Appendix 7.6

WINTERING BIRD AND DISTURBANCE SURVEY REPORT (OCTOBER 2023)

Greengage

Brighter strategies
for greener projects

Client: London Borough of Hillingdon

Project: HWSFAC

Report: 2023 Wintering Bird and Disturbance Survey

QUALITY ASSURANCE

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1.0 INTRODUCTION

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon (LBH) to undertake wintering bird surveys and disturbance surveys at a Site known as the proposed Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon. The Site is located at Broadwater Lake, Moorhall Road, Hillingdon.

The surveys were undertaken to inform a planning submission for the Site which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Sailing Club (BSC) facilities at the north end.

1.1 AIM OF SURVEYS

The wintering bird surveys were undertaken to establish the wintering bird assemblage for the lake and the population size of each species using the standard survey methodology that is comparable with other available published data (for the Site, the Colne Valley Gravel Pits (CVGP) and for the UK).

The disturbance surveys were undertaken (using a bespoke methodology) to establish the 'disturbance baseline' for the Site:

a. by recording typical activities (mainly focussed on sailing) that cause disturbance to birds; and

b. by objectively recording how disturbances affect species usage of the lake.

The aim of these surveys was to inform an ecological impact assessment for the Proposed Development:

- To ensure that impacts arising as a result of the Proposed Development could be accurately identified and characterised;
- To allow the effects of any changes to the degree of disturbance to waterbird species using the lake to be assessed; and
- To inform a range of appropriate mitigation and enhancement measures.

This report sets out the methodologies utilised and the results of the surveys. The data have then been analysed and interpreted, and an ecological impact assessment for wintering birds with respect to the potential impacts of the proposed development has been presented.

This report has been written with full access to proposed development plans at the time of writing.

1.2 SITE DESCRIPTION

The assessment area ('the Site') covers an area of approximately 79.95 hectares (ha) and is approximately centred on National Grid Reference TQ 04396 89593, OS Co-ordinates 504396, 189593.

The Site is located in South Harefield approximately 5km north of Uxbridge. The Site forms part of the Mid-Colne Valley Site of Special Scientific Interest (SSSI) and Site of Importance for Nature Conservation (SINC) and lies within the Colne Valley, an area of lakes and rural habitat.

The Site comprises an access road from Moorhall Road, the lake itself with an associated lagoon (south-east corner of the lake), a peninsula at the south-east corner, an existing sailing club (BSC) at the north end of the lake, parts of the margins of the lake, and islands set within the lake. Projecting north from the peninsula there is an island or isthmus which supports woodland.

Habitats present at the Site are areas of standing open water, broadleaved woodland, wet woodland, scattered trees, invasive non-native buddleia scrub, dense scrub, modified grassland, gravel hardstanding, concrete, and buildings. The dominant habitat across the Site was standing open water in the form of Broadwater Lake (approximately 60 ha lying within the red line boundary).

The habitats immediately surrounding the Site primarily comprise the River Colne to the west and north, a large residence with gardens to the north, the Grand Union Canal to the east, and woodland, scrub and a mineral processing site to the south along with residential bungalows on Boyer's Pit Road. Within the wider area, urban development in the form of South Harefield exists to the east, with further lakes, woodland and open grassland being present to the north, south and west.

1.3 BROADWATER LAKE

Broadwater Lake is an 80.8 hectare former gravel pit which lies on the Greater London / Buckinghamshire border between the villages of Denham (Bucks.) and Harefield (Gtr. London). It is centred at Ordnance Survey National Grid Reference TQ 044 895.

It is the largest of the lakes in the Colne Valley, which stretches from Watford in the north to Staines in the south, where it joins the River Thames.

The Lake contains a number of islands which are either wholly or partly wooded and / or are vegetated by tall ruderals.

Immediately to the north and east of the site boundary lies the River Colne which flows south. The river forms the geographic border between Greater London and Buckinghamshire. To the west lies the Grand Union Canal and to the south lies a settling gravel pit (Harefield Lake). There are other former gravel pits to the north of the River Colne (Troy Lake) and the east Tilehouse North and South Lakes. The land around the Lake is mostly comprised of mature woodland and wet woodland with some areas of scrub on the western side. The Broadwater Sailing Club is currently situated at the northern end of the lake.

An annotated map of the Site is given in Appendix A.

1.4 SAILING AT THE SITE

The Site is the home of the BSC. Sailing is permitted 365 days per year an hour before dawn and an hour after dusk, and typically there are sailing events on Sundays, some Saturdays, and Wednesday afternoons.

2.0 LEGISLATION AND CONSERVATION

The Wildlife and Countryside Act 1981[1] (as amended) is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions to recklessly or intentionally:

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

Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are specially protected at all times.

A number of birds feature on the Natural Environment and Rural Communities (NERC) Act, Section 41 (S41)[2] as species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 41 of the NERC Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

In addition to statutory protection, some bird species are classified according to their conservation status, such as their inclusion on the Red and Amber lists of Birds of Conservation Concern (BoCC) in the UK, 5 (Stanbury, et al 2021)[3]:

- Red list (high conservation concern) species are those that are Globally Threatened according to IUCN criteria; those whose population has declined rapidly (50% or more) in recent years; and those that have declined historically and not shown a substantial recent recovery;
- Amber list (medium conservation concern) species are those with an unfavourable conservation status in Europe; whose population or range has declined moderately (between 25% and 49%) in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations; and
- Green list (low conservation concern) species fulfil none of the above criteria.

3.0 METHODOLOGY

3.1 DESK STUDY

A desk study has been undertaken and is reported within the February 2023 Greengage PEA (Report Ref: 552023sh21Feb23FV01_PEA).

Protected species records within 2km of the Site were obtained from:

- Greenspace Initiative for Greater London (GiGL);
- Herts Biological Records Centre (HBRC); and
- Buckinghamshire and Milton Keynes Environment Records Centre (BMERC).

Wintering bird population data

The official estimated UK national population levels for each species of wintering birds were taken from Frost et al 2020[4]. These have been used in Section 5 to contextualise the numbers of birds recorded at the Site and evaluate the different species.

Wetland Bird Survey data (WeBS)

This report contains Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2021/22 © copyright and database right 2023. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, with fieldwork conducted by volunteers and previous support from WWT.

The Wetland Bird Survey (WeBS) monitors non-breeding waterbirds in the UK. Annual peak site counts for all waterbirds at every WeBS site which has at least one Core Count (over 8000 sites) are available in the Numbers & Trends section of the WeBS Report Online. These peak counts may be used under an Open Government Licence, except for some supplementary counts from other organisations.

The annual peak site counts monitoring data for the Colne Valley Gravel Pits (CVGP) was obtained from the WeBS website[5]. The data have been used in Section 5 to evaluate the role of the Site in supporting the CVGP assemblage and the different species recorded.

Review of Natural England website

Ecological information relating to the Site and the onsite designated features of the mid-Colne Valley SSSI (namely the non-breeding wintering assemblage of bird species and non-breeding tufted duck) was obtained from the Natural England website[6].

Literature search

Colne Valley

The following report commissioned by the Herts and Middlesex Wildlife Trust was reviewed to provide information for this study:

- White, GJ and Harris, AJ, 2008. The wetland resource of the Colne Valley: an assessment of its importance to nature conservation, with special reference to waterbirds.

Disturbance effects on waterbirds

A literature search was undertaken to inform the analysis and interpretation of the disturbance survey data. A range of published journals and books were reviewed covering noise and visual disturbance to wetland birds. Data relating to the relative sensitivity to disturbance of each species identified as a key ecological receptor for the Site was also searched for.

3.2 SURVEYS - STANDARD OBSERVATION METHOD

The standard methodology for the wintering and disturbance bird surveys undertaken at Broadwater Lake between October 2022 and March 2023 broadly followed the 'look-see' method used for the Wetland Bird Survey (WeBS)[7] and the species monitored were those recorded for WeBS.

For all surveys, the number of birds of each species was counted and each bird (or groups of birds in the case of a tight or a loose flock) spatially mapped in the field.

This data was subsequently digitised in QGIS (a free and open-source geographical information system).

Birds that were seen overflying the site and not interacting with it (e.g. not looking to land) were excluded from any totals and subsequent analyses.

3.3 WINTERING BIRD SURVEY

Counts were undertaken on days when no sailing occurred ('non-sailing' days), to establish the baseline without sailing disturbance.

A single observer (or sometimes two observers) walked around the perimeter of the lake and mapped the distribution and numbers of birds. This was done once each 'non-sailing' visit.

Standard wintering surveys may be undertaken by a single surveyor as the changes to the number of birds and species composition are relatively discrete and low in frequency.

The times of day that these counts were carried out varied, with some counts being made in the mornings and others in the afternoon, the latter generally finishing at about sunset. These afternoon counts were to attempt to ascertain the presence and composition of any gull roost that may have been present on the lake. No specific surveys were conducted for gulls, as it was found that any potential gull-roost counts could be observed during or after a waterbird count on the same day.

3.4 DISTURBANCE SURVEYS

Number of surveyors

On 'sailing' days counts were made by between two and four observers.

A multi-surveyor approach was required to monitor for disturbance effects. Changes in bird distribution and species composition due to disturbance may be sudden and affect different parts of the lake within a short time frame. There is no single vantage point from which the whole Site may be seen. Therefore, to ensure all disturbance effects were fully characterised it was important to use multiple vantage points to ensure all areas of the lake could be observed simultaneously.

The observers were positioned at vantage points around the lake. These vantage points were not set locations but were generally carried out from similar positions each time.

Pre-sailing count

Firstly, a count of birds on the whole lake was made. This was done early in the morning, prior to any actual sailing or disturbance from the area of the sailing club (which is situated at the northern end of the lake). Most of the counts were made from the vantage points, though some areas (e.g. the enclosed south-east bay of the lake) could not be seen from the vantage points so birds were mapped and counted on the way to the vantage point.

This count was considered to be comparable to counts undertaken on non-sailing days.

Disturbance behaviour monitoring

Once the initial (baseline) count had been completed, disturbance behaviour monitoring was carried out. For this the movements of any waterbirds caused by disturbance was noted. This was mainly focussed towards disturbance by sailing-related activities, which included safety boats (powerboats), race boats (a motorised launch) and the sailing boats themselves.

Disturbance events from other stimuli (e.g. aircraft, helicopters, birds of prey, dogs, fishermen, walkers, etc.) were also noted.

The disturbance monitoring was carried out at least until the end of the first sailing race and was deemed to have stopped once all the boats had returned to the sailing club pontoons. Each disturbance event which occurred during this time was noted with the number, direction and distance moved of any affected species as well as the disturbance type.

Post-sailing count

Once the disturbance monitoring had finished, a second distribution mapping survey and count of the waterbirds on the lake was undertaken.

Disturbance behaviour data recording

It was very difficult to keep track of what birds were doing during disturbance events where the activity type or degree of disturbance caused birds to take flight. These flocks often held more than one species. It was, therefore, impractical to map individual birds or flocks, so a tabular form of recording these was used. The form used for this can be seen in Appendix G.

3.5 SAMPLING FREQUENCY

The survey effort targeted was two 'Sailing-day' surveys and two 'Non-sailing' day surveys per month at the Site. This is a high level of survey effort, with a significant degree of robustness and redundancy built in. This provided confidence that, in the event of bad weather or surveyor illness causing a constraint to one or more surveys per month, the remaining data would still provide more data than usually collated for standard wintering bird surveys. Each sailing day also provided a non-disturbed 'pre-sail' baseline comparable with the non-sailing day data, and the post-sailing counts later in the day provided an opportunity for afternoon monitoring when numbers of certain species would be expected to be higher (such as gulls).

Twenty visits were made to the Site between mid-November 2022 and the end of March 2023. There were ten visits made on 'Sailing-days' and ten visits made on 'Non-sailing' days.

The dates that the visits were made and the number of observers for each visit is given in Table 3.1. Significant constraints to each survey have been flagged; these are discussed in Section 3.8.

Table 3.1 Dates of surveys, activities on each and suitability for data analyses.

Month	Visit No.	Date	Activity	No. of Observers	Constraint (if any)
November 2022	0 (Scoping Survey)	13/11/2022	Sailing Day	1	Single observer
	1	19/11/2022	Non-sailing Day	2	Disturbance due to strimming the islands
	2	27/11/2022	Sailing Day	1	Single observer
December 2022	3	04/12/2022	Sailing Day	2	
	4	08/12/2022	Non-sailing Day	1	
	5	18/12/2022	Sailing Day	4	Ice cover (no sailing due to ice)
	6	24/12/2022	Non-sailing Day	1	
January 2023	7	08/01/2023	Sailing Day	4	
	8	13/01/2023	Non-sailing Day	1	

Month	Visit No.	Date	Activity	No. of Observers	Constraint (if any)
	9	24/01/2023	Non-sailing Day	1	Ice cover
	10	26/01/2023	Non-sailing Day	1	
	11	29/01/2023	Sailing Day	3	
February 2023	12	07/02/2023	Non-sailing Day	1	
	13	12/02/2023	Sailing Day	4	
	14	19/02/2023	Sailing Day	3	
	15	23/02/2023	Non-sailing Day	1	
March 2023	16	12/03/2002	Sailing Day	3	
	17	14/03/2023	Non-sailing Day	1	
	18	19/03/2023	Sailing Day	3	
	19	24/03/2023	Non-sailing Day	1	

3.6 SURVEYORS

Wintering bird surveys were carried out by Bill Haines and Jonty Denton on behalf of Greengage.

Bill Haines has over 25 years' experience in undertaking professional ornithological surveys and has worked in a wide variety of habitats in the UK including wetlands, urban and suburban, farmland, woodlands coastal and estuarine, and upland and lowland heathland, using a wide range of scientifically proven survey methodologies. He is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

Dr Jonty Denton is a freelance Chartered Ecologist of over 30 years' experience, with Natural England licenses for Bats, Dormice, Great Crested Newt, Natterjacks, Sand Lizard, Smooth Snake, and White-clawed Crayfish. His clients include Natural England, the National Trust, Crown Estates, County Trusts, Butterfly Conservation, the Ministry of Defence, Royal Parks, and many County and District Councils, as well as the Environment Agency and Thames Water. Jonty is a highly experienced ornithologist having carried out ornithological surveys (for breeding and wintering birds), including pioneering studies of impact on birds of construction of bridge crossings and specialist surveys of impacts of piling works on Brent Geese in Langstone harbour. Jonty has travelled widely across all the continents and has seen over 50% of the world's avifauna.

The disturbance surveys were carried out by Bill Haines, Jonty Denton, Matthew Cameron and Jaimy Hodgetts on behalf of Greengage.

Matthew Cameron has more than ten years' experience as a keen amateur bird watcher and wildlife enthusiast, and has undertaken a range of professional ornithological surveys and ecological surveys since 2021.

Jaimy Hodgetts is a professional field ecologist with 5 years' experience carrying out a range of ecology surveys including ornithological surveys.

Bill Haines and Stephanie Harper wrote this report. Stephanie has a bachelors degree in Environmental Biology (BSc Hons), a Natural England CL17 Bat Survey Level 1 Class Licence and 15 years' experience in ecological surveying and consultancy.

Mike Harris, who reviewed this report, has a Bachelor's degree in Environmental Biology (BSc Hons), a Natural England Great Crested Newt Licence (2015-17819-CLS-CLS) and Dormouse Licence (2016-21291-CLS-CLS) and is a Chartered Environmentalist (CEnv) and Full member of CIEEM. Mike has over 18 years' experience in ecological surveying and has undertaken and managed numerous ecological surveys and assessments.

This report was written by Bill Haines and Stephanie Harper, and reviewed and verified by Mike Harris who confirms in writing (see the QA sheet at the front of this report) that the report is in line with the following:

- Represents sound industry practice;
- Reports and recommends correctly, truthfully and objectively;
- Is appropriate given the local site conditions and scope of works proposed; and
- Avoids invalid, biased and exaggerated statements.

3.7 WEATHER

On each visit weather details were noted. These are shown in Appendix B. As the surveys were undertaken across a whole season, a range of weather conditions were encountered. There were no days where visibility caused surveys to be abandoned, though during some visits, visibility was somewhat reduced temporarily, either due to mist or heavy rain. This did not constrain the survey results on those days due to the level of survey effort.

3.8 CONSTRAINTS / LIMITATIONS

Weather

The main weather constraint was ice. Ice cover meant that the use of the lake by its avifauna was atypical (limited to open water areas) and therefore the data would not be comparable with other visits with no ice present. Furthermore, no sailing could take place.

In January 2023 an additional survey on a 'Non-sailing' day was undertaken to compensate for a previous survey undertaken when the lake was iced over; however when this occurred in December it was not possible to replace the survey visit due to availability of surveyors being limited due to the Christmas holidays.

Disturbance surveys

Establishing the proper level of survey effort and methodology for such a large site took some trial and error. The first visit on a sailing day (on 13/11/22) was seen as a 'scoping visit' (made by a single observer) to assess the scale of bird movements and the availability and number of vantage points needed to adequately record data for all areas of the lake. It then took some time to assemble a survey team and unfortunately due to illness the second sailing day survey (27/11/22) was also only undertaken by a single surveyor.

Therefore, on both 'Sailing day' visits in November, the number of observers was not sufficient to cover the whole lake to an extent that all bird movements could be monitored. These visits have been excluded for disturbance analyses (dates shown in Table 3.1). As a result of the excluded visits, there was no data available for disturbance analyses in November.

When the lake was significantly iced over (over ca. 70% ice cover), counts were carried out, but not included in the disturbance analyses as no sailing occurred.

Discounting excluded visits, a total of seven 'Sailing' days and eight 'Non-sailing' days were suitable for disturbance analyses (undertaken in order to discern the effects of existing sailing disturbance on present wintering species).

It should be noted that disturbance behaviour monitoring will under-record the numbers of birds disturbed when disturbance results in flight of more than one species. When flocks of birds take flight it can be very confusing to watch. The behaviour of species and small groups which quickly resettle will be easier to record, and this will create a bias in the data. The data are therefore useful mainly to characterise general responses to disturbance per species, but do not account for all disturbance or all birds leaving the Site when disturbed.

Very mobile species / Gulls

Some species, especially gulls, are very mobile and frequently move between different areas of the lake (or leave the site altogether). Therefore, for these mobile species, it was necessary to make estimated counts in some cases.

When the non-sailing counts were done in the afternoons, daylight was a limiting factor. Thus, any birds (e.g. gulls) arriving at the site after dark could not be seen / identified with confidence and so the counts of some species may have been underestimated.

During the disturbance counts, many birds including mixed-species flocks were seen to be disturbed simultaneously. During these events it was not possible to accurately map the movements of individual

birds/species. Therefore, the disturbance events were recorded in tabular format rather than by mapping.

4.0 DESK STUDY

4.1 STATUTORY AND NON-STATUTORY SITES

The Site forms part of the Mid-Colne Valley SSSI and is designated for "*significant ornithological interest, particularly for the diversity of breeding woodland and wetland birds, and for the numbers of wintering wildfowl*".

The Site lies within the biological recording areas of The London Natural History Society. The River Colne forms the county boundaries between Greater London, Buckinghamshire (along the western edge of the Site) and Hertfordshire (along the northern edge of the Site).

A review of the statutory and non-statutory sites within 2km has been presented in the Site PEA[8].

4.2 SPECIES RECORDED WITHIN 2KM

The desk study data from the Greenspace Initiative for Greater London (GiGL) listed 121 bird species that had been recorded at, or within, 2km of the Site.

The GIGL data included the following number of notable species:

- WCA Schedule 1 Species = 18
- BoCC,4 red-listed Species = 33
- BoCC,4 amber-listed species = 46
- NERC-S41 species = 30

A desk study data of biological records from the Herts Biological Records Centre (HBRC) listed 101 bird species that had been recorded at, or within, 2km of the Site.

The HRBC data included the following number of notable species:

- WCA Schedule 1 Species = 12
- BoCC,4 red-listed Species = 27
- BoCC,4 amber-listed species = 37
- NERC-S41 species = 21

The Buckinghamshire and Milton Keynes Environment Records Centre (BMERC) data search listed 48 notable or invasive bird species at or within 1km of the Site.

The BMERC data search listed the following number of notable or invasive species:

- WCA Schedule 1 Species = 7
- BoCC,4 red-listed Species = 13
- BoCC,4 amber-listed species = 25
- NERC-S41 species = 8

A list of all the species with their notable statuses, returned by these three data searches can be seen in Appendix I.

4.3 LITERATURE REVIEW

Colne Valley

The following notes have been made from White and Harris 2008[9] - in most cases these are selections of the author's words taken verbatim. The report provides a historical perspective on the relative importance of the lake within the Colne Valley and the species it supported. The context of habitat succession and the availability of aquatic weed are mentioned as factors affecting population dynamics both within a given month and over a 10-20 year period.

Broadwater Lake attracted most birds from March through to October, while Stocker's Lake takes over from November through to February. This pattern of distribution has been recorded in previous studies. Although Broadwater can provide an excellent feeding resource and does have a functional refuge area within the lake, it seems that some species, notably dabbling duck, move out as soon as the food resource is eaten out.

In 2006, during very low water levels, blooms of blue-green algae were prominent on Broadwater and Harefield Moor Lakes.

***Key waterbird species.** (Broadwater Lake is) One of the two major waterbird refuges in the Colne Valley, significant for Shoveler, Pochard and Tufted Duck. The lake is significant for moulting waterbirds, notably Tufted Duck but also including Great Crested Grebe, Canada and Greylag Geese. Tufted Duck first established a moult refuge at Broadwater in the 1970s. A significant site for breeding waterbirds, notably Grey Heron and Cormorant. Cormorants first nested at Broadwater in 1987 (the first breeding record for the London area), but it was not until a second nest in 1996 that a colony became established and increased to the current total of 55 nests. Cormorants have also formed a winter roost at Broadwater since 1972/73. The lake forms an important feeding site for several species, including Wigeon, Coot and Gadwall when aquatic weeds are abundant. The islands and open water provide roost sites for Little Egret, Cormorant, Goldeneye, gulls and geese.*

Individual species:

Numbers of Gadwall in the Colne Valley are of national significance. The maximum total count was 264 in December 2006, with the peak site count being 138 at the Stocker's Lake complex in January. At Broadwater Lake, moderate numbers only were recorded in September and October, showing a very poor year for aquatic weed on this lake. In the past, high numbers of Gadwall have been recorded on Stocker's, Springwell, Troy Mill and Broadwater Lakes (see section 2.4), reflecting the abundance of available food. The occurrence pattern is typical; a sharp arrival and increase in September, followed by a slight increase up to midwinter and then a decline.

Numbers of Shoveler in the Colne Valley are of national significance. The maximum total count was 150 in October 2006, with the peak site counts being 92 at Broadwater Lake in October and 87 at the Stocker's Lake complex in February. The threshold for national significance is 148. Stocker's and Broadwater Lakes are consistently the most favoured locations, with birds being rather sparse elsewhere.

During the survey year, there was a shift in birds from Broadwater to Stocker's Lake during the course of the winter, a pattern recorded in previous years. The counts on mid-week days revealed no difference in occurrence pattern. This may suggest no movements are taking place. However, Shoveler are known to feed nocturnally in disturbed environments and it may be that are using Stocker's and Broadwater Lakes as daytime roosts whilst foraging at other sites during the night. This highlights the requirement for undisturbed daytime roosts and that disturbed, seemingly unsuitable sites can be more valuable to wildfowl than daytime observations suggest. The occurrence pattern is typical; a peak in autumn, usually in October, followed by a decline through to March as most Shoveler pass through in autumn to winter further south.

Numbers of Pochard in the Colne Valley were below the level of national significance in the survey year. The maximum total count was 399 in December 2006, with the threshold for national significance being 595. The peak site counts were 199 at the Stocker's Lake complex and 153 at Broadwater Lake, both in December. These two sites regularly held the key concentrations during the survey year.

Numbers of Tufted Duck in the Colne Valley are of national significance. The maximum total count was 1,116 in December 2006, but the peak site count was 569 at Broadwater Lake in August 2007. The threshold for national significance is 901. The mid-week distribution in December shows birds spreading out from the weekend refuges; from Broadwater Lake to neighbouring Troy Mill and Savay, and increases at the Stocker's complex with birds utilising the lakes suffering heavy human recreational disturbance at weekends (notably Bury and Batchworth Lakes). Similar patterns are evident in the mid-week February count but are less apparent due to the gradual decline in numbers in the second half of the winter.

Great Crested Grebe : Colne Valley is of national significance for wintering Great Crested Grebe. The peak total count of 218 in October 2006 is above the threshold for national significance (159). Although Great Crested Grebes are well distributed throughout the valley, the key sites are the Stocker's complex (46 on 8 October), the Broadwater complex (89 on 19 November) and the Denham Lakes (32 on 12 August). Birds tend not to be mobile between sites but rather stay until the resources or conditions force them to move. A feeding frenzy of Cormorants and Great Crested Grebes was noted in at Broadwater Lake in October, suggesting an abundance of small fish. Numbers were high at this site at this time but rapidly declined as the winter progressed, suggesting this resource was no longer available. …The national annual index shows a steady long-term rise in the wintering population, with a peak usually between August and October. At this time the population is boosted by birds of the year, and adults will move to wintering locations to form moult gatherings. The total of 203 birds in the Colne Valley in August may suggest that the population is mainly resident. Peak gatherings at Broadwater and Stockers lakes in September-October are likely to be moulting birds.

The numbers of Cormorant within the Colne Valley are of national significance. The peak total count of 289 in October and December 2006 is beyond the national significance threshold of 230. The numbers are boosted by a significant breeding colony and winter roost at Broadwater Lake. The winter roost peaked at 227 in October and the colony totalled 55 occupied nests in 2007. Broadwater is also an important feeding site, as evidenced by the feeding frenzy of Cormorants and Great Crested Grebes noted in October. The annual pattern is generally a late autumn peak followed by a steady decline through the winter

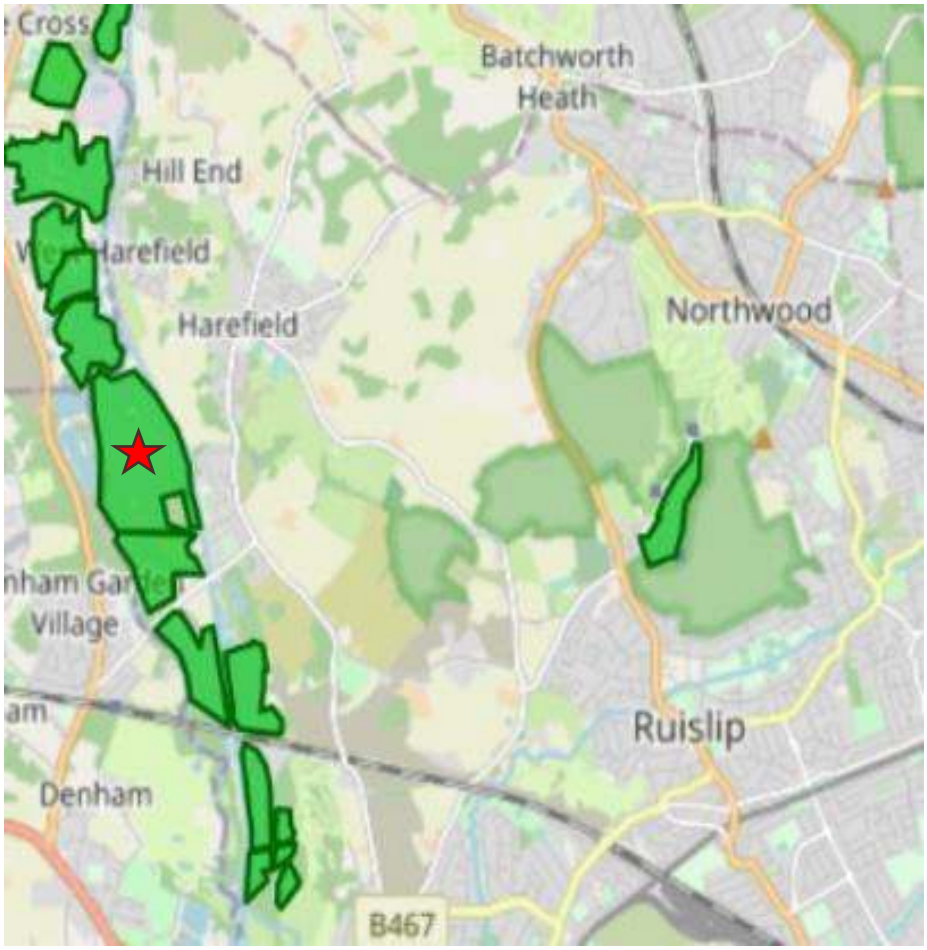
There are two significant heronries within the Colne Valley; at Stocker's lake and Broadwater Lake. These heronries held 31 and 15 breeding pairs of Grey Herons respectively in 2007. The figures tend to show an autumn peak followed by a steady decline over the winter, a typical pattern for a largely resident breeding bird.

