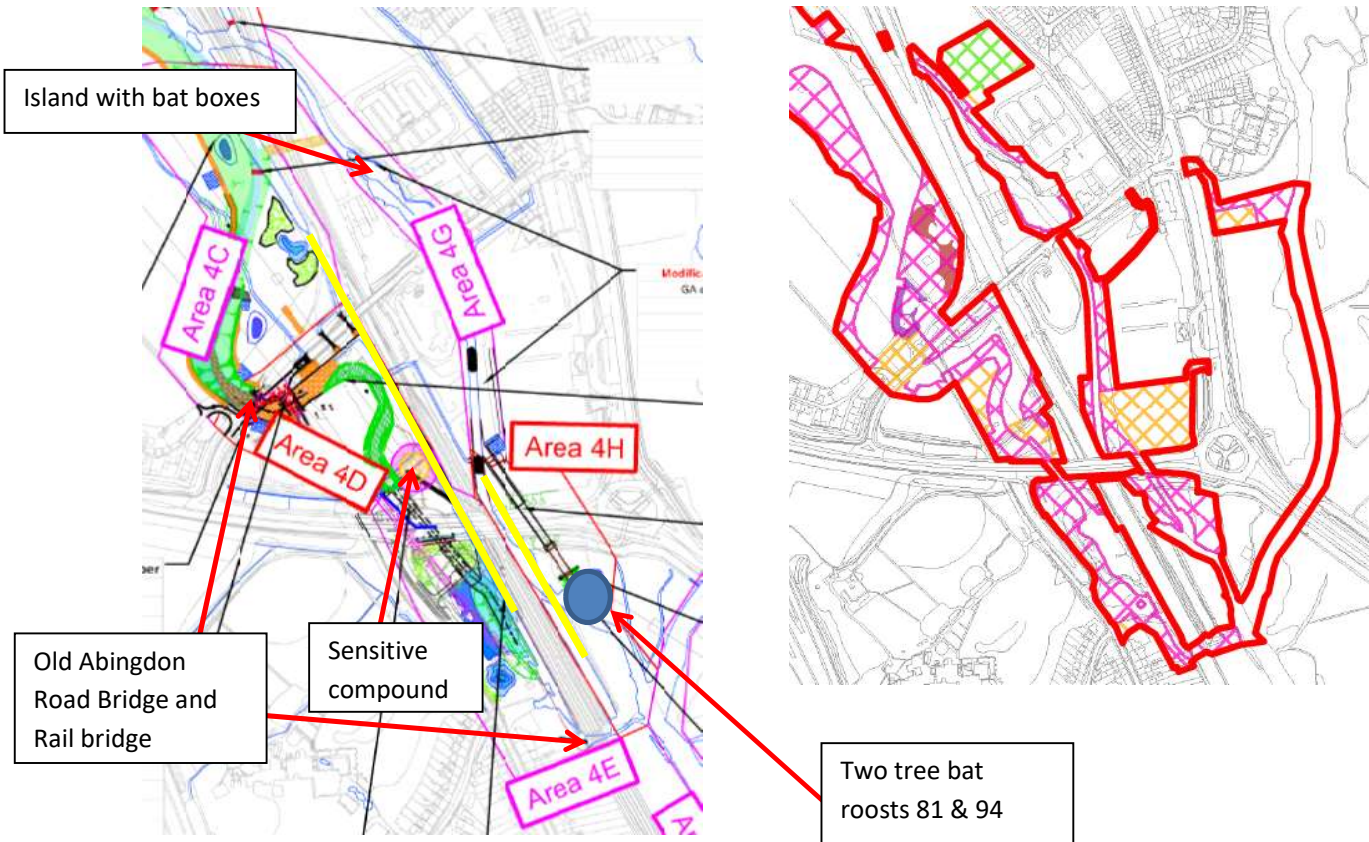


There is a large compound/storage area east of Willow Walk ideally no lighting at night or if there has to be ensure lighting is not spilling outwards (all directions) from the compound area.

The two trees housing a roost will be removed after the EPS bat licence has been received.

Areas 4D, 4E, 4H, 4G, arboricultural map 8

Figure 29 Areas 4D, 4E, 4H, 4G work areas



The two bridges highlighted above are likely to be subject to 24hr works to reduce road closure periods. There are alternative parallel watercourses bats could use through this area just east Old Abingdon Road bridge and beneath the southern bypass road.

It is important that the two bridge work areas and any other compounds illuminated at night do not cause light spill below 3m above upper bank level. These alternative bat flight routes are highlighted in yellow in Figure 18 above. The 'sensitive' compound highlighted needs to have a dark bat 'conduit' along the watercourse included if night lighting is proposed there, this could be just light proof fencing or a cover erected over the watercourse if required.

All compounds with night lighting should ensure they do not have light spill into adjacent watercourses.

The island is where the existing bat boxes are, these boxes will be moved prior to tree felling, after the EPS bat licence has been received.

The two tree roosts will be removed after the EPS bat licence has been received.

8. References

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