The peak total count for Coot of 1606 birds in November 2006 was somewhat lower than the threshold for national significance (1730). Coot are well distributed throughout the valley with several sites holding winter populations in excess of 100 birds. Stocker's, Lynsters, Troy Mill, and Broadwater all hold significant numbers with the peak count being 468 at the Stocker's lake complex in November. Numbers at Broadwater in 2006 were low and the peak winter counts (298 in September) quickly declined, suggesting a very poor year for aquatic weeds on the lake.

Kingfishers are present in low numbers throughout the Colne Valley, with a peak survey count of 11 in November 2006. Kingfishers are not monitored well by the standard WeBS counts as they are not only elusive but frequently occur away from the open water sites. No national thresholds are set but the WeBS report list sites with mean peak counts of seven or more. The Colne Valley is thus in the top tier of sites. Broadwater, Stocker's and Denham Lakes are the most regular sites and have the highest counts.

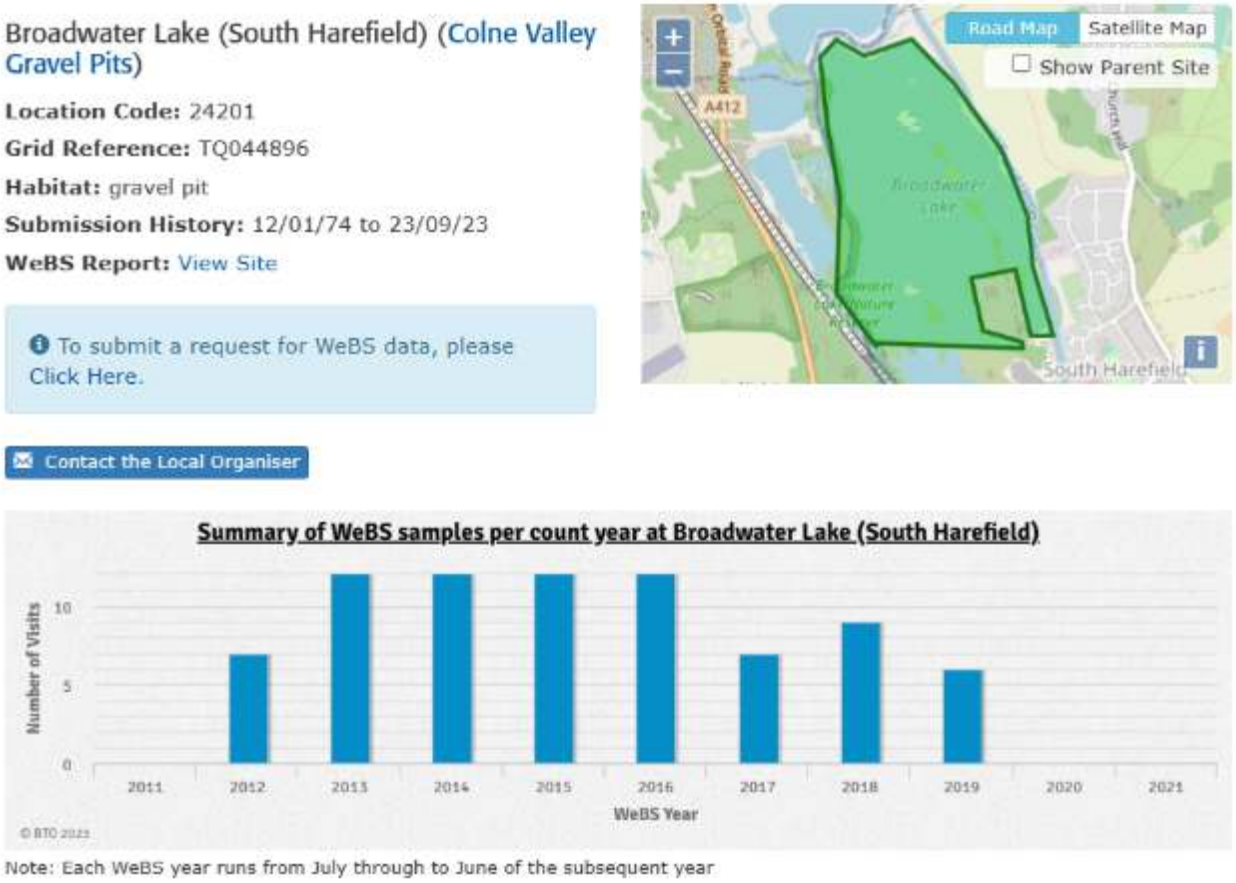
4.4 COLNE VALLEY GRAVEL PITS WEBS DATA

The full annual peak counts from 2015/16 to 2021/22 WeBS data are provided in Appendix C. The CVGP covers a large area as shown below. Broadwater Lake is indicated with a red star.



Although Broadwater Lake forms a component part of the CVGP, monitoring was last fully completed at Broadwater Lake in 2018/19 as detailed in Figure 4.1 (taken from [WeBS Online (BTO/RSPB/JNCC)]).

Figure 4.1 Broadwater Lake WeBS Monitoring



The absence of the Broadwater Lake survey data from the more recent CVGP data is not a significant issue and in fact allows the contribution of the Broadwater Lake assemblage to the wider CVGP populations to be more clearly seen.

The data have been used alongside the Site survey data in Section 6 to corroborate and evaluate the evaluation of the individual species and the role and importance of the Site as part of the CVGP.

Typical disturbance to waterbirds

The desk study for disturbance has been incorporated into Section 7 of this report.

5.0 WINTERING BIRD SURVEY

Data from all the visits and the distribution maps are shown in Appendices D & E respectively.

5.1 SPECIES ASSEMBLAGE

Species and their notable status

A total of thirty-three species of waterbird (plus two hybrids) were recorded over all 20 survey dates (excluding overflying birds). Overall, there were:

- Three species of goose (excluding hybrids)
- One species of swan
- 13 species of duck (of which there were seven species of dabbling duck, excluding hybrids, four species of diving duck, and two species of sawbill duck)
- Two species of grebe
- One species of heron
- One species of cormorant
- Three species of rails and crakes
- Three species of wader
- Five species of gull
- One species of kingfisher

There was one Wildlife and Countryside Act Sch 1 species recorded, Kingfisher.

There were two species recorded that are listed in NERC-S41. These were Lapwing and Herring Gull.

There were five species recorded that are red-listed in Birds of Conservation Concern, 5. These were:

Pochard	Goldeneye	Lapwing
Smew	Herring Gull	

There were fourteen species recorded that are amber-listed in Birds of Conservation Concern, 5. These were:

Greylag Goose	Pintail	Black-headed Gull
Shoveler	Teal	Common Gull
Gadwall	Mallard	Great Black-backed Gull
Wigeon	Moorhen	Lesser Black-backed Gull
Oystercatcher	Snipe	

Species where there were more than 100 birds recorded on any one visit are listed in Table 5.1 below.

Table 5.1 Species with more than 100 birds on one visit

English vernacular name	Peak count	Survey visit	Date recorded	Comment (n - number of valid counts)
Black-headed Gull	919	17	14/03/2023 (non-sail)	Median 223 (n=28)
Tufted Duck	455	8	13/01/2023 (non-sail)	Median 147 (n=29)
Shoveler	315	9	24/01/2023 (non-sail)	Median 67 (n=28)
Pochard	182	3	04/12/2022 (post-sail)	Median 78 (n=28)
Greylag Goose	110	4	08/12/2022 (non-sail)	This was only count above 100 due to a flock observed passing through, which settled temporarily at the lake. Typically numbers were from 1-25 (median 5) (n=14)

Key
Bold - WCA Schedule 1 species
BoCC, 5 red-listed species
BoCC, 5 amber-listed species
*NERC-S41 listed species

Overflying species

The only species that was noted overflying the Site but was not recorded on it was a Great Egret (Ardea alba) that flew north up the River Colne on Visit 13.

Waterbirds recorded outside the site boundary

Waterbirds seen outside the Site boundary, e.g. on the River Colne, the Grand Union Canal and adjacent pits were recorded during some visits. As the effort was not comparable between visits or observers, birds seen in these extra-limital areas have not been included in any analyses, unless they subsequently moved onto the Lake during a count period when they were counted as part of the count of the Site.

Not recorded /Absent

Little egret and common tern are summer occupants at the Site; these were not recorded during the course of the surveys.

5.2 EVALUATION OF SPECIES

The evaluation of individual wintering species may be used in two ways interchangeably:

- Species classification: to classify the value / importance of the wintering population of each species at the Site; and
- Site classification: to classify the Site with regard to its importance for each wintering species (in the context of its role in supporting the UK wintering population / species conservation status).

The BTO website[10] identifies the evaluation of internationally and nationally important species levels as follows:

> *"Criteria for assessing the international importance of wetlands have been agreed by the Contracting Parties to the Ramsar Convention on Wetlands of International Importance (Ramsar Convention Bureau 1988). Under criterion 6, a wetland is considered* ***internationally important*** *if it regularly holds at least 1% of the individuals in a population of one species or subspecies of waterbird, while criterion 5 states that any site regularly supporting 20,000 or more waterbirds also qualifies. Britain and Ireland's wildfowl belong, in most cases, to the northwest European population and the waders to the east Atlantic flyway population (Wetlands International 2012). A wetland in Britain is considered* ***nationally important*** *if it regularly holds 1% or more of the estimated British population of one species or subspecies of waterbird."*

The evaluation methodology is an extension of that used for the evaluation of national and international wetland sites, and is as follows:

1. Using the survey data, the peak count and median count of each species of wintering bird at the Site is established and the highest number regularly present at the Site is identified.;
2. This number is then calculated as a percentage of the official estimated UK national population levels;
3. The percentage is compared to a series of arbitrary bands to produce a classification of importance for each species, using a geographic scale. The bands used for each classification are given in Table 5.2.

Where there are additional factors affecting the conservation value of a species (e.g. the species is listed for its conservation concern, or forms part of the SSSI designation (i.e. tufted duck)) this may be taken into account and the geographic importance increased, particularly where wintering numbers are approaching the next percentage band / level. A straightforward justification for the variation can then be provided.

Table 5.2 Importance criteria used to assess each bird species.

Percentage of GB wintering population	Importance
>1%	National
>0.5%	Regional
>0.1%	Borough (equivalent to County, Metropolitan etc)
>0.01%	Local
>0.001%	Zone of influence (insignificant)
<0.001%	None (insignificant)

The importance for each wintering species, using the above assessment criteria, is given below in Table 5.3 for waterbirds. Statistics (maximum peak count, median count and number of visits present) have been provided to evidence the assessment.

The evaluation for non-native species and species not regularly present has been calculated but presented in (brackets).

Birds not regularly present (present on 4 dates or less and present only in 1 or 2 months across the 6 month monitoring period) may be regarded as not forming a component part of the wintering assemblage. Gulls are somewhat of an exception as these typically arrive at the Site through the afternoon and overnight on the open water, therefore they are typically under-recorded.

If a species is non-native and therefore the % threshold is not published, an evaluation has been made based on 1% of the BTO estimated wintering population for that species.

Kingfisher has also been assessed although there is no published data for the wintering population - kingfisher are present all year round and therefore the breeding UK population figure has been adopted as the same number present during the winter.

Hybrids are not a species and usually occur infrequently in very small numbers. These have not been assessed in the table below.

Table 5.3 Evaluation of each wintering species recorded.

Species Code	English Vernacular Name	Scientific Name	Peak count onsite	Median count	Present (no. visits recorded)	GB 1% threshold	Percentage of GB wintering population (%)	Evaluation of species
CG	Canada Goose	Branta canadensis	75 (visit 11)	10.5	3 other occasions numbers above 50 Absent on 5 occasions (4, 8, 9, 12, 15)	NA (non-native)		Non-native (Local)
GJ	Greylag Goose	Anser anser	25 (visit 18) and 22 (visit 16)	5	Present on 10 occasions, from 1 – 25 individuals - a count of 110 (visit 4) was a flock passing through and unusual	1400	0.0179	Local
MS	Mute Swan	Cygnus olor	4 (visit 18)	3	(present on 3 occasions across survey period) 2 on visit 1, 1 on visit 6	500	0.0080	Not regularly present (Zone of influence)
EG	Egyptian Goose	Alopochen aegyptiaca	16 (visit 7)	4	Absent 1,2,9,10 and 17	NA (non-native)		Non-native (Borough)
SV	Shoveler	Spatula clypeata	315 (visit 9)	67	All visits; over 200 individuals on 7 occasions	190	1.6579	National
GA	Gadwall	Mareca strepera	26 (visit 5)	5	Absent visits 2,11,15	310	0.0839	Local / Borough
WN	Wigeon	Mareca penelope	77 (visit 13)	25.5	Present on 15 occasions	4500	0.0171	Local
MA	Mallard	Anas platyrhynchos	26 (visit 18)	12	All visits	6700	0.0039	Local
PT	Pintail	Anas acuta	2 (visit 0)	NA	Absent remainder of surveys	200	0.0100	Not regularly present
T.	Teal	Anas crecca	25 (visit 5)	2	Present on 6 visits (0, 1, 5, 9, 10, 18) (dates in Nov, Dec, Jan and Mar).	4300	0.0058	Zone of influence
RQ	Red-crested Pochard	Netta rufina	6 (visit 7)	5	Present on 6 dates (Dec, Jan, Feb)	NA (non-native)		Small naturalised population present within Colne Valley
PO	Pochard	Aythya ferina	182 (visit 3 post-sailing) 172 (non-sailing peak)	78	All visits. Counts over 100 from 27th November and through December and early January on 6 dates. Median count drops to 60 between mid-January and end March.	230	0.7913	Regional
TU	Tufted Duck	Aythya fuligula	455 (visit 8)	147	All visits	1300	0.3500	Borough
GN	Goldeneye	Bucephala clangula	13 (visit 16)	6	All visits (absent visit 10)	190	0.0684	Local
SY	Smew	Mergellus albellus	1	1	Present on 5 dates (5-8; 11) (January and February)	1 (total population estimate 130)	1.000	Not regularly present (National)
MN	Mandarin Duck	Aix galericulata	1 (visits 16 and 18)	1	Absent remainder of surveys	NA (non-native)		Non-native - not regularly present

Species Code	English Vernacular Name	Scientific Name	Peak count onsite	Median count	Present (no. visits recorded)	GB 1% threshold	Percentage of GB wintering population (%)	Evaluation of species
GD	Goosander	Mergus merganser	1 (visit 10)	1	Absent remainder of surveys	150	0.0067	Not regularly present (Zone of influence)
LG	Little Grebe	Tachybaptus ruficollis	7 (visit 0 & 1)	2	All visits except visit 9 Median 4	150	0.0467	Local
GG	Great Crested Grebe	Podiceps cristatus	14 (visit 1)	8	All visits except visit 10	170	0.0824	Local
H.	Grey Heron	Ardea cinerea	18 (visit 16)	2	Absent on 6 occasions Median 4	450	0.0400	Local
CA	Cormorant	Phalacrocorax carbo	40 (visit 16)	14	6 counts over 26 – more present from visit 12 onwards	620	0.0645	Local
WA	Water Rail	Rallus aquaticus	1 (visit 9)	1	Absent remainder of surveys	N/A		Not regularly present (None (insignificant))
MH	Moorhen	Gallinula chloropus	10 (visit 13)	3	All visits	3,000	0.0033	Zone of influence
CO	Coot	Fulica atra	75 (visit 18)	41	All visits	2000	0.0375	Local
OC	Oystercatcher	Haematopus ostralegus	2	2	Present on 6 dates in February and March	2900	0.0007	None (insignificant))
L. *	Lapwing	Vanellus vanellus	65 (visit 12 - Feb)	2	Present on one date in each of Nov, Dec, Jan, Feb.	6200	0.0105	Local
SN	Snipe	Gallinago gallinago	1 (visit 17)	1	Absent remainder of surveys	10,000	0.0001	Not regularly present (None (insignificant))
BH	Black-headed Gull	Chroicocephalus ridibundus	919 (visit 17)	223	All visits	22000	0.0418	Local
CM	Common Gull	Larus canus	44 (visit 13)	3.5	Absent on visits, 0, 2 and 10	7000	0.0063	Zone of influence
GB	Great Black-backed Gull	Larus marinus	4 (visit 5)	3	3 dates in Nov, Dec, Jan - 3 or 4 birds	760	0.0053	Not regularly present (Zone of influence)
HG *	Herring Gull	Larus argentatus	40 (visit 9)	4	Peak count Jan. Present in Nov, Dec, Jan and March (3,6,1 birds)	7300	0.0055	Not regularly present (Zone of influence)
LB	Lesser Black-backed Gull	Larus fuscus	20 (visit 9)	2	Present every month (n=8)	1200	0.0167	Local
K.	**Kingfisher**	**Alcedo atthis**	2 (visit 4)	2	Recorded on visits 4,12,18	Not reported; resident breeding population 3850 pairs (2016) (assume GB pop is 7700)	0.026	Local

Key
Bold - WCA Schedule 1 species
BoCC, 5 red-listed species
BoCC, 5 amber-listed species
*NERC-S41 listed species

5.3 COLNE VALLEY GRAVEL PITS

Broadwater Lake forms a significant part of the wider Colne Valley Gravel Pits which is monitored annually for the WeBS count. The role of the Site was considered in the context of the wider CVGP wintering bird population.

Firstly, the CVGP dataset were briefly reviewed. The 5yr rolling average includes years (2021-2) when Broadwater Lake was not monitored, therefore the average would be expected to be affected and not a true representation of the entire CVGP population. The last year that the Broadwater Lake population would be included in the total for CVGP was 2018/19. The two numbers were compared for each species and it was found that for the vast majority of species, the numbers for the 5yr rolling average were lower than for 2018/19. The WeBS 5yr average count was lower than the 2022/23 site counts for a number of species. Whereas the WeBS 2018/19 data had higher counts or approximately the same count as for the Site (where Broadwater Lake is known to support the vast majority of a species within the Colne Valley).

Therefore, it was considered that the 2018/19 data were a better representation of the whole CVGP populations than the 5yr rolling average.

The CVGP species data (using the 2018/19 data) were then evaluated using the method set out in Section 5.2 above using the GB 1% threshold to identify the geographic importance for each species. Where the 5yr average was higher than the 2018/19 peak count then the 5yr average was used.

Table 5.4 provides the peak Site count recorded per species, and the median; this is set alongside data for the CVGP: the 5yr average peak count recorded (and if relevant the month in which the peak count was recorded), and the 2018/19 peak count (the last year within which the Broadwater Lake data were fully included). The percentage of the CVGP population occurring at the Site was calculated. The comment provides an evaluation of the Site population and how it contributes to the CVGP population.

For ease, below these tables, a summary has been provided in Section 5.4 below.

Table 5.4 CVGP evaluation and role of the Site in supporting the CVGP wintering bird populations.

English Vernacular Name	Peak count onsite	Median count onsite	GB 1% threshold	CVGP 5yr average (peak count month) (no count at BW Lake in 2021 or 2022)	CVGP peak count 2018-19 (last full count that included Broadwater Lake)	CVGP 2018/19 Percentage of GB	CVGP Evaluation	Difference between peak 2022-23 site count and 2018/19 CVGP count	% of CVGP population supported by the Site	Discussion
Canada Goose	75 (visit 11)	10.5	NA (non-native)	304 (Nov)	341	0.207	Borough	-266	21.99	Site supports CVGP population at Local level. Species non-native.
Greylag Goose	25	5	1400	142 (Aug)	78	0.034	Local	-53	32.05	Site supports CVGP population at Local level.
Mute Swan	4 (visit 18)	3	500	90	96	0.181	Borough	-92	4.17	Site not important for supporting CVGP population of this species - only recorded 3 times
Egyptian Goose	16 (visit 7)	4	NA (non-native)	36	39	0.696	Regional	-23	41.03	Site supports CVGP population at Borough level. Species non-native.
Shoveler	315 (visit 9)	67	190	198 (214 recorded in 2017/18; only 51+ counted in 2021/2)	284	0.990	National	117	110.92	Higher peak count than for entire CVGP population. Site will be core territory for this species with typically 1/3 population present onsite and occasional congregations of whole CVGP population. High number may represent a population growth trend.
Gadwall	26 (visit 5)	5	310	114 (90+ in 2021/2)	135	0.435	Borough / Regional	-109	19.26	Site supports CVGP population at Local / Borough level. Regularly present.
Wigeon	77 (visit 13)	25.5	4500	119	175	0.039	Local	-98	44.00	High proportion of CVGP population recorded onsite. Regularly present.
Mallard	26 (visit 18)	12	6700	220 (Oct)	246	0.036	Local	-220	10.57	Site not important for supporting CVGP population of this species
Pintail	2 (visit 0)	NA	200	Not recorded		0.000	Not recorded	2	NA	Only recorded once at the Site
Teal	25 (visit 5)	2	4300	52	101	0.023	Local	-76	24.75	Present at Site in 3 months - just using the lake occasionally
Red-crested Pochard	6 (visit 7)	5	NA (non-native)	38	45	7.895	Non-native	-39	13.33	Small naturalised population present within Colne Valley
Pochard	182 (visit 3 post-sailing) 172	78	230	215 (Sep) (156 recorded in 21/2)	273	0.941	National	-91	66.67	Site important for this species within CVGP, regularly supporting 1/3rd of population

English Vernacular Name	Peak count onsite	Median count onsite	GB 1% threshold	CVGP 5yr average (peak count month) (no count at BW Lake in 2021 or 2022)	CVGP peak count 2018-19 (last full count that included Broadwater Lake)	CVGP 2018/19 Percentage of GB	CVGP Evaluation	Difference between peak 2022-23 site count and 2018/19 CVGP count	% of CVGP population supported by the Site	Discussion
	(non-sailing peak)									
Tufted Duck	455 (visit 8)	147	1300	672 (Jan) (535 recorded in 2021/2)	710	0.507	Regional	-255	64.08	Site important for this species within CVGP, regularly supporting up to 1/3 the CVGP population
Goldeneye	13 (visit 16)	6	190	28	36	0.171	Borough	-23	36.11	Site supports CVGP population at the Local level
Smew	1 (visits 6-11)	1	1 (total population estimate 130)	Not recorded	Not recorded	Not recorded	Not recorded	1	Likely 100%	Present at Site in January and February- Site is possibly the most important site within CVGP.
Mandarin Duck	1 (visits 16 and 18)	1	NA (non-native)	3	4	0.029	Local	-3	25.00	Not a regular visitor at the Site
Goosander	1 (visit 10)	1	150	6	15	0.100	Borough	-14	6.67	Site not important for supporting CVGP population of this species
Little Grebe	7 (visit 0 & 1)	2	150	9	9	0.056	Local	-2	77.78	Typically 2 birds present, majority or total of CVGP population
Great Crested Grebe	14 (visit 1)	8	170	115 (Oct)	148	0.822	Regional	-134	9.46	Site not important for supporting CVGP population of this species
Grey Heron	18 (visit 16)	2	450	37 (Jan)	34	0.074	Local	-16	52.94	Site supports half the CVGP population
Cormorant	40 (visit 16)	14	620	126 (Nov)	158	0.243	Borough	-118	25.32	Site supports CVGP population at the Local level
Water Rail	1 (visit 9)	1	N/A	2	2			-1	50.00	Not a regular visitor at the Site
Moorhen	10 (visit 13)	3	3,000	70 (Jan)	77	0.025	Local	-67	12.99	Supports CVGP population (zone of influence / Local)
Coot	75 (visit 18)	41	2000	1482 (Nov)	1594	0.778	Regional	-1519	4.71	Site not important for supporting CVGP population of this species
Oystercatcher	2	2	2900	2 (3+ recorded 2021/2)	0	0.000	None (insignificant)	2	NA	Present onsite between 7th February and 19th March only.
Lapwing	65 (visit 12 - Feb)	2	6200	74	59	0.009	Local	6	87.84	Infrequent visitors to Site however present on dates in 4 months.
Snipe	1 (visit 17)	1	10,000	2 (0 for last 3 years)	6	0.001	Zone of influence	-5	16.67	Not a regular visitor at the Site

English Vernacular Name	Peak count onsite	Median count onsite	GB 1% threshold	CVGP 5yr average (peak count month) (no count at BW Lake in 2021 or 2022)	CVGP peak count 2018-19 (last full count that included Broadwater Lake)	CVGP 2018/19 Percentage of GB	CVGP Evaluation	Difference between peak 2022-23 site count and 2018/19 CVGP count	% of CVGP population supported by the Site	Discussion
Black-headed Gull	919 (visit 17)	223	22000	910 (Feb)	890	0.040	Local	29	103.26	Assumed whole CVGP population using the lake.
Common Gull	44 (visit 13)	3.5	7000	28	12	0.002	Zone of influence	32	366.67	Counts over 40 on 2 occasions onsite. Assumed whole CVGP population using the lake. Likely coming in at dusk so under-recorded across CVGP.
Great Black-backed Gull	4 (visit 5)	3	760	7	13	0.017	Local	-9	30.77	Infrequent visitors to Site however present on dates in 3 months, as dusk roosting may be under-recorded
Herring Gull	40 (visit 9)	4	7300	18	11	0.001	Zone of influence	29	363.64	Dusk roosting so under-recorded across CVGP.
Lesser Black-backed Gull	20 (visit 9)	2	1200	38 (Jul)	23	0.018	Local	-3	86.96	Site probably most important lake within CVGP
Kingfisher	2 (visit 4)	2	3850	7 (Apr)	4	0.052	Local	-2	50.00	Important for supporting population within CVGP

5.4 SUMMARY

The results are summarised in Table 5.5 below; these are the individual species forming a regular part of the wintering assemblage which are individually valued at the Local level or above.

Table 5.5 Species forming part of the Site assemblage and valued at the Local level or greater (17 species) along with historical and CVGP context

English Name	Onsite - Evaluation of species	Colne Valley (White and Harris 2008)*	Evaluation of species from CVGP 5yr average / 2018/19 peak count*
Shoveler	National	National	National
Pochard	Regional	Somewhat below National (likely Regional)	National
Tufted Duck	Borough	National	Regional
Gadwall	Local / Borough	National	Borough / Regional
Greylag Goose	Local	Not evaluated	Local
Wigeon	Local	Not evaluated	Local
Mallard	Local	Not evaluated	Local
Goldeneye	Local	Not evaluated	Borough
Little Grebe	Local	Not evaluated	Local
Great Crested Grebe	Local	National	Regional
Grey Heron	Local	Not evaluated	Local
Cormorant	Local	National	Borough
Coot	Local	Somewhat below National (likely Regional)	Regional
Lapwing	Local	No winter data. 17 recorded on autumn passage - 2 non-breeding pairs on cleared island (assume spring).	Local
Black-headed Gull	Local	Likely Local	Local
Lesser black-backed Gull	Local	Present year round - max count 13 (Nov07)	Local
Kingfisher	Local	Not evaluated (likely Local)	Local

Non-native species and species valued below the Local level which form a regular part of the assemblage at the Site are provided on Table 5.6:

Table 5.6 Site assemblage (9sp) valued at the Zone of influence or insignificant (none) along with CVGP context

English Name	Site evaluation	CVGP Evaluation
Canada Goose	Non-native (Local)	Non-native (Borough)
Egyptian Goose	Non-native (Local / Borough)	Non-native (Regional)
Moorhen	Zone of influence	Local
Teal	Zone of influence	Local
Red-crested Pochard	Non-native (naturalised)	Non-native (naturalised small population)
Great Black-backed Gull	Zone of influence	Local
Herring Gull	Zone of influence	Zone of influence
Common Gull	Zone of influence	Zone of influence
Oystercatcher	None (insignificant)	None (insignificant) (also not recorded in White and Harris 2008)

Non-regular visitors (present on 4 or less monitoring dates and in two months or less) which therefore do not form regularly part of the wintering assemblage are provided in Table 5.7 below.

Table 5.7 Non-regular visitors to the Site

English Name	Evaluation if were regular visitors	CVGP Evaluation
Smew	National (1)	National (1) (National in White and Harris 2008)
Pintail	Local	Not recorded
Mute Swan	Zone of influence	Borough
Goosander	Zone of influence	Borough
Mandarin Duck	Non-native	Local
Snipe	None (insignificant)	Zone of influence
Water Rail	NA	Not recorded

Commentary on the key species for the Site is collated in Table 5.8 below.

Table 5.8 Key species for the Site

English Name	Onsite Evaluation	CVGP Evaluation	Comment
Shoveler	National	National	Slightly higher peak count at the Site in 2022/23 than for 2018/19 CVGP population. Site likely to be home lake for this species. High number may represent a population growth trend. Specialist zooplankton feeder, prefers Broadwater and Stocker's Lake (White and Harris 2008) but likely to feed nocturnally on other disturbed lakes.
Pochard	Regional	National	Site very important for this species within CVGP, regularly supporting 1/3rd of population.
Tufted Duck	Borough	Regional	Site very important for this species regionally, regularly supporting up to 1/3 the CVGP population
Gadwall	Local / Borough	Borough / Regional	Site supports CVGP population at Local / Borough level. Regularly present.
Greylag Goose	Local	Local	Site supports CVGP population at Local level.
Wigeon	Local	Local	Site supports CVGP population at Local level.
Mallard	Local	Local	Site supports CVGP population at Local level.
Goldeneye	Local	Borough	Site supports CVGP population at Local level.
Little Grebe	Local	Local	Typically 2 birds present, majority or total of CVGP population
Great Crested Grebe	Local	Regional	Site not important for supporting CVGP population of this species
Grey Heron	Local	Local	Site supports half the CVGP population
Cormorant	Local	Borough	Site supports CVGP population at the Local level
Coot	Local	Regional	Supports CVGP population (zone of influence / Local) - peak site count 75 versus CVGP c. 1600
Lapwing	Local	Local	Assumed whole CVGP population visiting the lake infrequently.
Black-headed Gull	Local	Local	Assumed whole CVGP population using the lake.
Lesser black-backed Gull	Local	Local	Site probably most important lake within CVGP for this species.

6.0 PRE- AND POST-SAILING COUNTS

The results of the pre- and post- sailing counts are reported below. These provide:

a. an overview of changes to general distribution across the lake for individual species in response to sailing disturbance; and

b. a measure of the effect of disturbance on the counts of each species present on the lake immediately following the period of disturbance.

6.1 DISTRIBUTION EFFECTS

The sailing race track is shown below in Figure 6.1. The island numbers are shown in Figure 6.2.

Figure 6.1 BSC sailing race track showing main sailing areas

Figure 6.2 Island numbers

Generally, the sailing course extended from the Sailing Club (at the northern end of the Lake) through open water as far south as Island 14. The sailing boats often also circumnavigated Island 1 pre-and post-race. On occasion, the boats sailed between Islands 4 & 5 and up the eastern channel (between islands 1-4 and the eastern shore).

Figure 6.3 shows the distribution of waterbirds for all eligible visits (see Table 3.1) combined.

Figure 6.3 Distribution of all waterbirds for all eligible visits across the three events.

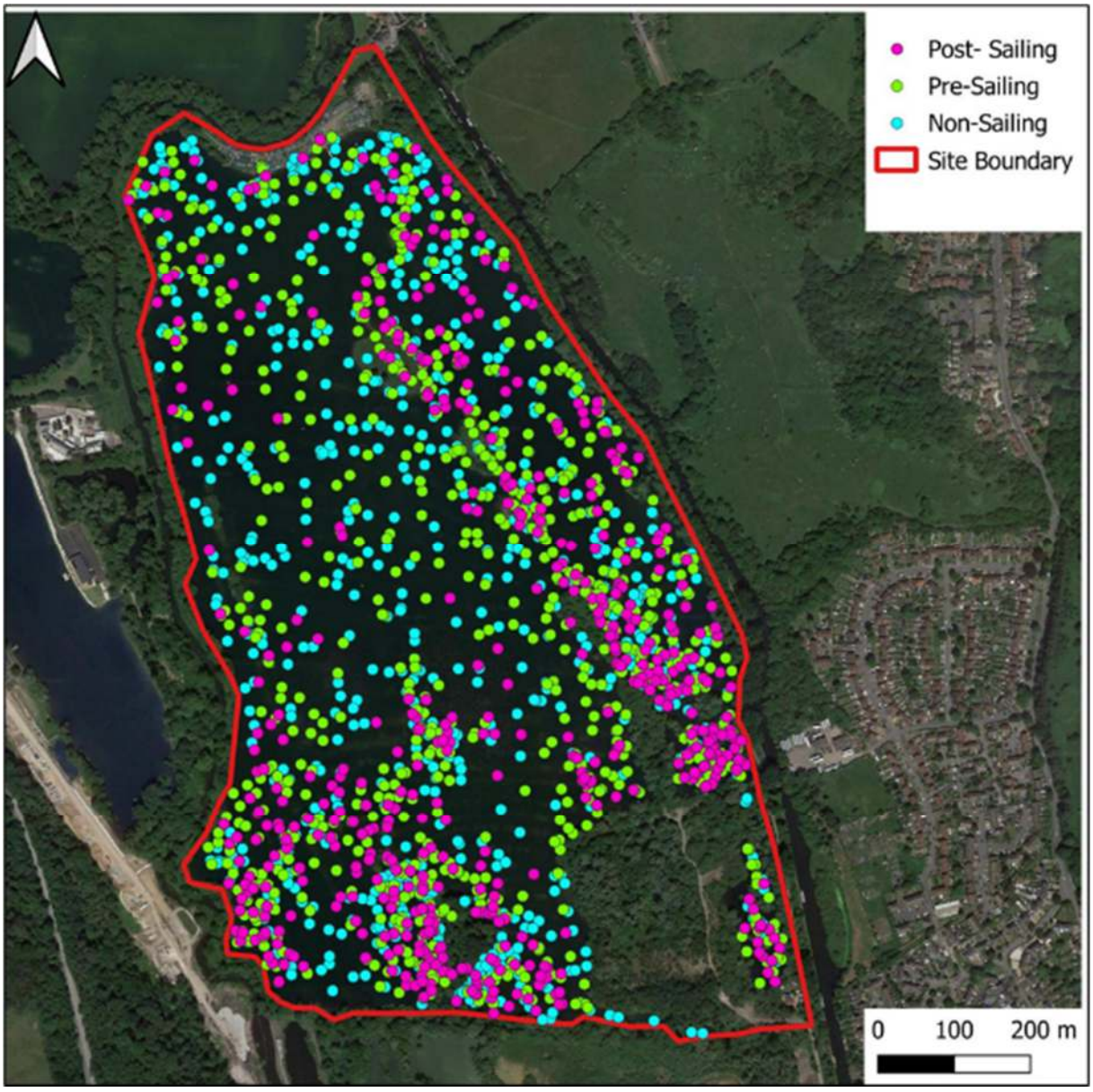
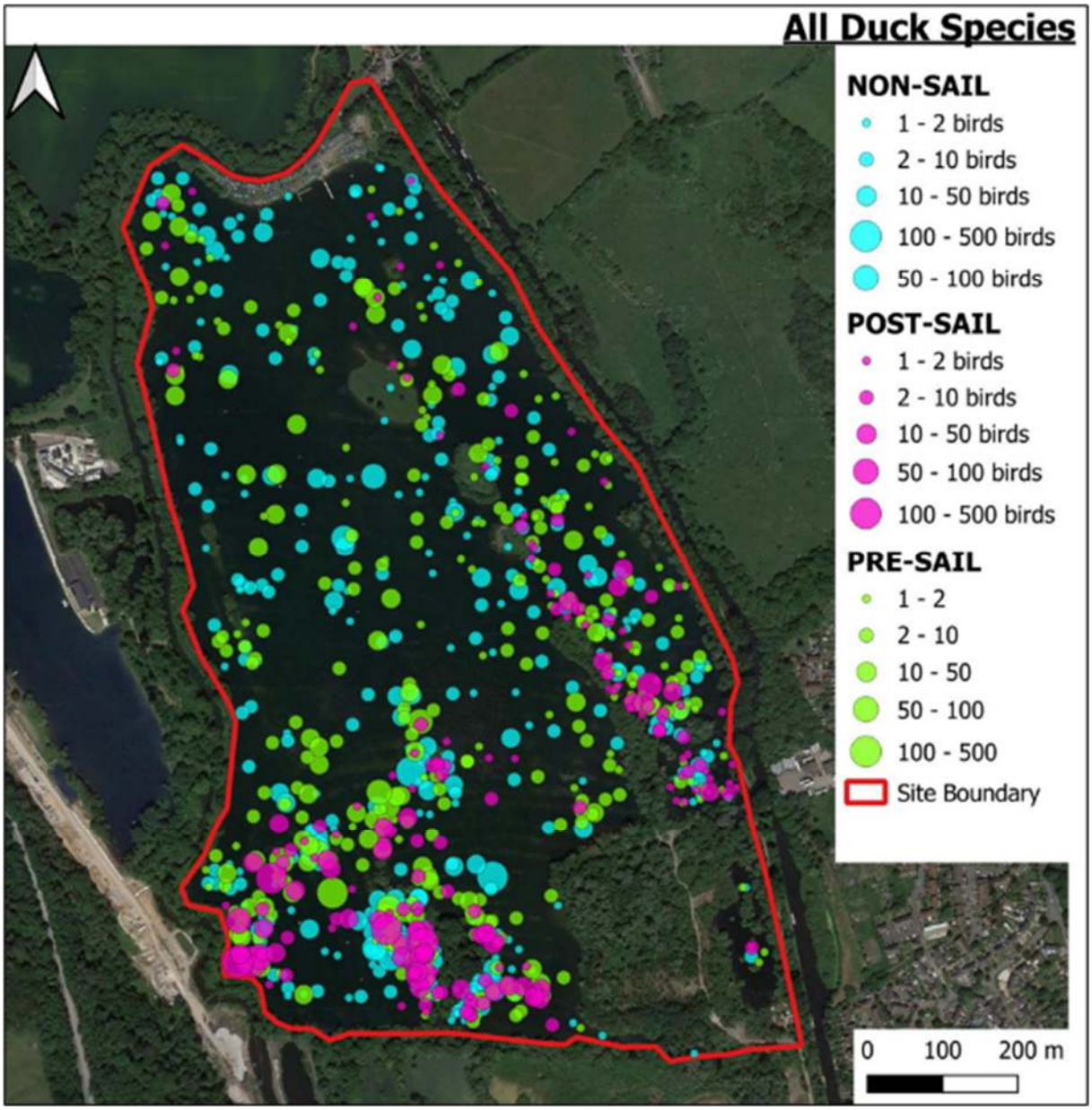


Figure 6.3 shows that there are more birds in the centre of the Lake (the sailing course) during non-sailing days and pre-sailing. During sailing and post-sailing many birds move to the east and south-west areas.

If this is analysed further using just the data for just duck species (Figure 6.4), it becomes apparent that the birds that remain in the middle of the lake are not ducks. Post sailing the ducks have moved predominately into the south-west of the site with fewer in the eastern corridor. Ducks that were present around islands 9, 14, 15 & 16 pre-sailing have either moved or vacated the site due to the sailing.

Figure 6.4 Distribution of duck species for all eligible visits across the three events.



The birds that remain in the middle of the sailing course, post-sailing tended to be predominately gulls (Figure 6.5) with species such as Coot and grebes, having moved to the sides of the lake once sailing commenced (Figure 6.6).

Figure 6.5 Distribution of gull species for all eligible visits across the three events

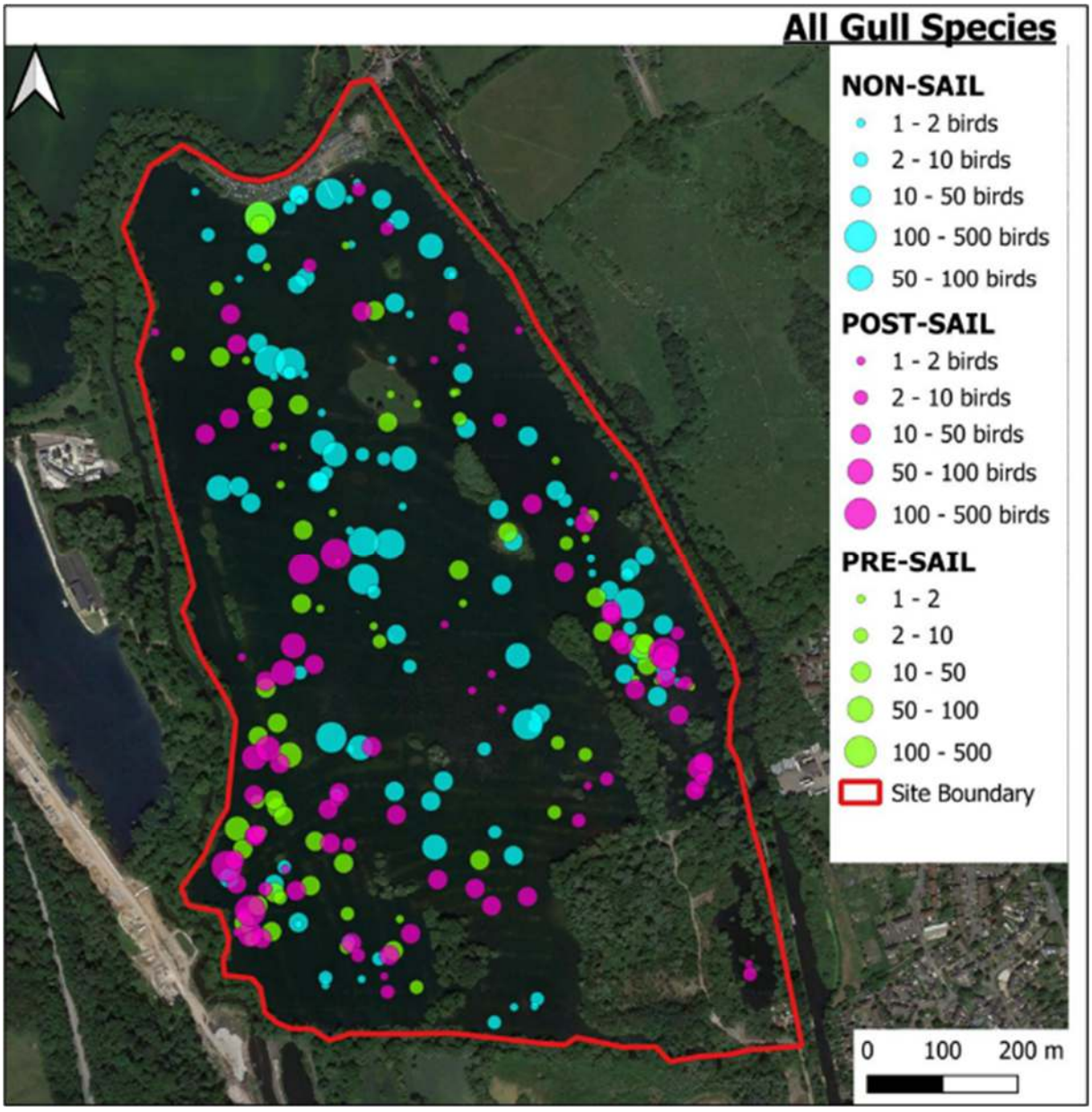
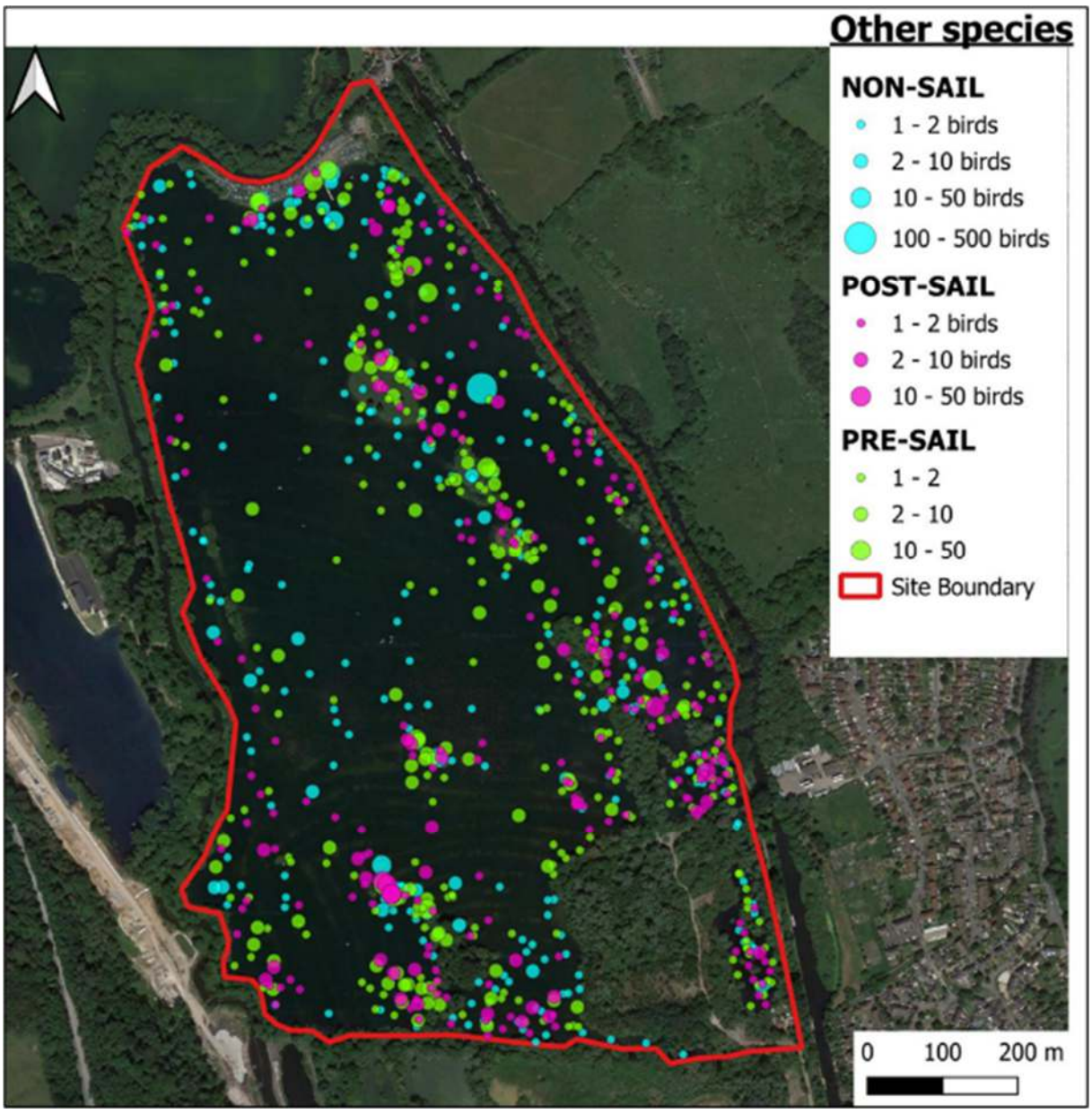
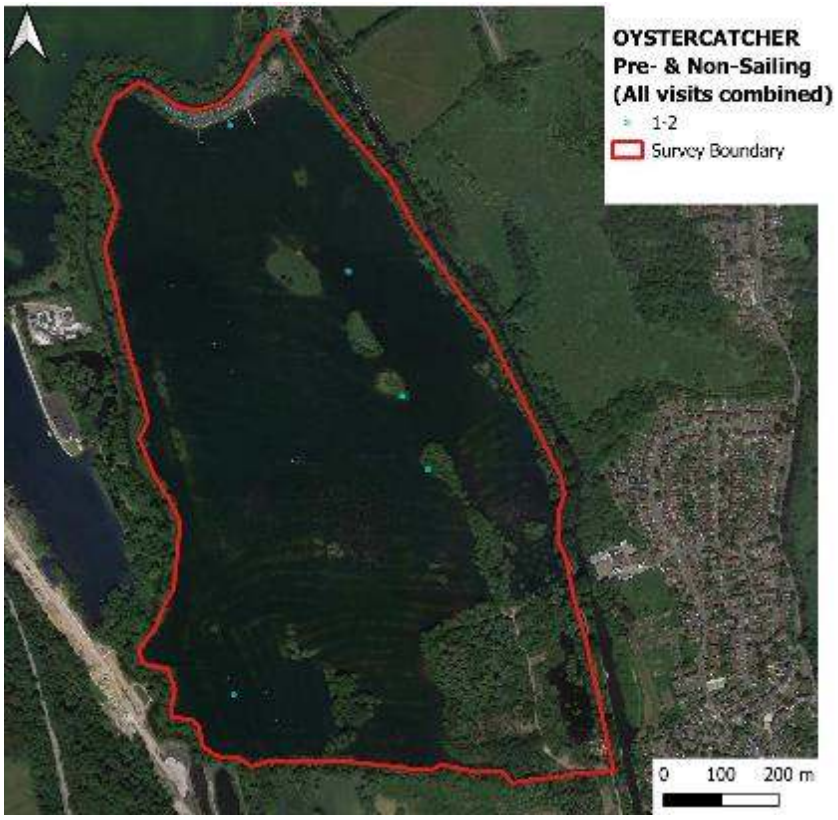


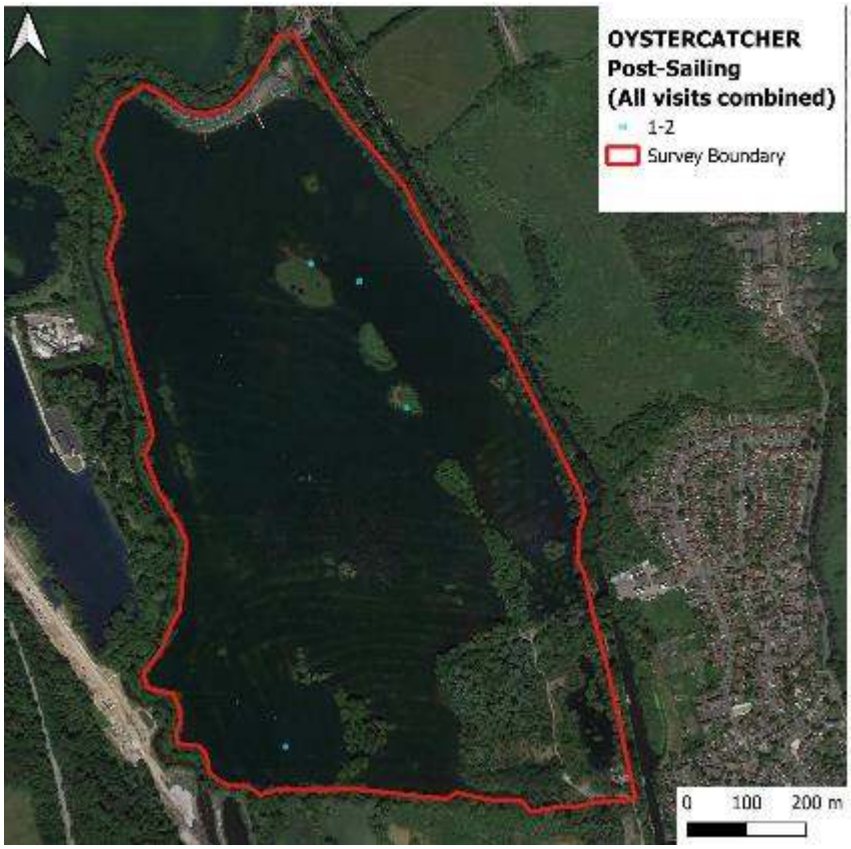
Figure 6.6 Distribution of other waterbird species (geese, swans, grebes, herons, cormorant, moorhen, coot, etc) for all eligible visits across the three events.



Waders are typically considered to be particularly prone to disturbance (of any kind). Oystercatcher was present for four of the disturbance surveys although in low numbers - there were typically 1 or 2 oystercatcher which tended to remain on the site post-sailing and there was evidence of an unchanged distribution (Figure 6.7).

Figure 6.7 Distribution of wader species for all eligible visits across the three events





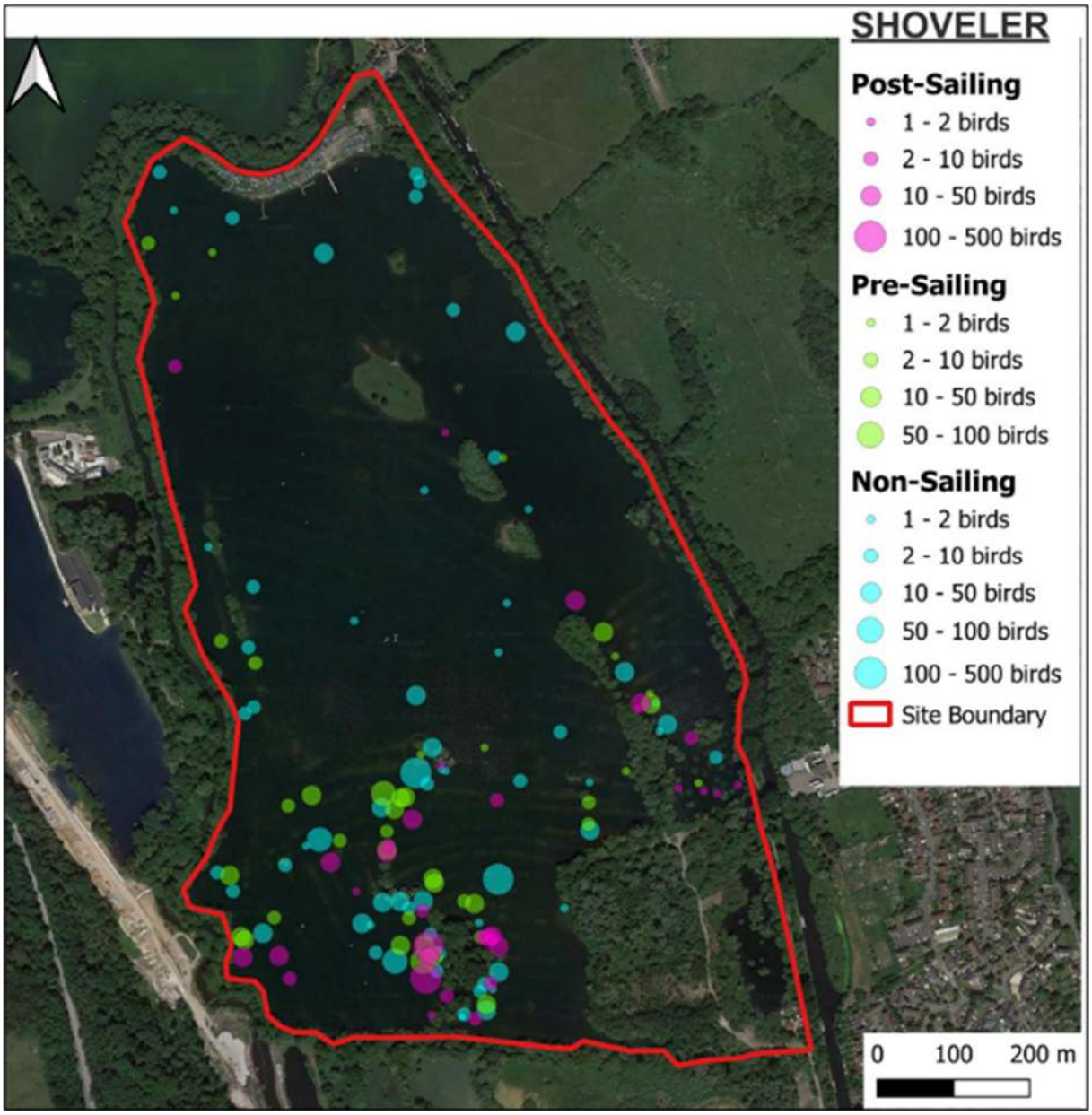
Key duck species

Three duck species are of particular importance at the Site: Shoveler, Pochard, and Tufted Duck. The following looks at the movements and distribution of these three species in relation to sailing disturbance.

Shoveler

The Shoveler at the Site tend to prefer the shallower water around the islands, especially around Islands 10, 11 and 12, in the southern corner and the edges of the lake. When disturbed the birds tended to move further south on the lake (Figure 6.8).

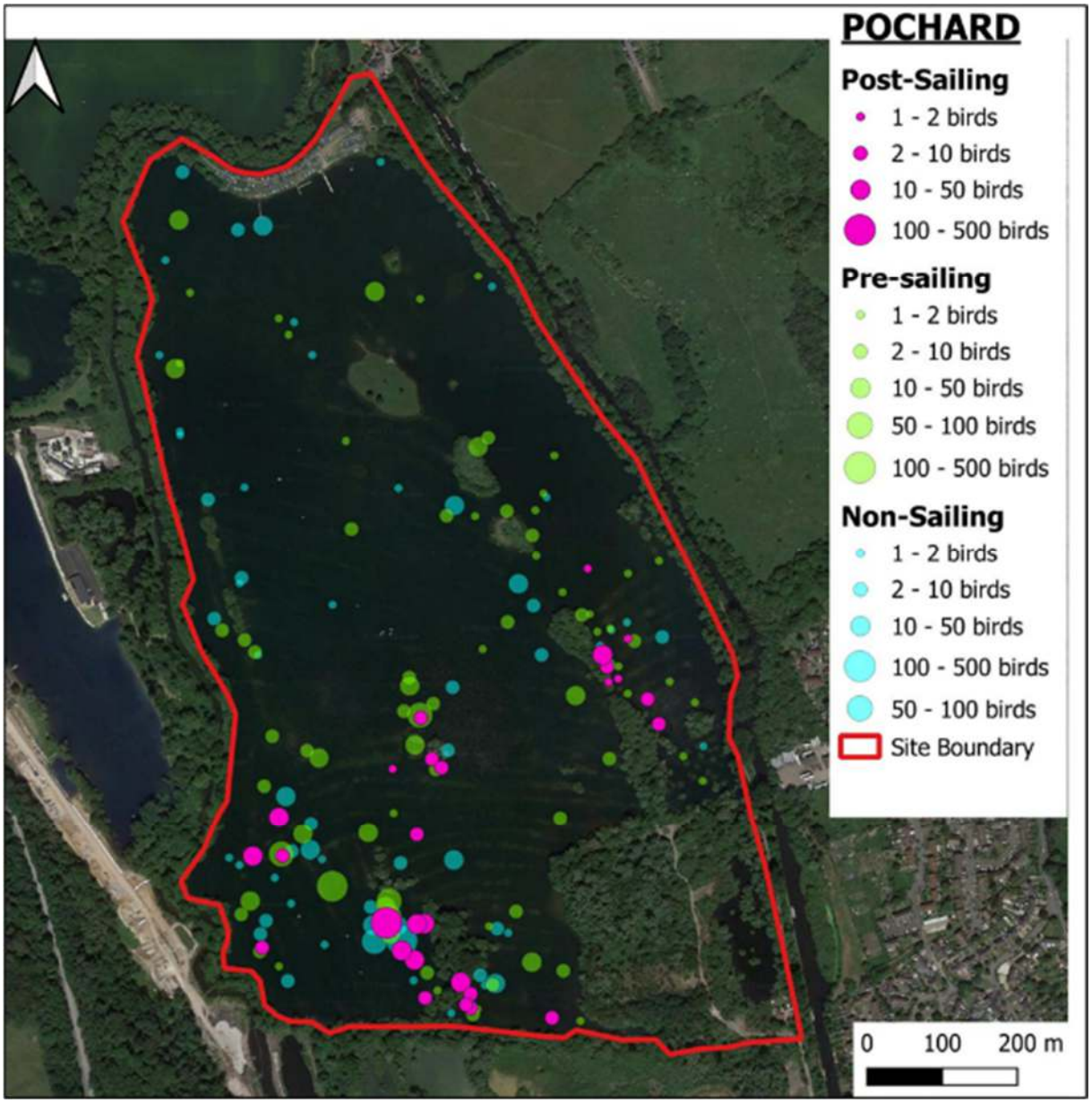
Figure 6.8 Distribution of Shoveler for all eligible visits across the three events.



Pochard

Pochard were found across the lake during the non-sailing and pre-sailing events, but most moved into the south west quadrant of the Lake following disturbance, with the remainder in the south east bay (Figure 6.9).

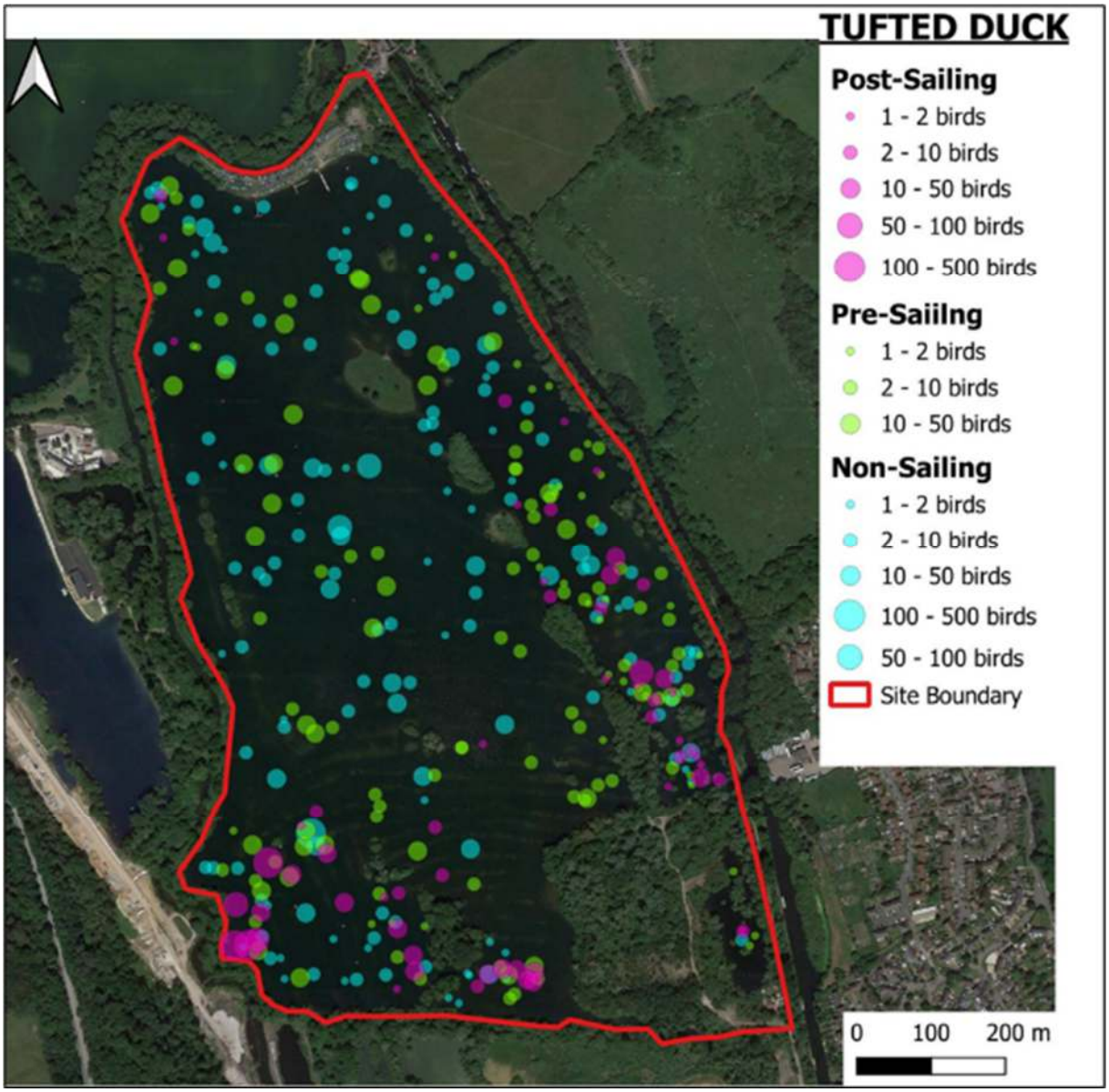
Figure 6.9 Distribution of Pochard for all eligible visits across the three events.



Tufted Duck

Tufted Duck was found across the whole of the lake. Post-sailing the species tended to concentrate in the far south-west corner, east of islands 10, 11 & 12 as well as in the southern part of the eastern corridor (Figure 6.10). However, the species seemed to be marginally more tolerant of disturbance as a few small groups were found in the north west corner and along the eastern corridor, post-sailing. This a slightly different pattern than Shoveler or Pochard.

Figure 6.10 Distribution of Tufted Duck for all eligible visits across the three events



6.2 RESPONSE CHARACTERISATION

The general response recorded of species groups to sailing disturbance is described in more detail below, with an indication of sensitivity to disturbance.

Ducks

Ducks showed a mixed response. Most birds tended to swim slowly south to the southwest and southeast areas as soon as people at BSC started to congregate and ready their boats for the morning's sailing (pers. obs.). The main disturbance event was caused when boats started entering the water, especially the safety boat (a motorboat) which would check the sailing course, often at speed. Birds responded to this by taking flight and either relocating to a 'safe' area of the lake (usually the southern part of the lake south of a line from islands 6, 12 & 13) or (less frequently) by appearing to leave the Site.

Some species of dabbling duck (e.g. Mallard and Gadwall) tended to be more tolerant to sailing disturbance and tucked into islands, whilst other species such as Shoveler and Wigeon were more prone to disturbance either moving to the 'safe' areas or vacated the Site.

Diving duck (e.g. Pochard, Goldeneye and Tufted Duck) tended to be easily disturbed by sailing and pre-sailing activity and it was mostly these species (along with Shoveler and Wigeon) that were flushed by boating activity, either relocating to safe parts of the lake or leaving it.

Geese

For goose species, many seemed to leave the Site, with Egyptian Goose being the most tolerant to sailing disturbance.

There were only small numbers of Mute Swan on the Site (only recorded on Visit 18), and they showed no response to the sailing disturbance.

Other waterbird species

Other waterbird species (Grebes, Grey Heron, Cormorant, Coot and Moorhen) generally showed more tolerance to sailing activities than other species such as ducks and geese.

Waders were present infrequently and the data did not allow for any meaningful conclusions to be made.

Gulls were the group of birds least affected by sailing. Though very few large gulls were present on the Site, Black-headed Gull numbers increased during the sailing events. This is not thought to be as a response of the sailing, rather that the species collects in increasing numbers at a waterbody throughout the day (pers. obs.). When gulls were displaced by the sailing boats they relocated a short distance to another part of the lake, but this was not necessarily the 'safe' areas and included the sailing course.

For some species, including ducks, there was what could be perceived to be an increase in numbers post-sailing. In many cases this was considered to be a false positive as birds were displaced from roosting places in the vegetation, either on the lake shores or around the various islands, by the sailing (where they may have been missed during the initial counts) and joined the displaced flocks in the southern part of the Lake.

6.3 CHANGES IN NUMBERS USING THE LAKE

By counting before and after a sailing event it was possible to assess the change in bird numbers pre-and post-sailing. The data were extensively analysed, with calculation of different statistics to try to characterise response. Either the median change has been reported, and / or the P95 value where relevant (this is the 95% statistical probability of the response occurring up to that level (but not exceeding it)).

The analysis data are provided in Appendix F: Disturbance Data Descriptive Statistics.

Different species/families of birds showed different percentage changes pre- and post-sailing. Narratives per species are provided below.

Gulls

Black-headed gull numbers always increased post-sailing. This is considered to be reflective of how these gulls use the lake, rather than the influence of sailing disturbance. As an important overnight gull roost, birds leave the lake very early to forage, returning to the lake throughout the day. This particular species is considered to be highly tolerant to disturbance and not affected by sailing.

Common gull numbers fluctuated significantly, with a large increase post-sailing on one occasion when 18 birds were already present (increasing to 44 post-sailing); however when only 1 or 2 birds were present they might leave or stay. Overall sailing disturbance is not considered to affect this species based on the data available, and the numbers present were independent of sailing activities.

Lesser black-backed gull was not present for any of the sailing day disturbance counts, while herring gull was only present on four occasions - no conclusions can be made about the effects of disturbance on these species.

Ducks

Tufted duck showed a tendency for increased numbers onsite post-sailing. On four of the disturbance monitoring surveys, numbers increased post-sailing by 20-30%. On one occasion the numbers essentially did not change (2%), and on two occasions numbers decreased (46-55%). Although this species very visibly responded to disturbance and large numbers were typically disturbed (see disturbance behaviour monitoring results) this is more a reflection of the large population using the lake and the tendency for this species to take flight. The data suggests the birds rarely leave the lake and prefer to remain onsite. The increased count post-sailing has been suggested by experienced ornithologists undertaking the surveys to be a result of birds coming out from hidden places within vegetation to join groups of birds, although this can't be verified. White and Harris (2008) reported that Broadwater Lake acts as a refuge for some species of birds when other smaller lakes across the Colne Valley are used for watersports, even when Broadwater itself is being used for sailing. This may also account for increased numbers.

Pochard also had post-sailing increases, equally mixed with post-sailing decreases. Numbers increased post-sailing on four occasions, and decreased on three. The biggest change was a loss of 39% and the biggest increase was 33%. The P95 response was a 26% gain post-sailing.

Goldeneye was similarly balanced in response to sailing disturbance, but with a slight tendency for individual birds to leave the lake. There was a 63-67% gain post sailing on two occasions, but three losses over 40%. Numbers of this species at the Site are much smaller (median = 6, peak count 13). Overall goldeneye shows high resilience to disturbance at Broadwater Lake.

Gadwall numbers also appeared to be independent of sailing activities. Counts increased post-sailing on two occasions, but remained the same or decreased on five occasions. Typically low numbers were

present (median was 5 for all visits, 6 when undisturbed and 4.5 when disturbed). The largest number change was an increase of 11 birds post-sailing (92%). Overall, there was a very slight effect of disturbance which was not considered to be significant. Gadwall numbers at Broadwater Lake appear to be independent of sailing disturbance and therefore other factors are determining presence and numbers on sailing days.

Mallard - counts increased post-sailing on two occasions, but remained the same or decreased on five occasions. When there were low numbers pre-sailing, the post-sailing response was an increase; concurrently when numbers were higher pre-sailing the post-sailing numbers showed a decrease. Overall the count changes appeared more to be a function of the visibility of the birds; disturbance from sailing does not appear to affect this species significantly (numbers independent of sailing disturbance).

Shoveler - counts increased post-sailing on two occasions, but remained the same or decreased on five occasions. The effect of disturbance appeared to increase numbers; however there was not a consistent response. 63% and 33% increases on two occasions were recorded along with decreases (5) between 21% up to 85%. The P95 response is a 33% increase. The median post-disturbance is higher than the median in the absence of disturbance or pre-sailing. Once again, the numbers of this species at Broadwater Lake appear to be independent of concurrent sailing activities, or that other factors have a stronger influence. It may also be that disturbance flushes some individuals out from hiding spots within vegetation to join groups of birds where they may be more easily counted.

Wigeon - due to low numbers / absence from counts before January, the data from November and December were discarded. Surveys from January to March found one increase in numbers (24 to 29) - the remaining counts showed a reduction in numbers post-sailing from 100% leaving (low numbers - 9 individuals) to 36% (when higher numbers present - 77 pre- and 42 post-sailing). Analysis of the medians for pre- and post-disturbance found a decrease of c. 13-21% which can be concluded is a result of sailing disturbance. Overall this species is considered to show a small decline in numbers as a result of sailing disturbance, and likely has a medium sensitivity to disturbance.

Geese

Greylag goose is a species that is clearly sensitive to disturbance. A typical c. 50% reduction in numbers was apparent in the dataset. The species was absent from the Site on two of the seven disturbance surveys analysed so the data are less robust than for other species which were present on more dates.

Canada goose was possibly the most sensitive species to sailing disturbance with a median of c.80% of birds leaving the Site as a result.

Egyptian goose responded to sailing disturbance with 43% of individuals leaving the Site.

Other waterbird species

Grebes

Great crested grebe had post-sailing increases, equally mixed with post-sailing decreases. The peak increase was 58% and decrease was 67%; the lowest change was an 8% gain post-sailing - effectively the typical response was a 44% gain (P95).

Little grebe was also recorded in low numbers; this species also tended to show increases post-sailing. Sometimes it was absent pre-sailing and other times post-sailing. The data suggest that disturbance is not the reason for the fluctuating counts at the lake, and the species is likely using other sites regularly - it was counted on 20 of 29 counts in total (i.e. n=20). No conclusion can be made about the effects of disturbance on this species as a result.

Cormorant

Cormorant showed a slight decrease in numbers post-sailing; one count post-sailing was higher but typically numbers reduced very slightly. The P95 was -20% which seems to represent a typical disturbance scenario for this species.

Grey Heron

Grey heron counts were the same or lower following sailing disturbance. Numbers recorded were typically low (median 1.5) with the peak count of 18 being unusual, so a reduction in numbers was usually 50%. Birds were often fishing in hidden spots during the day or away from the Site, reducing the counts. Heron is typically considered sensitive to any kind of visual disturbance however rarely leaving a site entirely but moving away to a more secluded spot (if available).

Coot

Coot had one post-sailing count higher (38%) than pre-sailing; the rest of the counts showed lower numbers (-4% to -54%). Overall a 7% reduction post-sailing was typical.

Moorhen

Moorhen numbers remained unchanged on 2 occasions, and increased once (40%) but numbers reduced on 4 occasions post-sailing, with a reduction of 20-100%. Numbers were typically low (peak count 10 median 3). Overall the changes could not be confidently ascribed to the effects of sailing due to the small population size.

Waders

Lapwing was only present on a single sailing day survey (visit 0) which was not included in the disturbance analyses due to being constrained by being undertaken by a single surveyor. Nonetheless, 32 lapwing were counted pre- and post-sailing (i.e. no apparent effect of sailing). The other dates when individuals were present were not sailing days. This species is only considered to be a regular member of the assemblage due to being present in four different months on single dates. No conclusions can be made about effects of sailing disturbance given the low levels of presence.

Oystercatcher was present for four of the disturbance surveys although in low numbers - there were typically 1 or 2 oystercatcher with post-sailing increases or decreases by 1 individual only which averaged out as a 0% change from sailing disturbance.

Kingfisher

Kingfisher does not utilise the open water habitats affected by sailing disturbance and therefore an assessment has not been made for this species.

7.0 DISTURBANCE BEHAVIOUR

7.1 LITERATURE SEARCH

Colne Valley

The following text has been taken from White and Harris 2008 which provides a historical perspective on disturbing activities for the Site:

"***Recreational use and impacts on water birds.***

The Broadwater sailing club operates from the northern shore and uses the northern half of the lake (see case study Appendix 1). When sailing is occurring birds relocate to the southern half of the lake in the refuge area around the wooded islands. In 2006-07 sailing was possible daily, but organised race events were held on Sundays from 10.00am and Wednesday evenings in the summer. Broadwater Lake is principally fished for Carp, with low stocking levels of specimen fish. The other main target species is the Pike. Broadwater Lake has no angling close season."

Sensitivity of species to disturbance

Tuite (1984)[11] performed an extensive analysis of English wildfowl distribution in areas of water recreation. A multiple regression was used to distinguish the effects of physical attribute of the lake, recreation types and the sensitivity of particular species. The species most affected were teal, shoveler and goldeneye. The most tolerant were mute swan, tufted duck, pochard and mallard. Greatest impact was caused by power boating, with coarse fishing, sailing and rowing also important. In some cases recreational boating could be considered to limit carrying capacity of a waterbody in winter. A study by Platteeuw and Hendens (1997)[12] noted a similar hierarchy of sensitivity of species. Batten (1977)[13] found sailing boats within 450m-750m caused tufted duck and pochard to fly up on a London reservoir. Angling can also provide deleterious visual stimulus, due to visible presence on the bank angling can alter the feeding behaviours, distribution, and cause fly ups (Bell and Austin, 1985)[14]. Greylag geese seemed to habituate to people walking as long as they did not leave paths (Kuhl, 1979)[15].

HS2 disturbance surveys

HS2 provided a report[16] relating the results of two years of disturbance monitoring for construction effects on birds (22 surveys in 2021 twice a month; 13 surveys in 2022 timed to coincide with disturbing HS2 works). The report was produced for issue to Natural England. The surveys used vantage points around the lake and monitored for an hour at each station. Surveys were focussed on the south-west corner of the lake within 500m of HS2's works.

No apparent effects of noise, vibration or visual disturbance arising from HS2's construction works were recorded.

The surveys provided some useful information on the effects of disturbance on birds within the south-west corner of Broadwater Lake:

- Visual disturbance caused higher levels of disturbance than noise effects with 100% of disturbance events recorded in 2022 attributed to visual disturbance.
- The vast majority of disturbances were caused by aircraft and surveyors (pedestrians), with surveyors provoking a response in 100% of events;
- None of the logged disturbances in 2021 caused birds to leave the lake entirely and in fact no birds left the south-west corner of the lake, although they moved further away; and
- In 2022, only 2% of potential disturbances logged caused a reaction from the birds (10 events).

Categories of disturbance recorded were:

- Aircraft - caused 11 disturbance events in 2021 (c. 31%) causing a full range of responses (29 TU; 16 SV; 5 GN; 8 WN; 2 PO; 2 EG);
- Aircraft - 4 events in 2022 causing birds to fly away (3) or alert (1) - effects on 30 BH; 8 TU; 40BH; 1 CO; 8 TU;
- Predators - 2 events in total - caused birds to become alert (1 BH) or agitate on nest (6 CN);
- Surveyors (pedestrians) - 8 events in 2021 - effects on 4 TU; 2 SV; 58 and 127 TU;
- Surveyors (pedestrians) - 4 events in 2022 - effects on 75 CG/MS/CO; 4 PO;
- Construction noise - 2 events in 2021 causing 4 TU to fly or swim away;
- Piling and traffic noise - 3 events in 2021 causing birds to fly away (11 TU; 6 SV);
- Unknown - 10 events in 2021 causing 31 TU to fly away; 1 event in 2022 causing 20 CO to fly away.

TU =Tufted Duck, SV = Shoveler, GN = Goldeneye, WN = Wigeon, EG = Egyptian Goose, BH= Black-headed gull, CN = Common Tern, CO = Coot, CG/MS/CO = Canada Goose/Mute Swan/Coot, PO = Pochard

Discussion of species sensitivity

If this data is collated by species, the vast majority of disturbance responses recorded were from tufted duck. Nine disturbance events caused disturbance to 29, 8, 4, 58, 127, 4, 4, 11 and 31 birds respectively.

The next most responsive species was shoveler with four disturbance events and 16, 2, 6 and 6 birds responding each time. Coot appeared to be disturbed twice (1 and 20). Black-headed gull was also disturbed twice with 30 and 40 birds disturbed. A group of Canada geese, mute swan, and coot were flagged as being disturbed with 75 individuals in total affected.

Remaining species were only recorded being disturbed once: goldeneye (5), wigeon (8), grey wagtail (2), Egyptian goose (2), and pochard (4).

It is important to remember that HS2 did not observe any birds leaving the lake entirely.

7.2 TYPES OF DISTURBANCE

Disturbance to waterbirds at the Site logged between November and March 2023 arose from a range of sources. Twelve disturbing activities were logged whilst the sailing boats were out, within three broad categories: sailing, aviation, and pedestrians. The degree to which each activity was observed to disturb the birds present was noted. Table 7.1 lists these and the recorded number of distance events.

Of the 202 disturbance events, 74.2% were caused by sailing related activities, with the powerboat accounting for 58 instances of disturbance, sailing boats 60 and these two together a further 31 instances. This would be expected as the disturbance surveys were undertaken on sailing days.

Additionally, there were 11 instances of disturbance caused by aircraft either taking off or landing at the nearby airstrip to the west of the Site. Pedestrians (walkers and the surveyors for this study) caused 6 disturbance events. There were also 30 disturbance events noted where the cause was not apparent and could not be established (or even guessed at).

Table 7.1 Number of disturbance events caused by different disturbance types.

Disturbance Type	Bird reaction to disturbance									Totals
	1	2	3	4	5	6	7	8	Unknown	
Aircraft			1	2	6	2				11
Helicopter				1						1
Observer						2				2
Other (Raceboat)			1							1
Other (Raptor)	1									1
Powerboat	3	8	12	3	5	19	7	1		58
Powerboat & Sailing Boat/s	1	1	2		10	5	4	8		31
Sailing Boats	3	12		18	1	17	4	5		60
Unknown			2	1	4	5	6	7	5	30
Unknown (possibly Boats)			1					1		2
Unknown (not boats)				1						1
Walker				1	2	1				4
TOTALS	8	21	19	27	28	51	21	22	5	202

Key to 'Birds Reaction to Disturbance'
0 - No Reaction
1 - Increased vigilance

Disturbance Type	Bird reaction to disturbance	Totals
2 - Birds swam slowly away from disturbance		
3 - Birds swam rapidly away from disturbance		
4 - Bird flew < 50m from disturbance (direct flight - DF)		
5 - Birds flew 50 - 100m from disturbance (DF)		
6 - Birds flew >100m from disturbance (DF)		
7 - Birds flew around Site before settling back on Lake		
8 - Birds appeared to leave Site		

Non-disturbing activities

Klaxon

A klaxon is sounded by the Sailing Club to alert boats to the end of sailing sessions and for other reasons. It was noted that all birds were completely habituated to the klaxon and did not respond at all.

Fishing

By itself, fishing activities around the south and eastern shores of the Lake seemed to have little effect on the birds, except that they would move away from the immediate area, especially when there was movement on the bank (setting up and checking fishing lines).

No significant reaction to disturbance from fishing was noted during the sailing day surveys.

HS2

There was no disturbance that could be attributed to the building of the HS2 railway, though as disturbance surveys were undertaken at weekends, work on the rail infrastructure was less or absent compared to that of weekdays.

7.3 REACTION TO DISTURBANCE

If Table 7.1 is examined further, it provides information on how disturbing different activities were found to be on the birds present. Powerboats and sailing together caused the highest number of events (8) whereby birds left the site entirely. Unknown disturbance caused 7 such events.

Table 7.2 below sets out the degree of reaction to disturbance as a percentage. The most common reaction (25%) to any kind of disturbance was for birds to fly >100m from the disturbance, but to remain on the lake.

Most reactions to disturbance were less extreme than this. Only 11% of disturbance events (14 events from sailing and powerboat activity, and 8 events from unknown disturbances) caused birds to leave the lake entirely at the time of disturbance.

Table 7.2 Degree of reaction of birds to disturbance as a percentage

Bird Reaction to Disturbance	No. events	Response (%)
1 - Increased vigilance	8	3.96
2 - Birds swam slowly away from disturbance	21	10.40
3 - Birds swam rapidly away from disturbance	19	9.41
4 - Bird flew < 50m from disturbance (direct flight - DF)	27	13.37
5 - Birds flew 50 - 100m from disturbance (DF)	28	13.86
6 - Birds flew >100m from disturbance (DF)	51	25.25
7 - Birds flew around Site before settling back on Lake	21	10.40
8 - Birds appeared to leave Site	22	10.89
Unknown	5	2.48

7.4 SPECIES SENSITIVITY

Appendix I provides the reaction and numbers recorded of each species when responding to disturbance (the source of disturbance has not been factored in for this analysis).

For the duck species identified as important receptors at the Site, Table 7.3 below sets out the percentage of individuals responding in a particular way when subject to disturbance events. The disturbance categories have been grouped to simplify somewhat and reflect the likely energetic toll arising from the response.

Table 7.3 Selected species response to disturbance (full table provided in Appendix I)

English Vernacular Name	Percentage			
	Increased vigilance	Swim away	Fly on / around lake	Leave
Shoveler	0.0	0.0	97.2	2.8
Gadwall	0.0	0.0	100.0	0.0
Wigeon				
Mallard	4.4	6.7	68.9	20.0
Pochard	0.0	27.5	66.1	6.3
Tufted Duck	0.0	54.0	44.8	1.3
Goldeneye	16.7	37.5	45.8	0.0

In terms of individual species response to disturbance events, there is a marked difference in the scale of response between species. The scale of response can be interpreted as a broad measure of sensitivity to

disturbance. The descriptions below set out the duck species tentatively ranked from most to least sensitive using only this monitoring data.

- The most sensitive species was mallard, whereby 20% of disturbed individuals were noted to leave the Site in response to a disturbance event.
- Around 27% of pochard were recorded swimming away, with 66% flying away but remaining at the Site. 6.3% of individuals left the Site entirely.
- 97% of individual shoveler flew away from disturbances, although only 2.8% of individuals left the lake entirely.
- 54% of tufted duck responded to disturbance by swimming away, and only 1.3% of individuals were recorded leaving the lake.
- Gadwall - 100% of birds flew up and none left the lake.
- The least sensitive species was goldeneye, with a lower response to disturbance (only 45.8% of individuals flew as a response to disturbance) and no individuals recorded leaving the Site.

Wigeon was not recorded responding to any disturbance events - no conclusions can be made due to the small size of the dataset.

8.0 SUMMARY

Greengage Environmental Ltd was commissioned by London Borough of Hillingdon (LBH) to undertake wintering bird surveys and disturbance surveys at a Site known as the proposed Hillingdon Water Sports Facility and Activity Centre (HWSFAC) in the London Borough of Hillingdon. The Site is located at Broadwater Lake, Moorhall Road, Hillingdon.

The surveys were undertaken to inform a planning submission for the Site which seeks to develop the HWSFAC on the peninsula, with eventual demolition of the current Broadwater Lake Sailing Club facilities at the north end.

To inform the analysis and interpretation of results, a desk study was undertaken including a literature search and review of HS2 survey data.

Surveys were completed in November 2022 through to end of March 2023 and a total of 29 counts were made on 20 visits in total.

The wintering bird survey has confirmed the following:

- The Site supports Nationally important numbers of shoveler with the peak count of 315 (visit 9) equating to 1.66% of the estimated GB wintering population;
- The highest wintering bird count at Broadwater Lake was 1735 birds on visit 8 which included 306 shoveler, 455 tufted duck and 791 black-headed gull;
- There were 17 species valued at the Local level or above that were regularly present at the Site including two Red-listed species (pochard and lapwing), eight Amber-listed species and one NERC-S41 listed species (kingfisher);
- There were nine species valued below the Local level which form a regular part of the assemblage at the Site (including five Amber-listed species and one Red-listed species Herring gull);
- The Site provides an important gull roost with peak counts of 919 black-headed gull (visit 17), 44 common gull (visit 13), 40 herring gull (visit 9), 20 lesser black-backed gull (visit 9);
- The Site supports Regionally important numbers of pochard with a peak count of 182 (visit 3);
- The population of tufted duck at the Site is evaluated as being of Borough importance, with a peak count of 455 recorded on visit 8 and median count across the winter of 147 (n=29 i.e. present on all visits).

The literature search found the following points of relevance:

- Disturbance from sailing has been occurring at the Site even while quarrying operations were ongoing more than 40 years ago - historically the Site had a better range of wetland habitats and may have supported more species even up until the late 2000s. The development of woodland and closed tree canopies appears to have severely impacted the diversity and carrying capacity of the Site although the historic data have not been analysed in detail for this report;

- Availability of aquatic weeds is likely to play an important role in supporting and regulating numbers of dabbling ducks at the Site including shoveler, gadwall, teal, wigeon, mallard, pintail;
- As a function of both its size and the presence of undisturbed areas protected by islands, the Site has historically been reported to provide a refuge to birds using other sites that were disturbed by watersports or other activities.

The disturbance surveys have confirmed the following:

- In the absence of disturbance the whole lake is used by a wide range of species. Once sailing commences birds typically move to refuge areas within the lake in the south-west and east;
- Numbers of several species of ducks (tufted duck, goldeneye, pochard mainly but also shoveler mallard and gadwall) increased on two or more post-sailing disturbance counts. The increase may be partly explained by 'flushing' and greater visibility post-disturbance as the birds flock together, but it is very likely that birds are coming to the Site from other areas and are not deterred by sailing disturbance. Overall sailing disturbance did not appear to be the most significant factor regulating numbers of ducks at the Site on days when sailing activities were monitored;
- The distribution of ducks across the lake was significantly affected by sailing with the vast majority of birds recorded post-sailing within refuge areas in the south-west and east of the Site;
- Only tufted duck carried on using other parts of the site post-disturbance, with small groups in the north-west, north and north-east;
- Gulls were the group of birds least affected by sailing. Though very few large gulls were present on the Site, Black-headed Gull numbers increased during the sailing events;
- Cormorant and grey heron were typically present in low numbers; sailing disturbance provoked a small reduction (up to 11-12 individual cormorant and 1 grey heron) (c. 20% for cormorant and c. 50% for grey heron);
- It was not possible to confidently characterise the response of waders due to infrequent presence at the Site although they appeared to be hardly affected at all by sailing disturbance;
- Coot and Moorhen generally showed tolerance to sailing activities - a 7% reduction post-sailing was typical for coot;
- The numbers of grebes were frequently recorded to increase post-sailing, although this seemed to be more a function of their usual behaviour / movements which were little influenced by disturbance from sailing;
- Geese were highly sensitive to sailing disturbance generally, more so than other species. Egyptian goose was least sensitive with 43% leaving the Site as a result of sailing disturbance; this increased to 50% for greylag goose and 80% of Canada goose.

The presence of the south-west refuge area has long been considered important to allow birds to remain at the lake during sailing events; surveys for this report have also shown the wider importance of islands

generally as a refuge (on the lee side) during sailing disturbances, the role of the east edge of the lake has been particularly clarified by these surveys.

The literature search and analysis of bird counts within the Site and CVGP shows that Broadwater Lake has an important role within the Colne Valley in supporting regionally and nationally important numbers of wintering wildfowl. Even while sailing disturbance occurs, it has been historically noted that birds disturbed at other smaller sites will still fly to Broadwater Lake to use the refuge areas; the data from these surveys (whereby some species counts increased post-disturbance) support this observation. It is clearly important to retain refuge areas and ensure these are protected and strengthened as part of the Proposed Development.

APPENDIX A ANNOTATED MAP OF THE SITE SHOWING MAIN FEATURES AND ISLANDS (NUMBERED) AND TERN RAFTS (LETTERED) REFERRED TO IN THIS REPORT

APPENDIX B WEATHER DETAILS FOR EACH VISIT

Table B.1 Weather Details for 2022 Surveys

Visit No.	Date				Weather					Additional Weather Notes
		Activity		Survey Times	Cloud (oktars)	Wind (Direction and Beaufort No.)	Precipn.	Temp (oC)	Visibility	
Scoping Survey (Visit 0)	13/11/2022	Sailing Day	Start	08:20	0/8	Calm	0	N/R	Moderate / Poor	Misty from start - 10:00, clearing by 11:10
			Finish	09:00	0/8	Calm	0	N/R	Moderate / Poor	
			Start	N/R	0/8	Calm	0	N/R	Moderate	
			Finish	N/R	0/8	Calm	0	N/R	Good	
1	19/11/2022	Non-sailing Day	Start	08:30	7/8	NW 1	0	8	Good	
			Finish	N/R	7/8	NW 1	0	10	Good	
2	27/11/2022	Sailing Day	Start	N/R	8/8	N 1-2	YES	N/R	Moderate	
			Finish	N/R	8/8	N 1-2	YES	N/R	Moderate	
			Start	N/R	8/8	N 1-2	YES	N/R	Moderate	

Visit No.	Date				Weather					Additional Weather Notes
		Activity		Survey Times	Cloud (oktars)	Wind (Direction and Beaufort No.)	Precipn.	Temp (oC)	Visibility	
			Finish	N/R	8/8	N 1-2	YES	N/R	Moderate	
3	04/12/2022	Sailing Day	Start	08:20	8/8	NNE 1	1	4	Moderate	Slight mist throughout
			Finish	09:30	8/8	NNE 1	0	5	Moderate	
			Start	09:30	8/8	NNE 1	0	5	Moderate	
			Finish	10:40	8/8	NNE 1	0	5	Moderate	
4	08/12/2022	Non-sailing Day	Start	11:05	0/8	NNW 1-2	0	2	Excellent	
			Finish	14:25	0/8	NNW 1	0	2	Excellent	
5	18/12/2022	Sailing Day	Start	08:30	8/8	SE 1	0	1.5	Good	Lake >80% frozen - No Sailing Sleet showers at end of survey
			Finish	11:00	8/8	SE1	2	2	Good	
6	24/12/2022	Non-sailing Day	Start	N/R	7/8	Calm	0	N/R	Good	
			Finish	N/R	7/8	Calm	0	N/R	Good	

Table B.2 Weather Details for 2023 Surveys

Visit No.	Date				Weather					Additional Weather Notes
		Activity		Survey Times	Cloud (oktars)	Wind (Direction and Beaufort No.)	Precipn.	Temp. (oC)	Visibility	
7	08/01/2023	Sailing Day	Start	08:25	2/8	W 2-3	0	8	Good	Showers, then heavy rain from ca 09:30 - end of survey. Visibility poor at times
			Finish	09:20	6/8	W 1	0	14	Good	
			Start	11:20	8/8	W 1	4	14	Moderate/ Poor	
			Finish	12:00	8/8	W 1	4	14	Moderate/Poor	
8	13/01/2023	Non-sailing Day	Start	10:40	2/8	W 4-5 (6)	0	9	Excellent	Mostly sunny, dry but with a stong, gusty W wind
			Finish	15:00	4/8	W 3-4 (5)	0	9	Excellent	
9	24/01/2023	Non-sailing Day	Start	N/R	7/8	Calm	0	N/R	Good	Southern & Eastern parts of Lake still iced ovcer
			Finish	N/R	7/8	Calm	0	N/R	Good	
10	26/01/2023	Non-sailing Day	Start	N/R	0/8	NE 4-5	0	N/R	Excellent	Cool, with strong breeze, Some of southern area still iced-over
			Finish	N/R	0/8	NE 4-5	0	N/R	Excellent	
11	29/01/2023	Sailing Day	Start	08:15	8/8	SW 1-2	0 (1)	4	Good	
			Finish	09:15	8/8	SW 1-2	0	4	Good	
			Start	10:45	8/8	WSW 2-3	0	5	Good	

Visit No.	Date				Weather					Additional Weather Notes
		Activity		Survey Times	Cloud (oktars)	Wind (Direction and Beaufort No.)	Precipn.	Temp. (oC)	Visibility	
			Finish	11:45	8/8	WSW 2-3	0	6	Good	
12	07/02/2023	Non-sailing Day	Start	13:40	0/8	SSW 1	0	5	Excellent	
			Finish	17:00	0/8	ENE 1	0	4	Excellent	
13	12/02/2023	Sailing Day	Start	08:10	8/8	SSE 1-2	0	7	Moderate/Good	Dull & overcast throughout
			Finish	08:50	8/8	calm	0	7	Moderate/Good	
			Start	11:30	8/8	SSE 1-2	0	8	Moderate/Good	
			Finish	12:10	8/8	SSE 1-2	0	8	Moderate/good	
14	19/02/2023	Sailing Day	Start	08:00	6/8	WNW 1-2	0	8	Good	
			Finish	09:10	3/8	WNW 1-2	0	9	Excellent	
			Start	11:10	6/8	WNW 1-2	0	9	Excellent	
			Finish	12:00	5/8	WNW 1-2	0	10	Excellent	
15	23/02/2023	Non-sailing Day	Start	N/R	N/R	N/R	N/R	N/R	N/R	
			Finish	N/R	N/R	N/R	N/R	N/R	N/R	
16	12/03/2002	Sailing Day	Start	08:10	1/8	WSW 2-3	0	8	Excellent	

Visit No.	Date				Weather					Additional Weather Notes
		Activity		Survey Times	Cloud (oktars)	Wind (Direction and Beaufort No.)	Precipn.	Temp. (oC)	Visibility	
			Finish	08:55	6/8	WSW 2	0	8	Excellent	
			Start	11:15	8/8	W 2-3	0	9	Good	
			Finish	11:55	8/8	W 2	0	10	Good	
17	14/03/2023	Non-sailing Day	Start	13:25	6/8	W2-3	0	8	Good/Excellent	Sun-glare on water
			Finish	15:50	7/8	W 1-2	0	8	Excellent	
18	19/03/2023	Sailing Day	Start	08:30	6/8	SE 1	0	9	Excellent	
			Finish	10:00	6/8	SE 1	0	9	Excellent	
			Start	11:10	7/8	S 2	0	10	Good	
			Finish	12:30	7/8	S 2	0	10	Good	
19	24/03/2023	Non-sailing Day	Start	10:00	2/8	SW 1-2	0	N/R	Excellent	Torrential downpours at 12:00 & 13:00 on strengthening SW wind
			Finish	14:00	8/8	SW 4-5	3	N/R	Moderate/Good	

APPENDIX C WEBS DATA

COLNE VALLEY GRAVEL PITS Annual peak counts from 2015/16 to 2021/22

Annual peak counts data for Colne Valley Gravel Pits in the 2021/22 WeBS report

Please note, supplementary peak counts are not included in downloads

Species Name	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	Current 5yr Mean
Brent Goose	0	0	0	0	0	0	0	0
Brent Goose (Dark-bellied - bernicla)	0	0	0	0	0	0	0	0
Canada Goose	306	302	286	341	309	293	293	304
Canada x Greylag Goose	2	1	1	0	0	0	1	0
Barnacle Goose	0	0	2	1	1	0	1	1
Barnacle Goose (naturalised)	0	0	2	1	1	0	1	1
Bar-headed Goose	0	0	0	0	0	0	0	0
Emperor Goose	0	0	0	0	0	0	0	0
Snow Goose	0	0	0	0	0	0	0	0
Greylag Goose	47+	78+	205	78	98+	137+	105+	142
Greylag Goose (British/Irish)	47+	78+	205	78	98+	137+	105+	142
Domestic Greylag Goose	2	19	1	2	0	0	0	1
Pink-footed Goose	0	0	0	0	0	0	0	0
White-fronted Goose	0	0	0	0	0	0	0	0
White-fronted Goose (European - albifrons)	0	0	0	0	0	0	0	0
Hybrid goose	0	0	1	0	0	0	0	0
Black Swan	0	0	1	0	0	0	0	0
Mute Swan	103	109	123	96	55	84	70+	90
Bewick's Swan	0	0	0	0	0	0	0	0
Egyptian Goose	17	16	28	39	24+	41	23+	36
Shelduck	4	2	0	0	0	2	0	0
Ruddy Shelduck	0	0	0	0	0	0	0	0
Muscovy Duck	0	0	0	0	0	0	0	0
Wood Duck	0	0	0	0	2	1	1	1
Mandarin Duck	3	3	0	4	3	1+	4+	3
Garganey	0	0	0	0	0	0	0	0
Shoveler	49	238	198	284	111	83+	51+	198
Gadwall	315	206	124	135	87	109	90+	114
Wigeon	245	370	182	175+	36	61+	84	119
Mallard	248	204	216	246	179	240	201+	220
Domestic Mallard	5	3	0	1	2	0	8	2
Pintail	0	0	0	0	1	0	0	0
Teal	24	55	28	101	28	11+	13+	52
Red-crested Pochard	15	26	32	45	42	61	9	38
Pochard	309+	185	162+	273	111+	144+	156	215
Tufted Duck	1069+	990	750+	710	555	389+	535+	672
Scaup	0	0	0	0	1	0	0	0
Aythya hybrid	0	0	0	1	0	0	0	0
Common Scoter	0	0	0	0	1	0	0	0
Long-tailed Duck	0	0	0	0	0	0	0	0
Goldeneye	21	26	31+	36	16	15+	12+	28
Smew	0	1	0	0	0	0	0	0
Goosander	2	2	8	15	3+	0	2	6
Red-breasted Merganser	0	0	0	1	0	0	0	0
Ruddy Duck	0	0	0	0	0	0	0	0
Lake Duck	0	0	0	1	0	0	0	0
Hybrid duck	2	1	0	0	1	0	0	0
Little Grebe	11	14	10	9	10	8	7+	9
Red-necked Grebe	0	0	0	0	0	0	0	0
Great Crested Grebe	121	107	81	148	87+	69+	72+	115
Slavonian Grebe	0	0	0	0	0	0	0	0
Black-necked Grebe	0	0	0	0	0	0	0	0
Bittern	0	0	0	0	0	0	0	0
Grey Heron	35	46	41	34	37	29+	26+	37
Great White Egret	0	0	1	1	0	0	1	1
Little Egret	16	16	14	44	12+	10+	9+	29
Cormorant	128	117	86	158	135	73+	109+	126
Water Rail	5	1	3	2	2	3+	2	2
Moorhen	67	95	68	77	50	86+	63+	70
Coot	1958+	1944	1652	1594	1201	1148+	1089+	1482
Oystercatcher	2	3	2	0	0	3	3+	2
Lapwing	64	81	118	59	44	35+	25+	74
Little Ringed Plover	2	0	0	0	0	0	0	0

Black-tailed Godwit		0		0		0		0		0		0		0		0
Ruff		0		0		0		0		0		0		0		0
Dunlin		0		0		0		0		0		0		0		0
Little Stint		0		0		0		0		0		0		0		0
Snipe		1		5		3		6		0		0		0		2
Common Sandpiper		1		0		1		1		1	3+			0		1
Green Sandpiper		6		7		4		4		3	2+			0		3
Redshank		0		0		0		0		0		0		0		0
Wood Sandpiper		0		0		0		0		0		0		0		0
Greenshank		0		0		0		0		0		0		0		0
Black-headed Gull	986+			1089	929+			890	804+			608+		785+		910
Little Gull		0		0		0		0		0		0		0		0
Common Gull		14		10	13+			12		45	16+			5+		29
Great Black-backed Gull		3		2		8		13	2+			0	1+			7
Herring Gull		8		24	23+			11		16	12+			9+		17
Yellow-legged Gull		0		0		0		1		3		2		0		1
Lesser Black-backed Gull		22	13+		21+			23	52+			15+		16+		38
Sandwich Tern		1		0		0		2		0		0		0		0
Common Tern		48		43		40		60	23+			23+		25+		50
Arctic Tern		6		15		3		0		0		0		0		1
Black Tern		0		0		0		0		0		0		0		0
Kingfisher		7		8		9		4		5		9	8+			7

APPENDIX D NO. OF WATERBIRDS RECORDED BY VISIT

For these data tables the following key has been used to signify the notable status, if any, of the different species.

Key
Bold - WCA Schedule 1 species
BoCC, 5 red-listed species
BoCC, 5 amber-listed species
*NERC-S41 listed species

D.1 VISIT 0 (SCOPING VISIT) – 13/11/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	8	4
EG	Egyptian Goose	Alopochen aegyptiaca	1	2
SV	Shoveler	Spatula clypeata	54	
GA	Gadwall	Mareca strepera	6	12
WN	Wigeon	Mareca penelope	4	
MA	Mallard	Anas platyrhynchos	20	3
PT	Pintail	Anas acuta	2	
T.	Teal	Anas crecca	4	
PO	Pochard	Aythya ferina	20	24
TU	Tufted Duck	Aythya fuligula	170	60
GN	Goldeneye	Bucephala clangula	1	1
LG	Little Grebe	Tachybaptus ruficollis	6	7
GG	Great Crested Grebe	Podiceps cristatus	14	10
CA	Cormorant	Phalacrocorax carbo	1	4
MH	Moorhen	Gallinula chloropus	3	2
CO	Coot	Fulica atra	34	29
L. *	Lapwing	Vanellus vanellus	32	32
BH	Black-headed Gull	Chroicocephalus ridibundus	5	
GB	Great Black-backed Gull	Larus marinus	2	1
TOTALS			387	191
No. of Species			19	14

VISIT 1 – 19/11/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
CG	Canada Goose	Branta canadensis	10
MS	Mute Swan	Cygnus olor	2
SV	Shoveler	Spatula clypeata	55
GA	Gadwall	Mareca strepera	1
MA	Mallard	Anas platyrhynchos	8
ZF	Mallard x domestic duck hybrid	Anas platyrhynchos	2
T.	Teal	Anas crecca	1
PO	Pochard	Aythya ferina	77
TU	Tufted Duck	Aythya fuligula	237
GN	Goldeneye	Bucephala clangula	3
LG	Little Grebe	Tachybaptus ruficollis	7
GG	Great Crested Grebe	Podiceps cristatus	12
CA	Cormorant	Phalacrocorax carbo	14
MH	Moorhen	Gallinula chloropus	1
CO	Coot	Fulica atra	41
BH	Black-headed Gull	Chroicocephalus ridibundus	28
CM	Common Gull	Larus canus	2
TOTALS			**501**
No. of Species			**17**

VISIT 2 – 19/11/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre- sailing	Post- Sailing
CG	Canada Goose	Branta canadensis	1	
SV	Shoveler	Spatula clypeata	38	39
MA	Mallard	Anas platyrhynchos	16	4
PO	Pochard	Aythya ferina	152	141
TU	Tufted Duck	Aythya fuligula	294	237
GN	Goldeneye	Bucephala clangula	4	4
LG	Little Grebe	Tachybaptus ruficollis	1	
GG	Great Crested Grebe	Podiceps cristatus	8	2
CA	Cormorant	Phalacrocorax carbo	11	7
MH	Moorhen	Gallinula chloropus	2	1
CO	Coot	Fulica atra	28	20
BH	Black-headed Gull	Chroicocephalus ridibundus	4	4
HG *	Herring Gull	Larus argentatus	6	
LB	Lesser Black-backed Gull	Larus fuscus	3	
TOTALS			568	459
No. of Species			14	10

D.2 VISIT 3 04/12/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre- sailing	Post- Sailing
CG	Canada Goose	Branta canadensis	44	
EG	Egyptian Goose	Alopochen aegyptiaca	2	
SV	Shoveler	Spatula clypeata	62	49
GA	Gadwall	Mareca strepera	4	4
MA	Mallard	Anas platyrhynchos	16	9
PO	Pochard	Aythya ferina	152	182
TU	Tufted Duck	Aythya fuligula	226	322
GN	Goldeneye	Bucephala clangula	2	6
LG	Little Grebe	Tachybaptus ruficollis	1	
GG	Great Crested Grebe	Podiceps cristatus	10	8
H.	Grey Heron	Ardea cinerea	2	1
CA	Cormorant	Phalacrocorax carbo	4	5
MH	Moorhen	Gallinula chloropus	3	3
CO	Coot	Fulica atra	49	39
L. *	Lapwing	Vanellus vanellus	1	
BH	Black-headed Gull	Chroicocephalus ridibundus	30	106
CM	Common Gull	Larus canus	3	1
TOTALS			611	735
No. of Species			18	14

D.3 VISIT 4 – 08/12/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
GJ	Greylag Goose	Anser anser	110
EG	Egyptian Goose	Alopochen aegyptiaca	2
SV	Shoveler	Spatula clypeata	70
GA	Gadwall	Mareca strepera	9
WN	Wigeon	Mareca penelope	1
MA	Mallard	Anas platyrhynchos	19
PO	Pochard	Aythya ferina	169
TU	Tufted Duck	Aythya fuligula	131
GN	Goldeneye	Bucephala clangula	1
LG	Little Grebe	Tachybaptus ruficollis	4
GG	Great Crested Grebe	Podiceps cristatus	10
H.	Grey Heron	Ardea cinerea	1
CA	Cormorant	Phalacrocorax carbo	3
MH	Moorhen	Gallinula chloropus	4
CO	Coot	Fulica atra	43
BH	Black-headed Gull	Chroicocephalus ridibundus	257
CM	Common Gull	Larus canus	1
LB	Lesser Black-backed Gull	Larus fuscus	2
KF	Kingfisher	Alcedo atthis	2
TOTALS			839
No. of Species			19

D.4 VISIT 5 – 18/12/2022 – SAILING DAY (NO SAILING DUE TO ICE)

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
CG	Canada Goose	Branta canadensis	2
GJ	Greylag Goose	Anser anser	9
EG	Egyptian Goose	Alopochen aegyptiaca	2
SV	Shoveler	Spatula clypeata	235
GA	Gadwall	Mareca strepera	26
WN	Wigeon	Mareca penelope	6
MA	Mallard	Anas platyrhynchos	21
T.	Teal	Anas crecca	25
RQ	Red-crested Pochard	Netta rufina	6
PO	Pochard	Aythya ferina	102
TU	Tufted Duck	Aythya fuligula	236
GN	Goldeneye	Bucephala clangula	12
SY	Smew	Mergellus albellus	1
LG	Little Grebe	Tachybaptus ruficollis	1
GG	Great Crested Grebe	Podiceps cristatus	12
CA	Cormorant	Phalacrocorax carbo	2
MH	Moorhen	Gallinula chloropus	3
CO	Coot	Fulica atra	74
BH	Black-headed Gull	Chroicocephalus ridibundus	290
CM	Common Gull	Larus canus	5
GB	Great Black-backed Gull	Larus marinus	4
HG *	Herring Gull	Larus argentatus	3
TOTALS			1077
No. of Species			22

D.5 VISIT 6 – 24/12/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
CG	Canada Goose	Branta canadensis	1
MS	Mute Swan	Cygnus olor	1
EG	Egyptian Goose	Alopochen aegyptiaca	4
SV	Shoveler	Spatula clypeata	60
GA	Gadwall	Mareca strepera	24
MA	Mallard	Anas platyrhynchos	25
RQ	Red-crested Pochard	Netta rufina	4
PO	Pochard	Aythya ferina	126
TU	Tufted Duck	Aythya fuligula	135
GN	Goldeneye	Bucephala clangula	4
SY	Smew	Mergellus albellus	1
GG	Great Crested Grebe	Podiceps cristatus	3
H.	Grey Heron	Ardea cinerea	2
CA	Cormorant	Phalacrocorax carbo	1
MH	Moorhen	Gallinula chloropus	2
CO	Coot	Fulica atra	12
BH	Black-headed Gull	Chroicocephalus ridibundus	11
CM	Common Gull	Larus canus	1
TOTALS			**417**
No. of Species			**18**

D.6 VISIT 7 – 08/01/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	12	1
EG	Egyptian Goose	Alopochen aegyptiaca	16	5
SV	Shoveler	Spatula clypeata	41	86
GA	Gadwall	Mareca strepera	2	
WN	Wigeon	Mareca penelope	9	
MA	Mallard	Anas platyrhynchos	9	7
RQ	Red-crested Pochard	Netta rufina	6	
PO	Pochard	Aythya ferina	135	172
TU	Tufted Duck	Aythya fuligula	147	45
GN	Goldeneye	Bucephala clangula	8	
SY	Smew	Mergellus albellus	1	1
LG	Little Grebe	Tachybaptus ruficollis	2	
GG	Great Crested Grebe	Podiceps cristatus	4	5
H.	Grey Heron	Ardea cinerea	1	1
CA	Cormorant	Phalacrocorax carbo	1	
MH	Moorhen	Gallinula chloropus	2	
CO	Coot	Fulica atra	35	16
BH	Black-headed Gull	Chroicocephalus ridibundus	72	87
CM	Common Gull	Larus canus	1	
GB	Great Black-backed Gull	Larus marinus	3	
TOTALS			674	259
No. of Species			20	11

VISIT 8 – 13/01/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
EG	Egyptian Goose	Alopochen aegyptiaca	2
SV	Shoveler	Spatula clypeata	296
GA	Gadwall	Mareca strepera	2
WN	Wigeon	Mareca penelope	19
MA	Mallard	Anas platyrhynchos	4
PO	Pochard	Aythya ferina	59
TU	Tufted Duck	Aythya fuligula	461
GN	Goldeneye	Bucephala clangula	5
SY	Smew	Mergellus albellus	1
LG	Little Grebe	Tachybaptus ruficollis	3
GG	Great Crested Grebe	Podiceps cristatus	4
H.	Grey Heron	Ardea cinerea	2
MH	Moorhen	Gallinula chloropus	2
CO	Coot	Fulica atra	59
L. *	Lapwing	Vanellus vanellus	2
BH	Black-headed Gull	Chroicocephalus ridibundus	791
CM	Common Gull	Larus canus	19
TOTALS			**1731**
No. of Species			**17**

D.7 VISIT 9 – 24/01/2022 – NON-SAILING DAY (ICE AFFECTED)

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
SV	Shoveler	Spatula clypeata	315
GA	Gadwall	Mareca strepera	9
WN	Wigeon	Mareca penelope	32
MA	Mallard	Anas platyrhynchos	20
T.	Teal	Anas crecca	10
RQ	Red-crested Pochard	Netta rufina	3
PO	Pochard	Aythya ferina	98
TU	Tufted Duck	Aythya fuligula	99
GN	Goldeneye	Bucephala clangula	4
GG	Great Crested Grebe	Podiceps cristatus	2
H.	Grey Heron	Ardea cinerea	2
WA	Water Rail	Rallus aquaticus	1
MH	Moorhen	Gallinula chloropus	2
CO	Coot	Fulica atra	9
BH	Black-headed Gull	Chroicocephalus ridibundus	512
CM	Common Gull	Larus canus	40
GB	Great Black-backed Gull	Larus marinus	3
HG *	Herring Gull	Larus argentatus	40
LB	Lesser Black-backed Gull	Larus fuscus	20
TOTALS			1221
No. of Species			19

D.8 VISIT 10 – 26/01/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
CG	Canada Goose	Branta canadensis	2
SV	Shoveler	Spatula clypeata	204
GA	Gadwall	Mareca strepera	1
WN	Wigeon	Mareca penelope	64
MA	Mallard	Anas platyrhynchos	9
T.	Teal	Anas crecca	2
PO	Pochard	Aythya ferina	60
TU	Tufted Duck	Aythya fuligula	96
GD	Goosander	Mergus merganser	1
LG	Little Grebe	Tachybaptus ruficollis	1
MH	Moorhen	Gallinula chloropus	2
CO	Coot	Fulica atra	13
BH	Black-headed Gull	Chroicocephalus ridibundus	223
TOTALS			678
No. of Species			14

D.9 VISIT 11 – 29/01/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	75	11
GJ	Greylag Goose	Anser anser	6	
EG	Egyptian Goose	Alopochen aegyptiaca	4	5
SV	Shoveler	Spatula clypeata	201	87
WN	Wigeon	Mareca penelope	24	29
MA	Mallard	Anas platyrhynchos	4	9
PO	Pochard	Aythya ferina	78	57
TU	Tufted Duck	Aythya fuligula	160	74
GN	Goldeneye	Bucephala clangula	12	2
SY	Smew	Mergellus albellus	1	1
LG	Little Grebe	Tachybaptus ruficollis	2	2
GG	Great Crested Grebe	Podiceps cristatus	3	1
H.	Grey Heron	Ardea cinerea	5	
CA	Cormorant	Phalacrocorax carbo	5	4
MH	Moorhen	Gallinula chloropus	6	3
CO	Coot	Fulica atra	53	40
BH	Black-headed Gull	Chroicocephalus ridibundus	101	218
CM	Common Gull	Larus canus	1	1
TOTALS			741	544
No. of Species			18	16

D.10 VISIT 12 – 07/02/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
GJ	Greylag Goose	Anser anser	1
ZD	Hybrid Goose	Anser x branta	1
EG	Egyptian Goose	Alopochen aegyptiaca	2
SV	Shoveler	Spatula clypeata	218
GA	Gadwall	Mareca strepera	11
WN	Wigeon	Mareca penelope	30
MA	Mallard	Anas platyrhynchos	26
RQ	Red-crested Pochard	Netta rufina	5
PO	Pochard	Aythya ferina	56
TU	Tufted Duck	Aythya fuligula	195
GN	Goldeneye	Bucephala clangula	4
LG	Little Grebe	Tachybaptus ruficollis	2
GG	Great Crested Grebe	Podiceps cristatus	2
H.	Grey Heron	Ardea cinerea	4
CA	Cormorant	Phalacrocorax carbo	26
MH	Moorhen	Gallinula chloropus	8
CO	Coot	Fulica atra	47
OC	Oystercatcher	Haematopus ostralegus	1
L.*	Lapwing	Vanellus vanellus	65
BH	Black-headed Gull	Chroicocephalus ridibundus	474
CM	Common Gull	Larus canus	12
LB	Lesser Black-backed Gull	Larus fuscus	2
KF	Kingfisher	Alcedo atthis	1
TOTALS			1193
No. of Species			23

D.11 VISIT 13 – 12/02/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	35	10
GJ	Greylag Goose	Anser anser	2	1
EG	Egyptian Goose	Alopochen aegyptiaca	11	4
SV	Shoveler	Spatula clypeata	134	200
GA	Gadwall	Mareca strepera	7	5
WN	Wigeon	Mareca penelope	77	42
MA	Mallard	Anas platyrhynchos	14	10
RQ	Red-crested Pochard	Netta rufina	5	3
PO	Pochard	Aythya ferina	32	43
TU	Tufted Duck	Aythya fuligula	110	144
GN	Goldeneye	Bucephala clangula	8	9
LG	Little Grebe	Tachybaptus ruficollis		3
GG	Great Crested Grebe	Podiceps cristatus	5	12
H.	Grey Heron	Ardea cinerea		1
CA	Cormorant	Phalacrocorax carbo	27	16
MH	Moorhen	Gallinula chloropus	10	2
CO	Coot	Fulica atra	21	34
OC	Oystercatcher	Haematopus ostralegus	2	2
BH	Black-headed Gull	Chroicocephalus ridibundus	34	224
CM	Common Gull	Larus canus	18	44
TOTALS			552	809
No. of Species			18	20

VISIT 14 – 19/02/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	51	7
GJ	Greylag Goose	Anser anser	4	4
EG	Egyptian Goose	Alopochen aegyptiaca	10	4
SV	Shoveler	Spatula clypeata	198	130
GA	Gadwall	Mareca strepera	14	
WN	Wigeon	Mareca penelope	36	19
MA	Mallard	Anas platyrhynchos	21	6
PO	Pochard	Aythya ferina	30	45
TU	Tufted Duck	Aythya fuligula	139	196
GN	Goldeneye	Bucephala clangula	7	6
LG	Little Grebe	Tachybaptus ruficollis	1	3
GG	Great Crested Grebe	Podiceps cristatus	5	9
H.	Grey Heron	Ardea cinerea	6	1
CA	Cormorant	Phalacrocorax carbo	25	16
MH	Moorhen	Gallinula chloropus	3	5
CO	Coot	Fulica atra	59	55
OC	Oystercatcher	Haematopus ostralegus	2	2
BH	Black-headed Gull	Chroicocephalus ridibundus	210	677
TOTALS			**821**	**1186**
No. of Species			**18**	**18**

D.12 VISIT 15 – 23/02/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
GJ	Greylag Goose	Anser anser	1
EG	Egyptian Goose	Alopochen aegyptiaca	4
SV	Shoveler	Spatula clypeata	118
WN	Wigeon	Mareca penelope	10
MA	Mallard	Anas platyrhynchos	7
PO	Pochard	Aythya ferina	11
TU	Tufted Duck	Aythya fuligula	64
GN	Goldeneye	Bucephala clangula	8
LG	Little Grebe	Tachybaptus ruficollis	1
GG	Great Crested Grebe	Podiceps cristatus	4
H.	Grey Heron	Ardea cinerea	8
CA	Cormorant	Phalacrocorax carbo	12
MH	Moorhen	Gallinula chloropus	3
CO	Coot	Fulica atra	40
OC	Oystercatcher	Haematopus ostralegus	2
BH	Black-headed Gull	Chroicocephalus ridibundus	545
CM	Common Gull	Larus canus	3
LB	Lesser Black-backed Gull	Larus fuscus	1
TOTALS			842
No. of Species			18

VISIT 16 – 12/03/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	70	6
GJ	Greylag Goose	Anser anser	22	2
EG	Egyptian Goose	Alopochen aegyptiaca	7	
MN	Mandarin Duck	Aix galericulata	1	
SV	Shoveler	Spatula clypeata	33	5
GA	Gadwall	Mareca strepera	6	3
WN	Wigeon	Mareca penelope	42	27
MA	Mallard	Anas platyrhynchos	19	10
ZF	Mallard x domestic duck hybrid	Anas platyrhynchos		2
PO	Pochard	Aythya ferina	99	60
TU	Tufted Duck	Aythya fuligula	120	122
GN	Goldeneye	Bucephala clangula	13	7
LG	Little Grebe	Tachybaptus ruficollis		1
GG	Great Crested Grebe	Podiceps cristatus	11	8
H.	Grey Heron	Ardea cinerea	18	3
CA	Cormorant	Phalacrocorax carbo	40	31
MH	Moorhen	Gallinula chloropus	3	3
CO	Coot	Fulica atra	47	45
OC	Oystercatcher	Haematopus ostralegus		2
BH	Black-headed Gull	Chroicocephalus ridibundus	464	784
CM	Common Gull	Larus canus	11	2
HG	Herring Gull	Larus argentatus		1
LB	Lesser Black-backed Gull	Larus fuscus	1	
TOTALS			1027	1124
No. of Species			19	20

D.13 VISIT 17 – 14/03/2022 – NON-SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
BH	Black-headed Gull	Chroicocephalus ridibundus	919
CA	Cormorant	Phalacrocorax carbo	20
CG	Canada Goose	Branta canadensis	3
CM	Common Gull	Larus canus	4
CO	Coot	Fulica atra	42
GA	Gadwall	Mareca strepera	5
GG	Great Crested Grebe	Podiceps cristatus	8
GN	Goldeneye	Bucephala clangula	1
H.	Grey Heron	Ardea cinerea	4
LB	Lesser Black-backed Gull	Larus fuscus	1
LG	Little Grebe	Tachybaptus ruficollis	2
MA	Mallard	Anas platyrhynchos	9
MH	Moorhen	Gallinula chloropus	4
PO	Pochard	Aythya ferina	85
SN	Snipe	Gallinago gallinago	1
SV	Shoveler	Spatula clypeata	18
TU	Tufted Duck	Aythya fuligula	171
WN	Wigeon	Mareca penelope	29
TOTALS			1326
No. of Species			18

D.14 VISIT 18 – 19/03/2022 – SAILING DAY

Species Code	English Vernacular Name	Scientific Name	No. of Birds	
			Pre-sailing	Post-Sailing
CG	Canada Goose	Branta canadensis	53	11
GJ	Greylag Goose	Anser anser	25	10
MS	Mute Swan	Cygnus olor	4	4
EG	Egyptian Goose	Alopochen aegyptiaca	7	4
MN	Mandarin Duck	Aix galericulata		1
SV	Shoveler	Spatula clypeata	35	17
GA	Gadwall	Mareca strepera	1	12
WN	Wigeon	Mareca penelope	13	7
MA	Mallard	Anas platyrhynchos	21	13
T.	Teal	Anas crecca		2
PO	Pochard	Aythya ferina	84	72
TU	Tufted Duck	Aythya fuligula	175	220
GN	Goldeneye	Bucephala clangula	3	8
LG	Little Grebe	Tachybaptus ruficollis	1	
GG	Great Crested Grebe	Podiceps cristatus	11	12
H.	Grey Heron	Ardea cinerea	5	1
CA	Cormorant	Phalacrocorax carbo	36	24
MH	Moorhen	Gallinula chloropus	3	1
CO	Coot	Fulica atra	75	66
OC	Oystercatcher	Haematopus ostralegus	2	1
BH	Black-headed Gull	Chroicocephalus ridibundus	409	549
CM	Common Gull	Larus canus	20	17
LB	Lesser Black-backed Gull	Larus fuscus	2	
KF	Kingfisher	Alcedo atthis	1	
TOTALS			986	1052
No. of Species			22	21

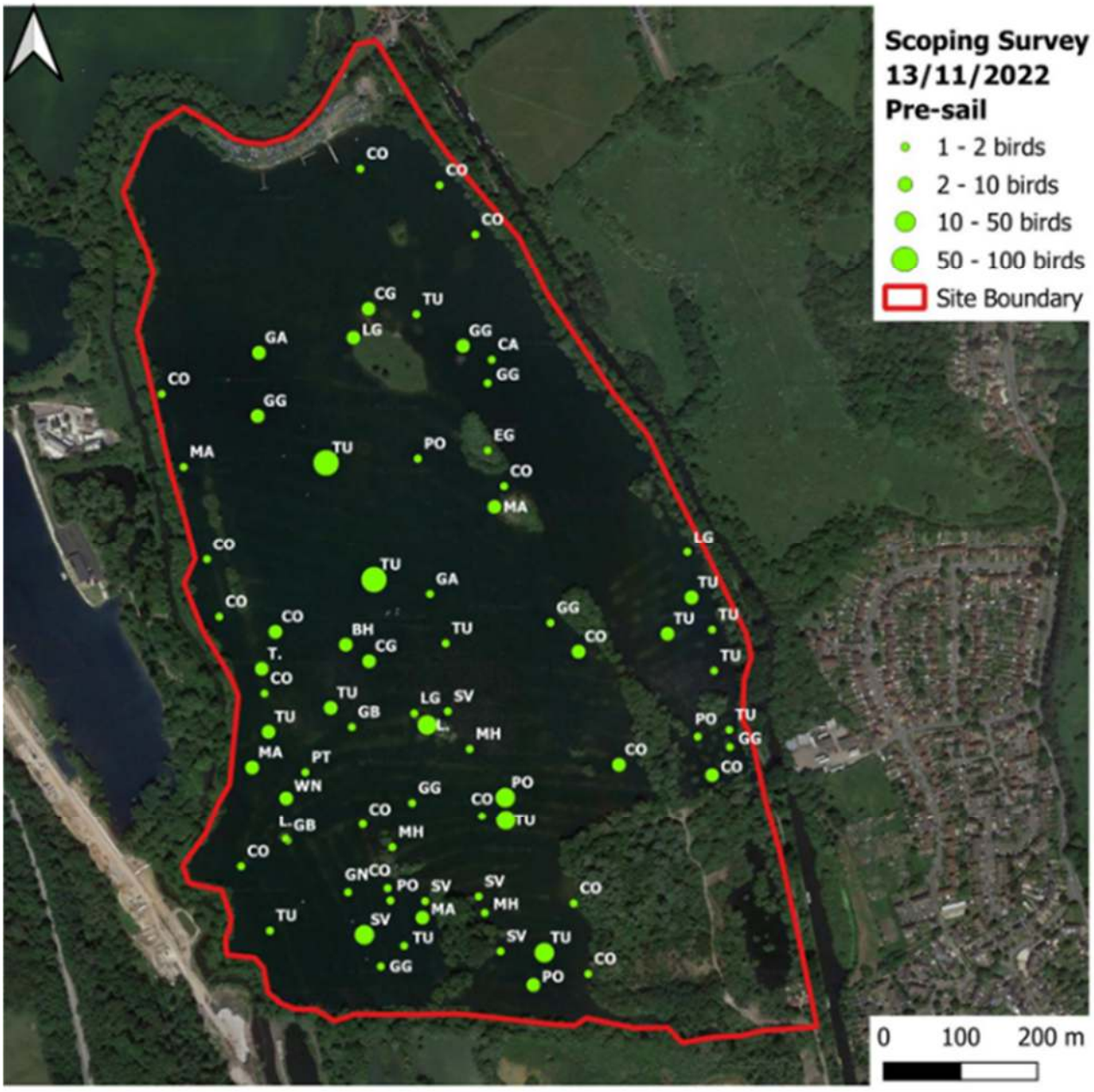
D.15 VISIT 19 – 24/03/2022 – NON-SAILING DAY

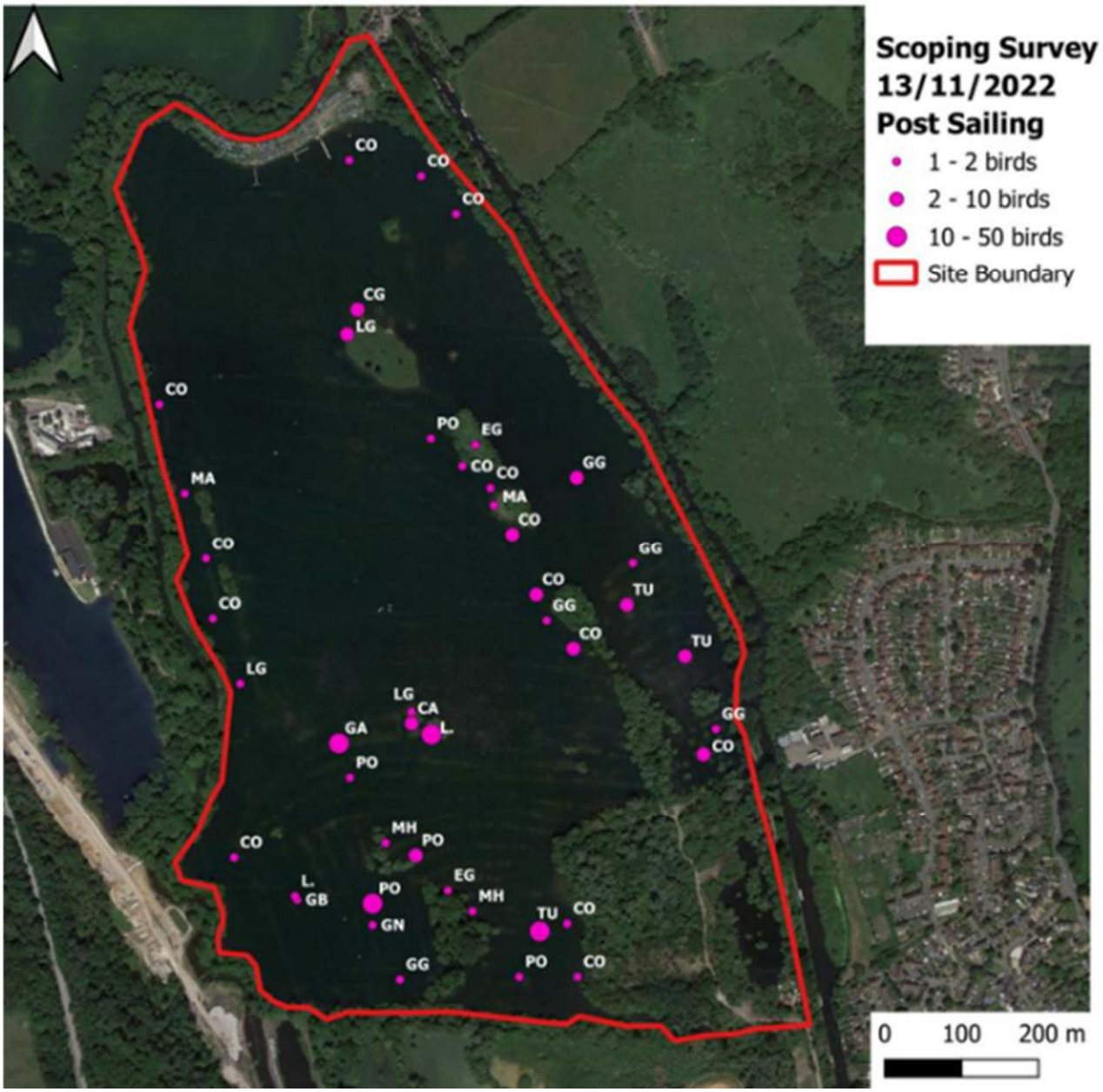
Species Code	English Vernacular Name	Scientific Name	No. of Birds
			No Sailing
CG	Canada Goose	Branta canadensis	16
GJ	Greylag Goose	Anser anser	8
EG	Egyptian Goose	Alopochen aegyptiaca	2
SV	Shoveler	Spatula clypeata	6
GA	Gadwall	Mareca strepera	4
WN	Wigeon	Mareca penelope	2
MA	Mallard	Anas platyrhynchos	16
PO	Pochard	Aythya ferina	43
TU	Tufted Duck	Aythya fuligula	88
GN	Goldeneye	Bucephala clangula	6
GG	Great Crested Grebe	Podiceps cristatus	10
CA	Cormorant	Phalacrocorax carbo	38
MH	Moorhen	Gallinula chloropus	2
CO	Coot	Fulica atra	24
BH	Black-headed Gull	Chroicocephalus ridibundus	201
CM	Common Gull	Larus canus	13
TOTALS			479
No. of Species			17

APPENDIX E MAPS SHOWING DISTRIBUTION OF WATERBIRDS BY VISIT

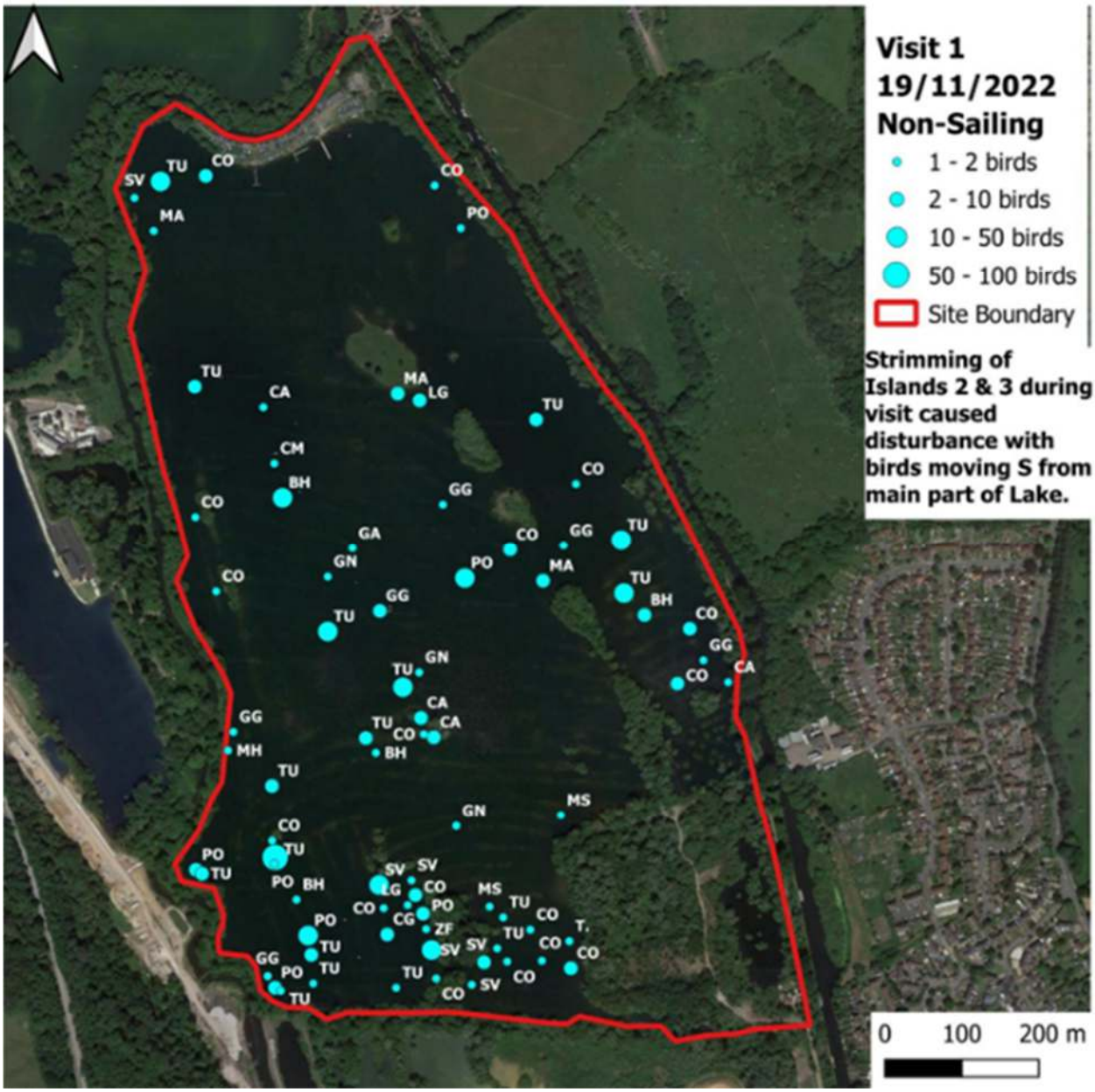
Species codes can be found in Appendix C.

E.1 VISIT 0 (SCOPING VISIT) – 13/11/2022 – SAILING DAY

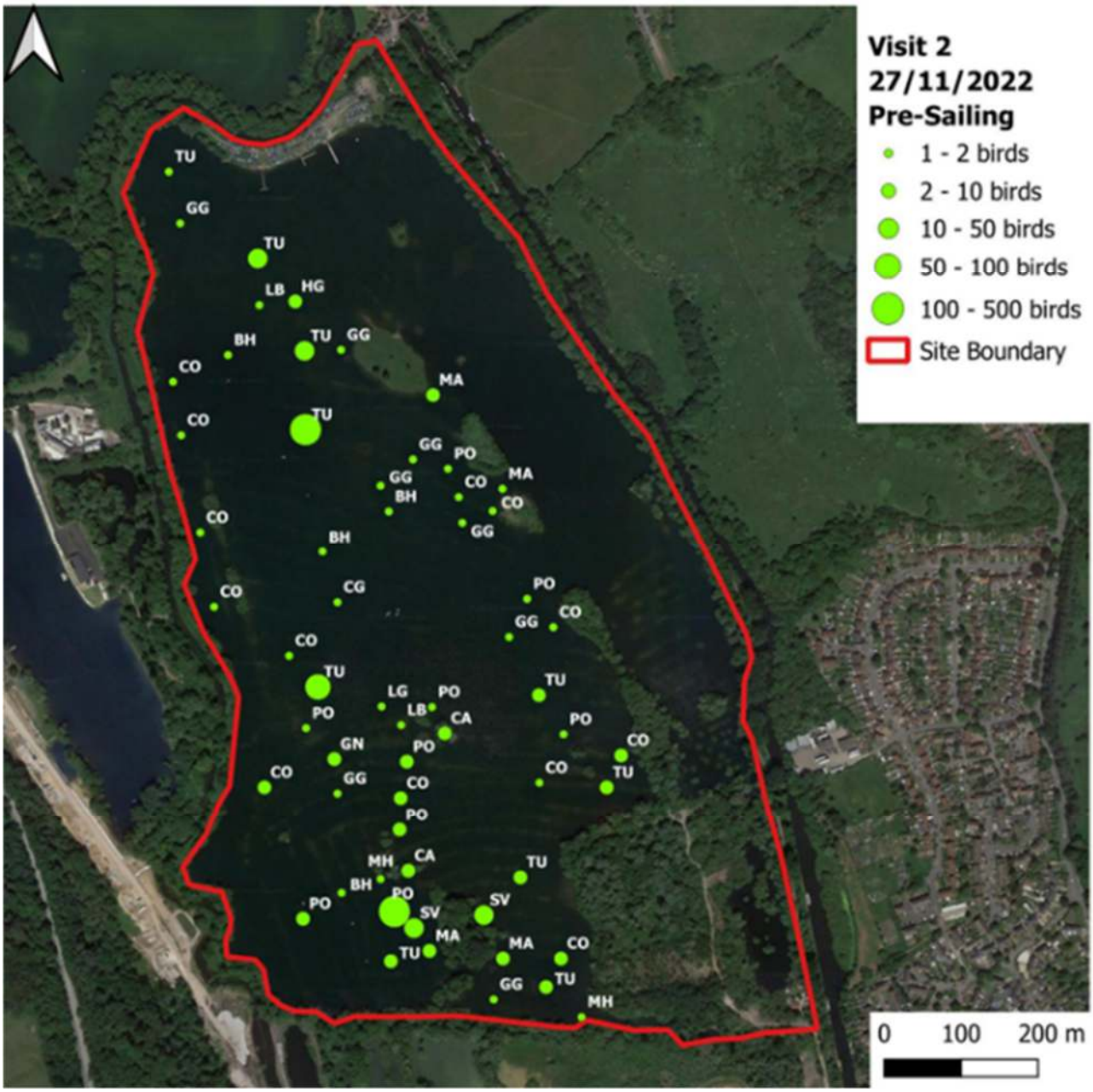


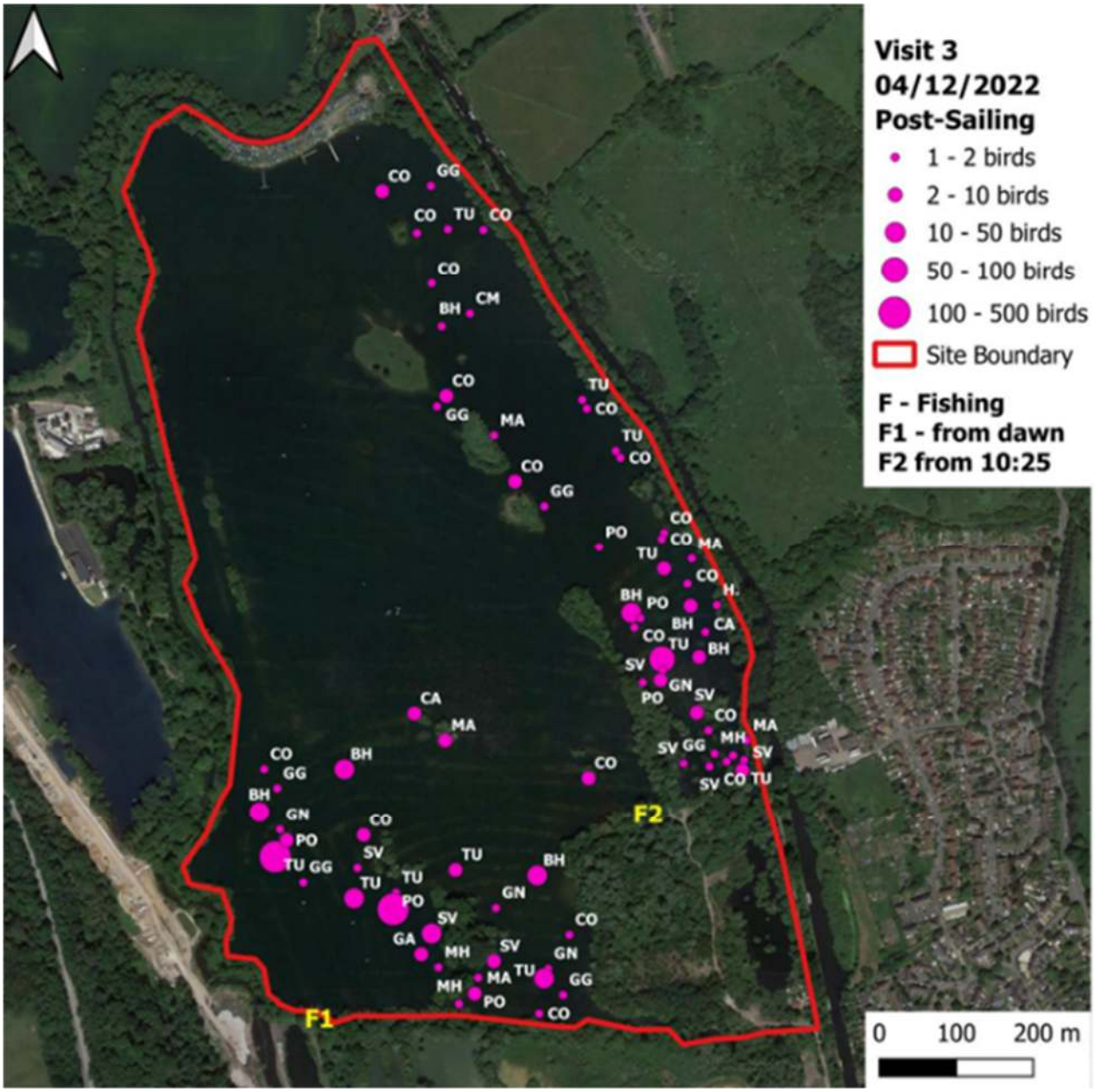

Scoping Survey
13/11/2022
Post Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
Site Boundary
0
100
200 m

E.2 VISIT 1 – 19/11/2022 – NON-SAILING DAY

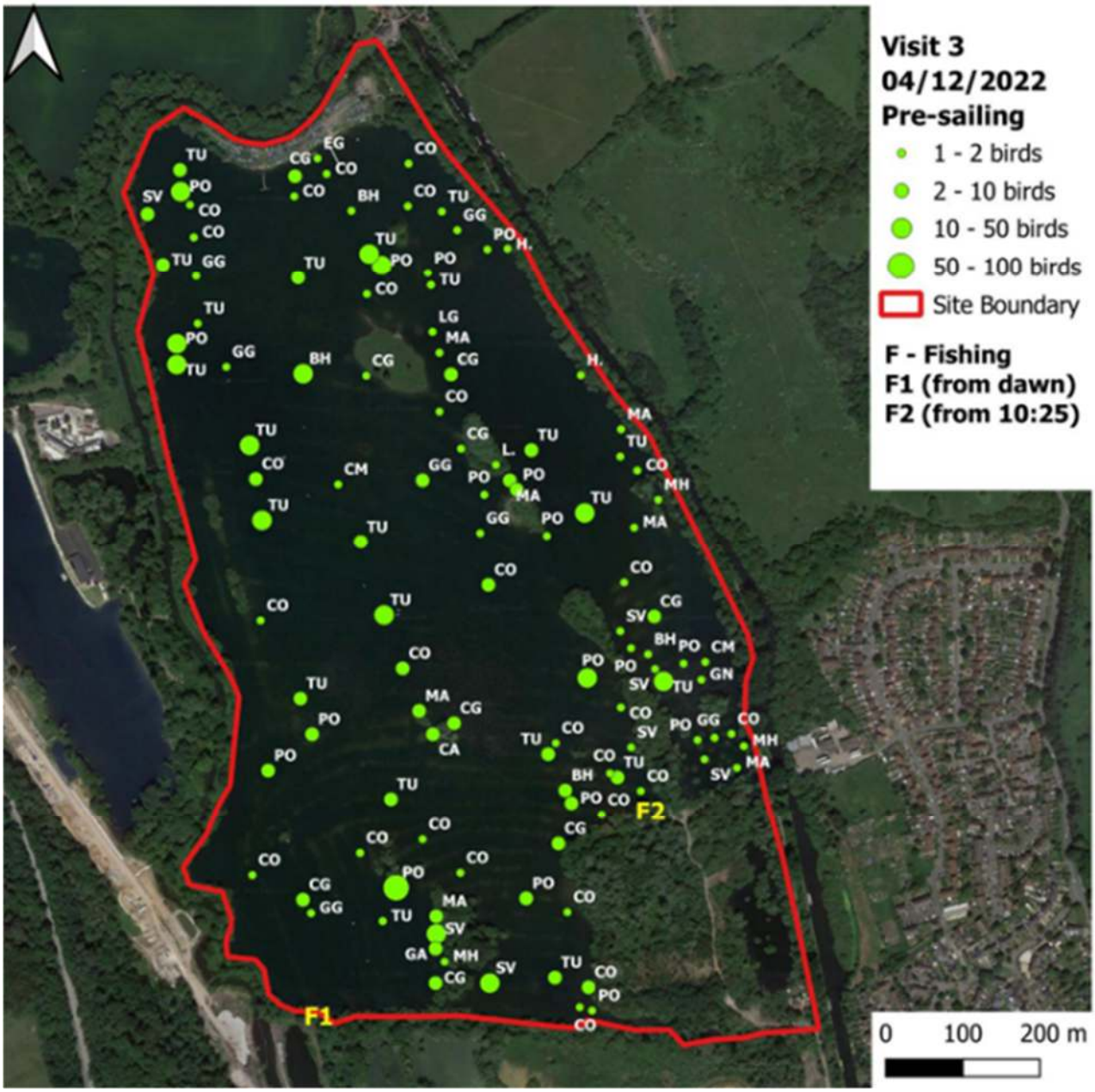


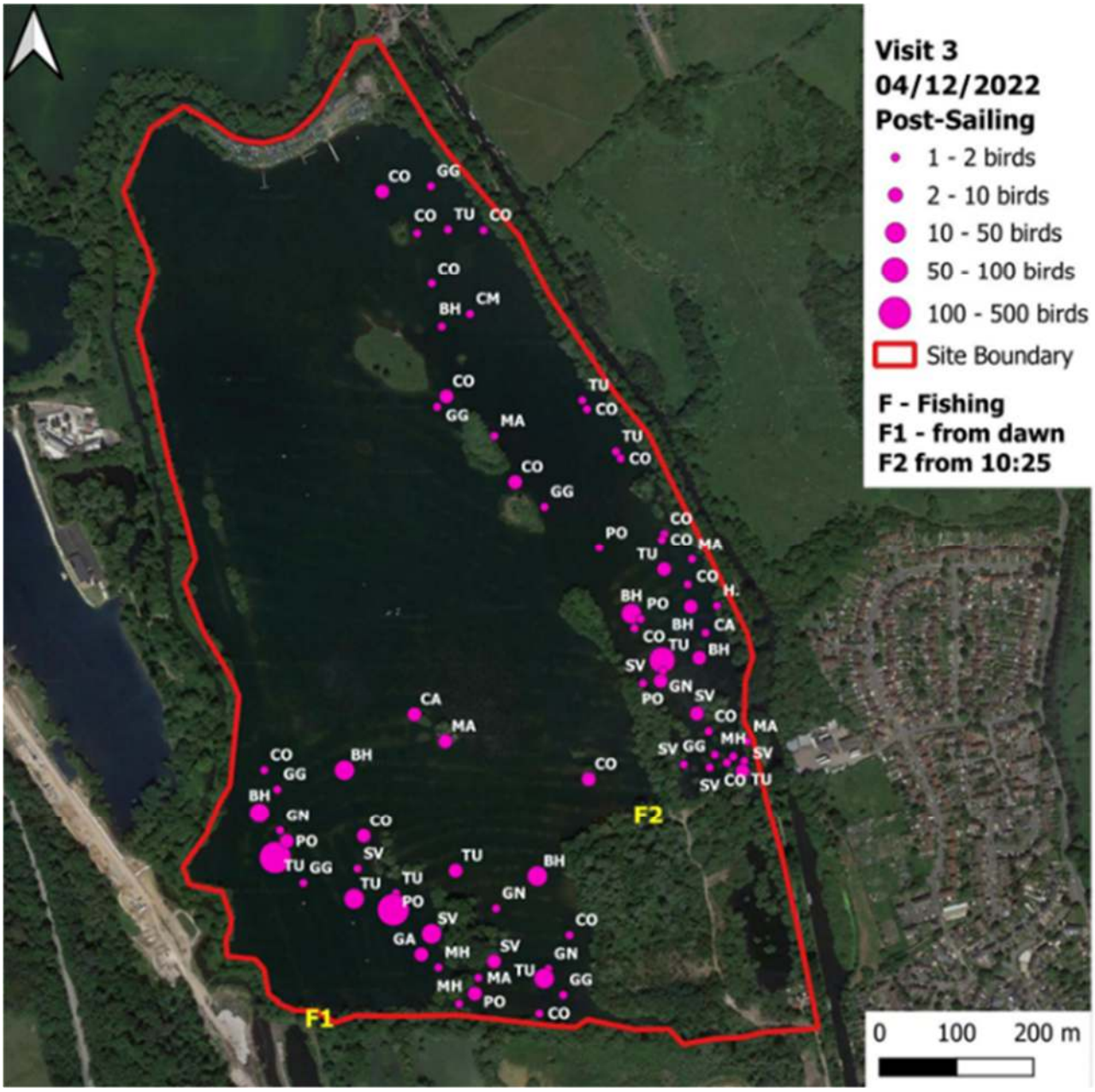
E.3 VISIT 2 – 19/11/2022 – SAILING DAY



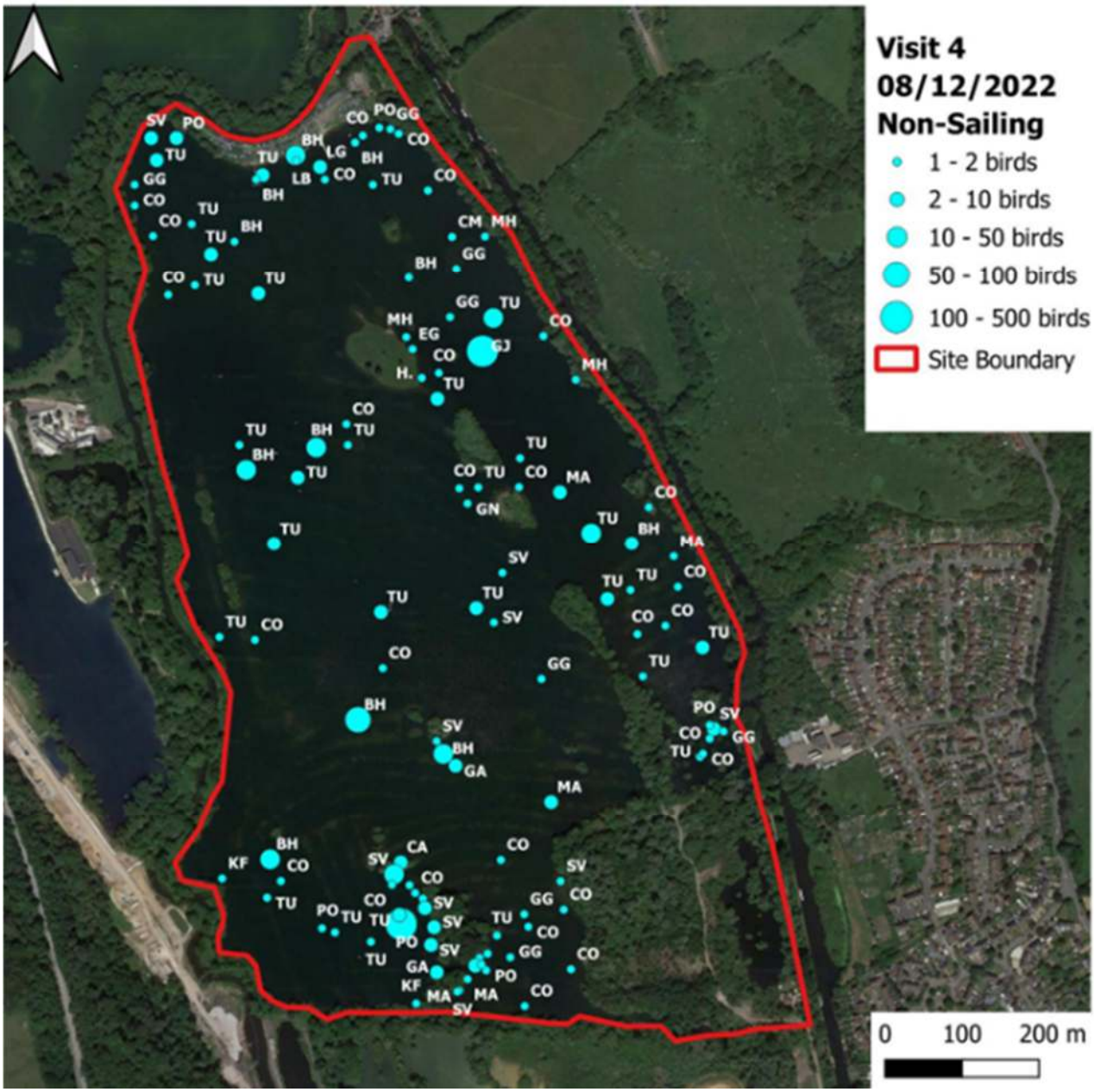

Visit 3
04/12/2022
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
F - Fishing
F1 - from dawn
F2 from 10:25
F1
F2
0
100
200 m

E.4 VISIT 3 – 04/12/2022 – SAILING DAY

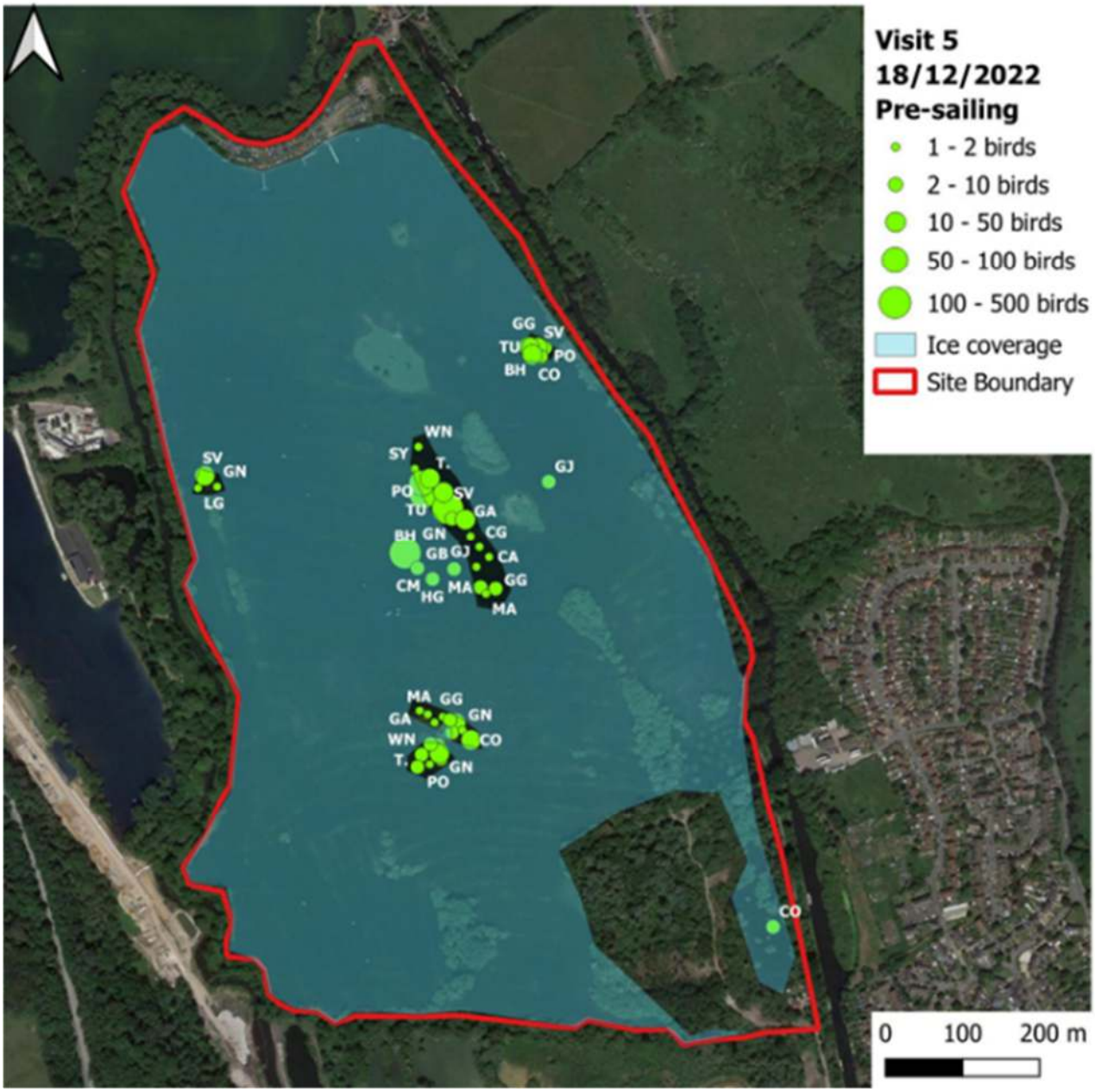



Visit 3
04/12/2022
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
F - Fishing
F1 - from dawn
F2 from 10:25
F1
F2
0
100
200 m

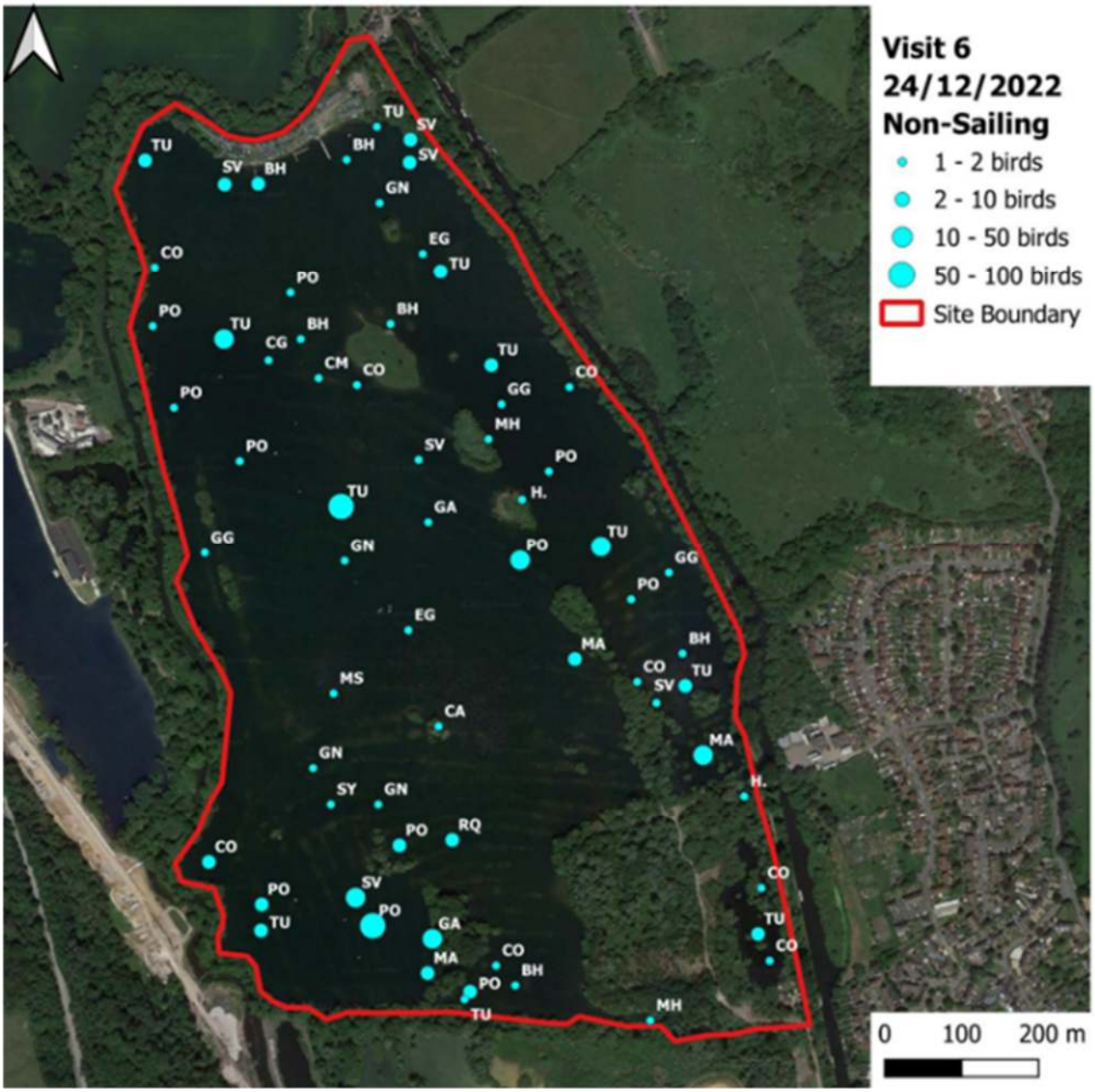
E.5 VISIT 4 – 08/12/2022 – NON-SAILING DAY



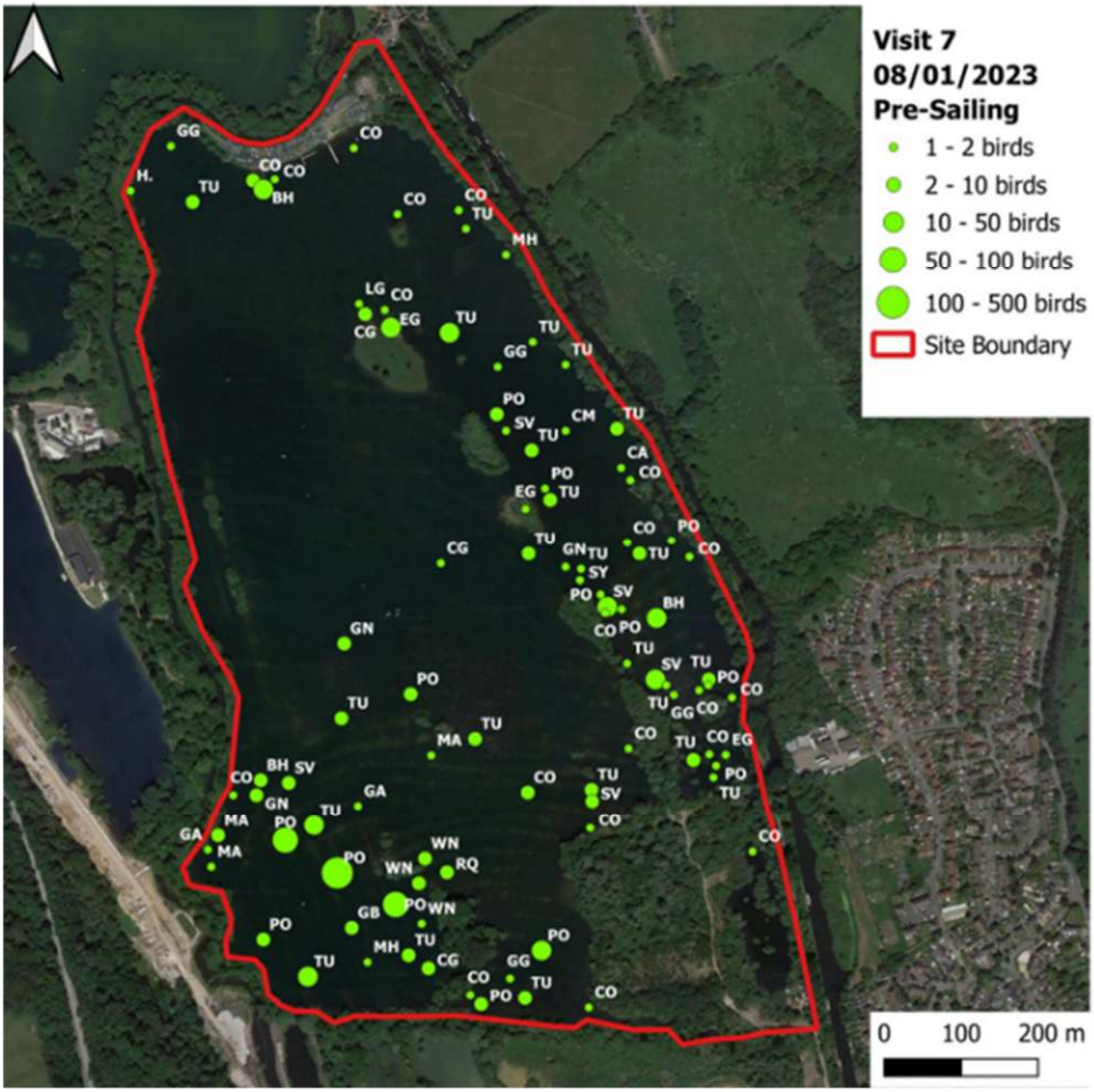
E.6 VISIT 5 – 18/12/2022 – SAILING DAY (NO SAILING DUE TO ICE)

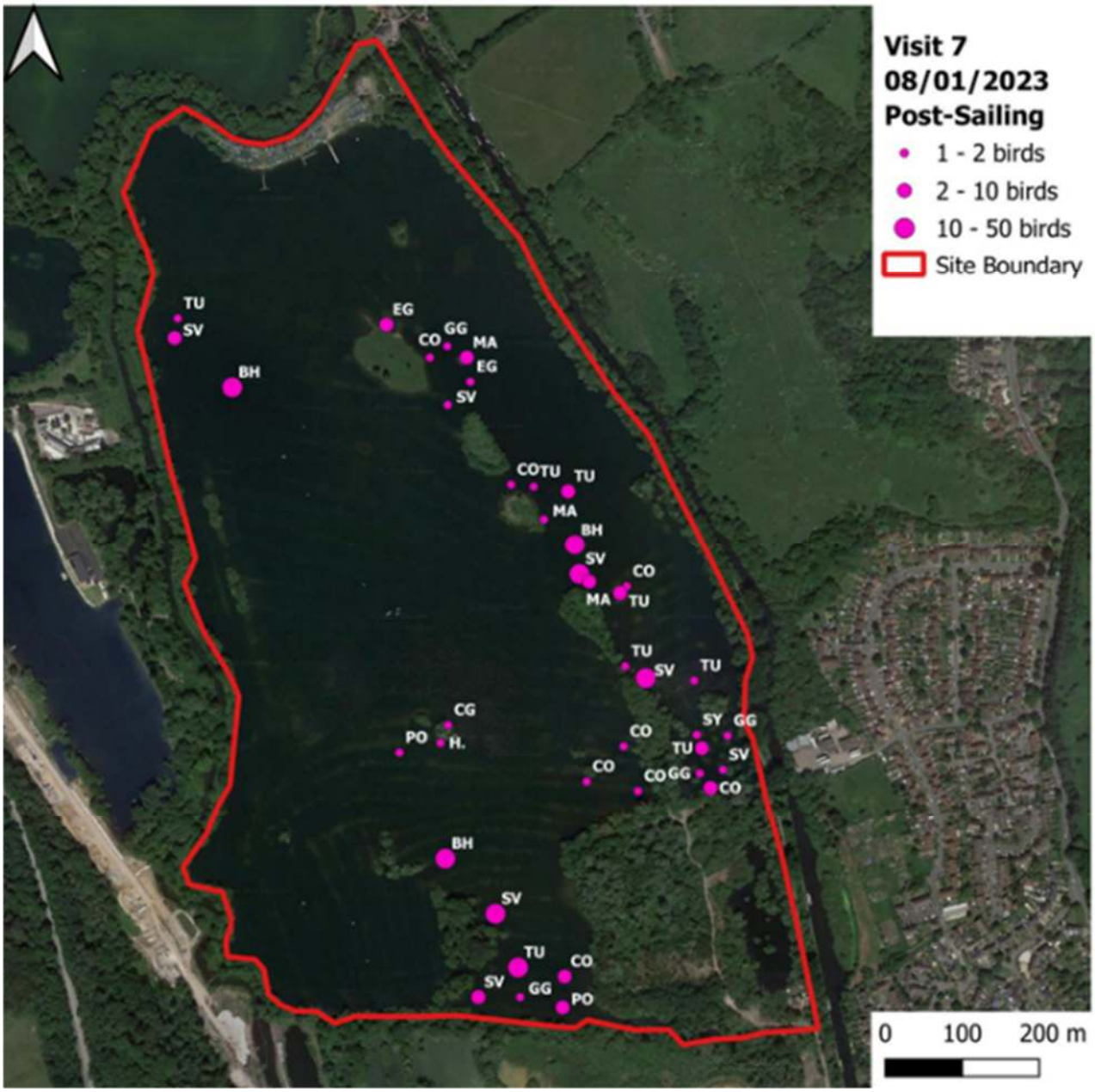


E.7 VISIT 6 – 24/12/2022 – NON-SAILING DAY

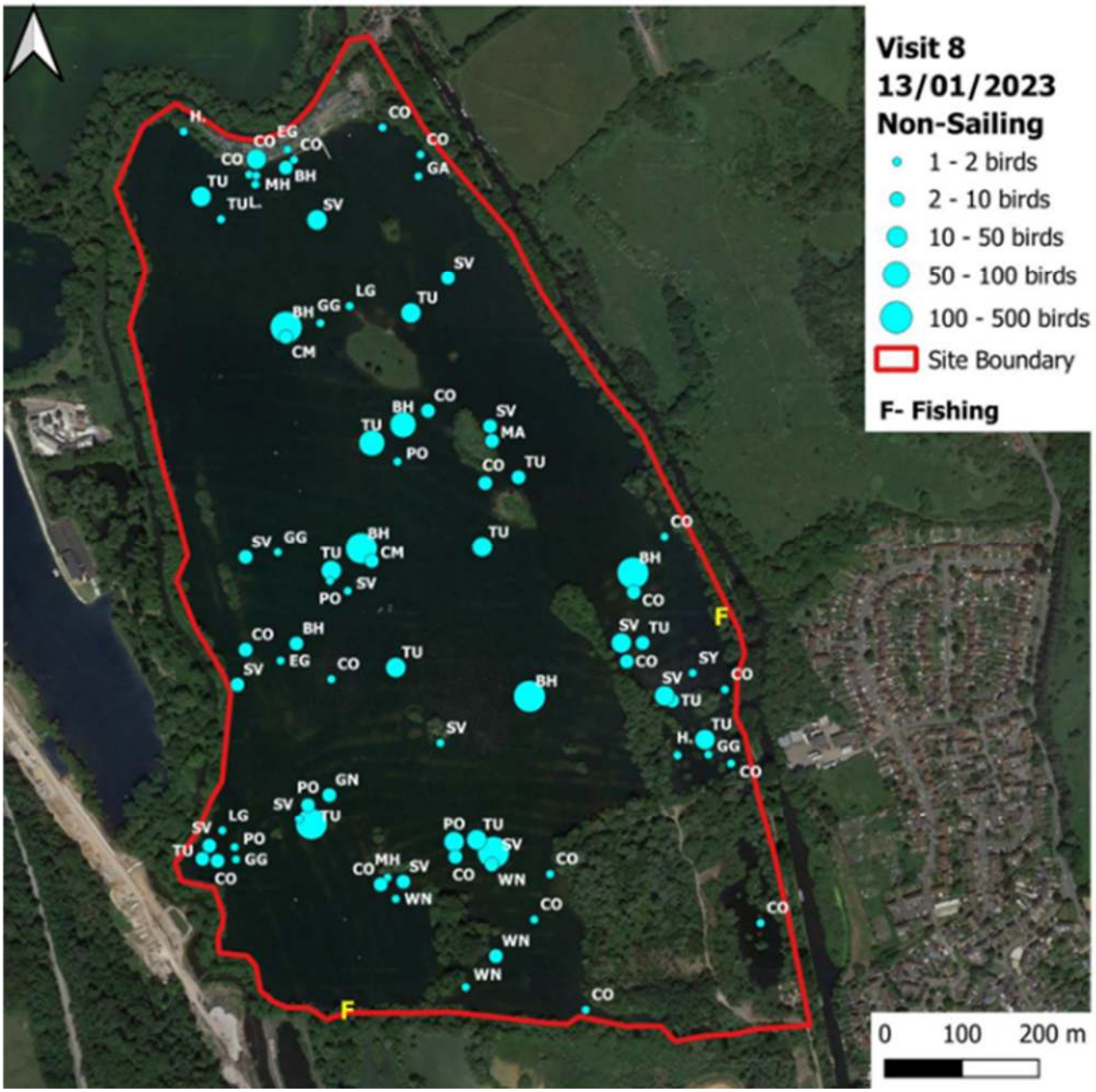


E.8 VISIT 7 – 08/01/2022 – SAILING DAY

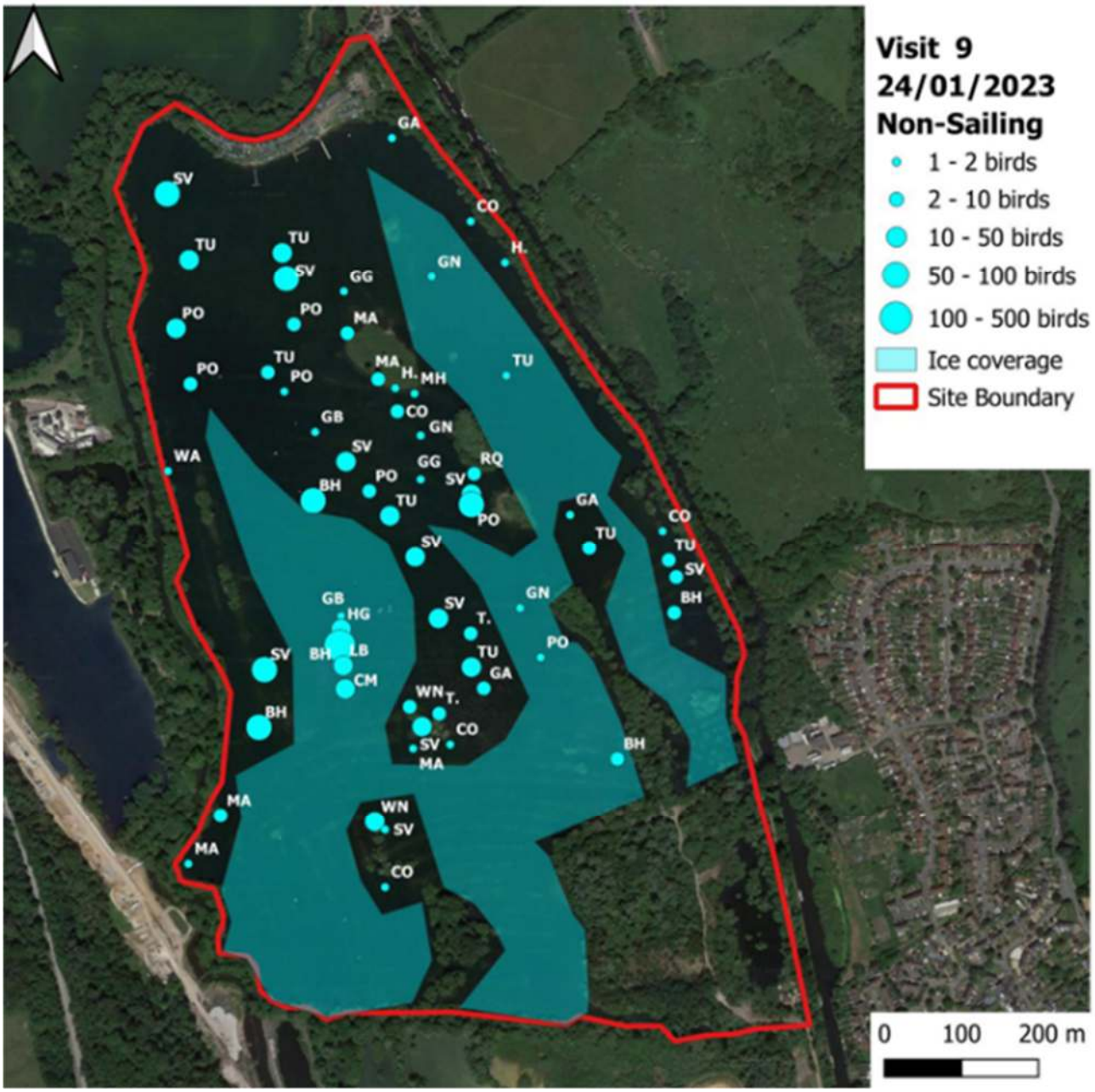



Visit 7
08/01/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
Site Boundary
0
100
200 m
TU
SV
BH
EG
CO
GG
MA
EG
SV
CO
TU
TU
MA
BH
SV
CO
MA
TU
TU
SV
TU
CG
PO
H.
SY
GG
CO
TU
SV
CO
CO
GG
CO
BH
SV
TU
CO
SV
GG
PO

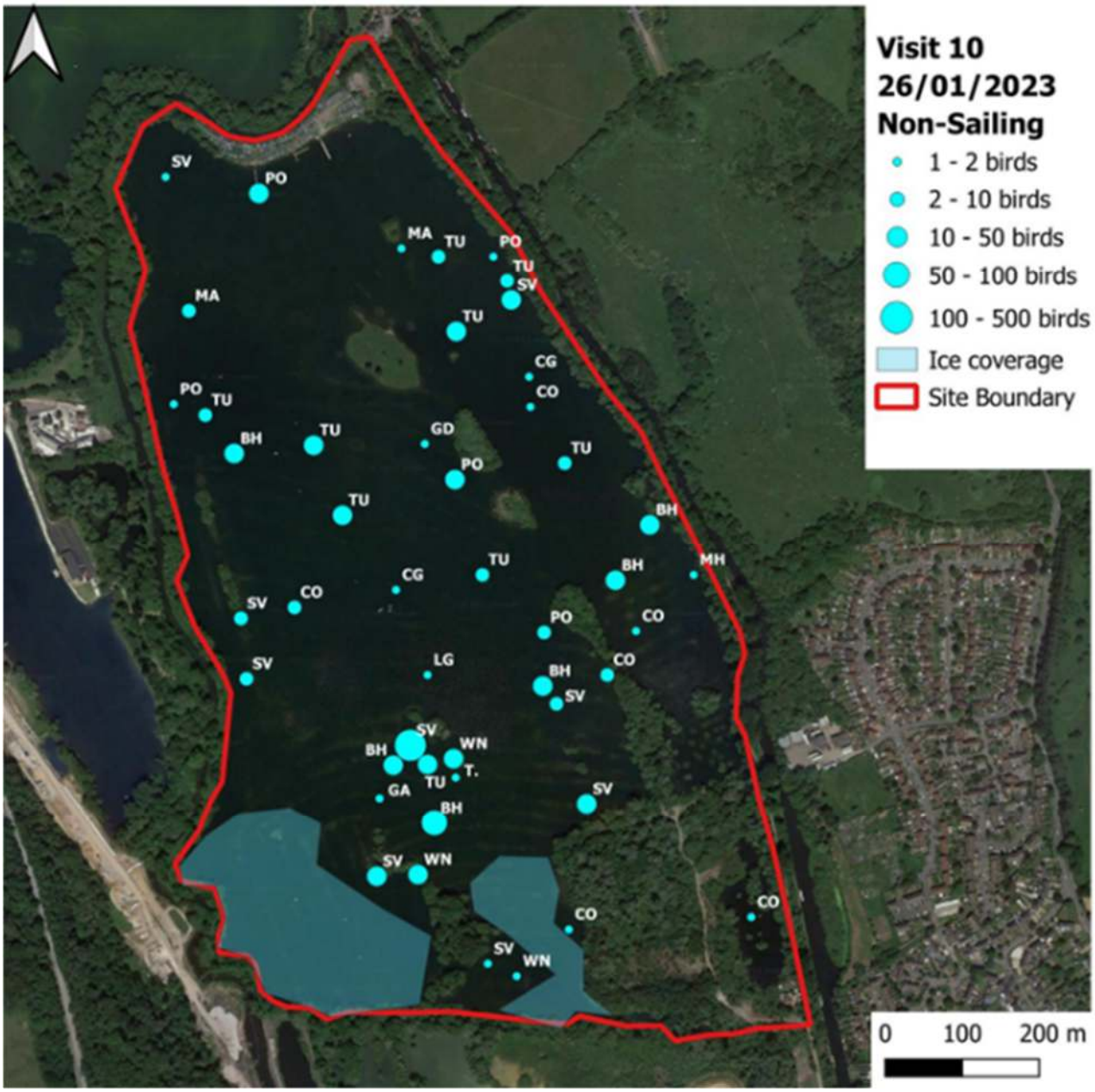
E.9 VISIT 8 – 13/01/2022 – NON-SAILING DAY



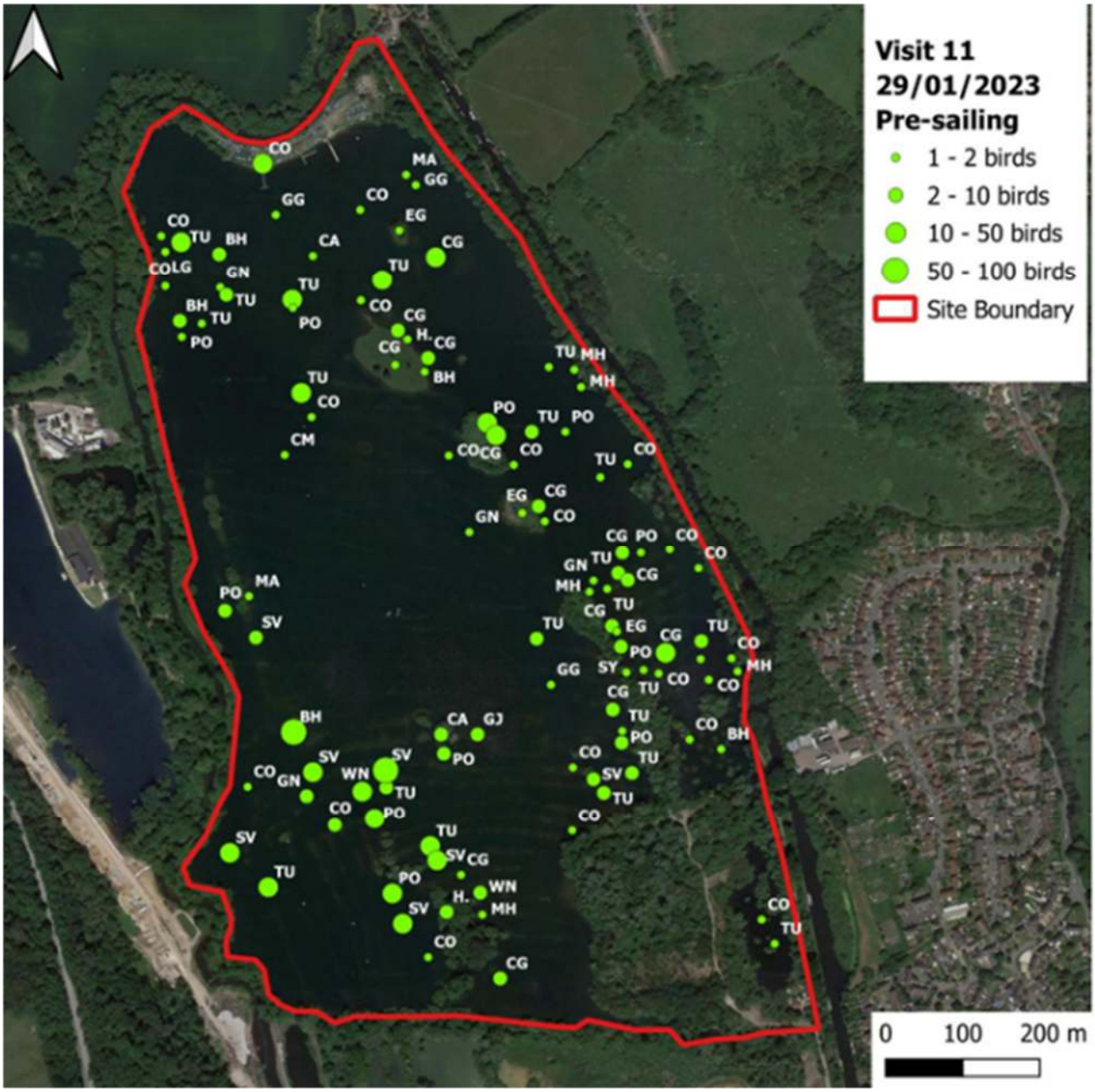
E.10 VISIT 9 – 24/01/2022 – NON-SAILING DAY (ICE AFFECTED)

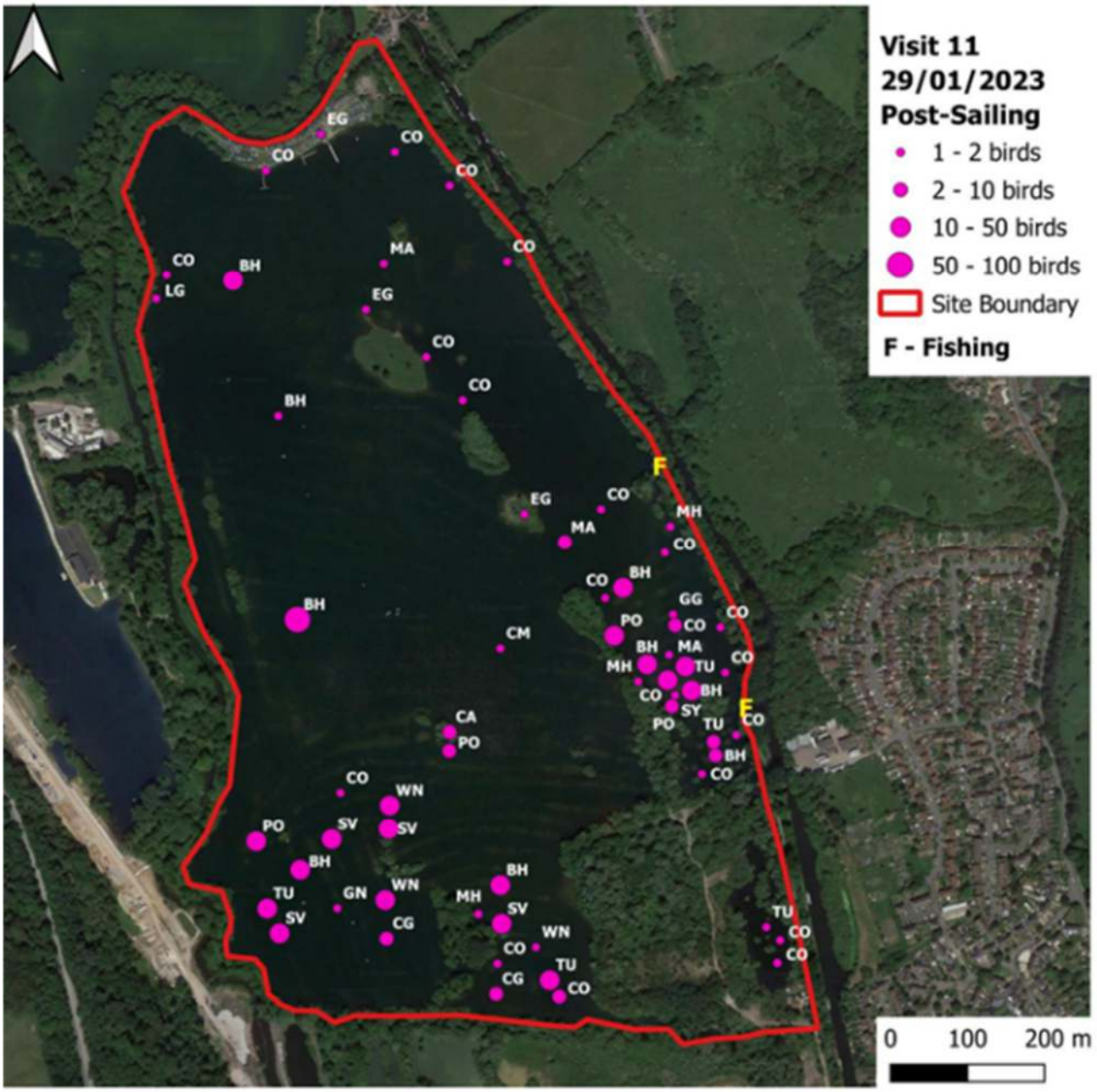


E.11 VISIT 10 – 26/01/2022 – NON-SAILING DAY

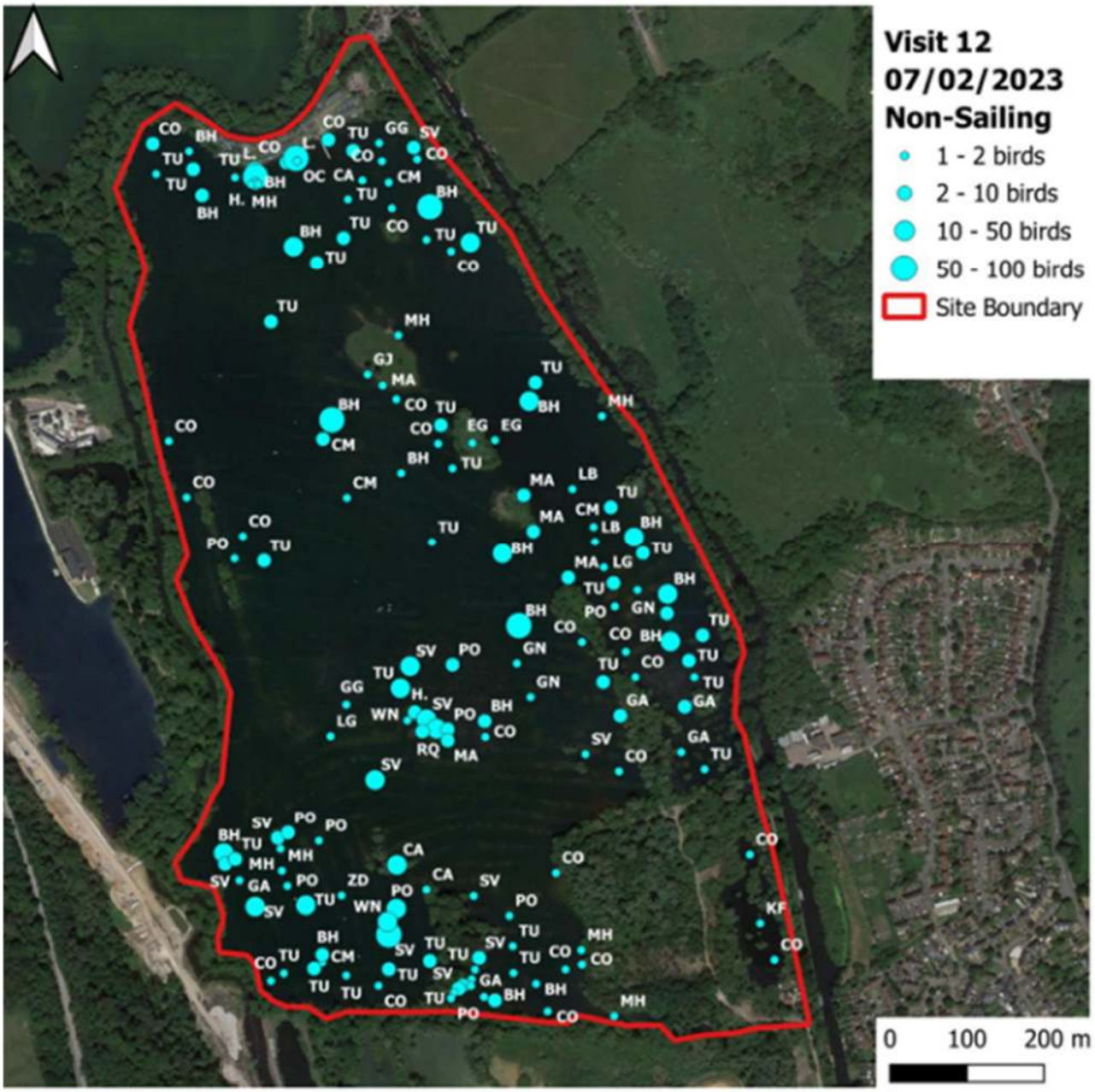


E.12 VISIT 11 – 29/01/2022 – SAILING DAY

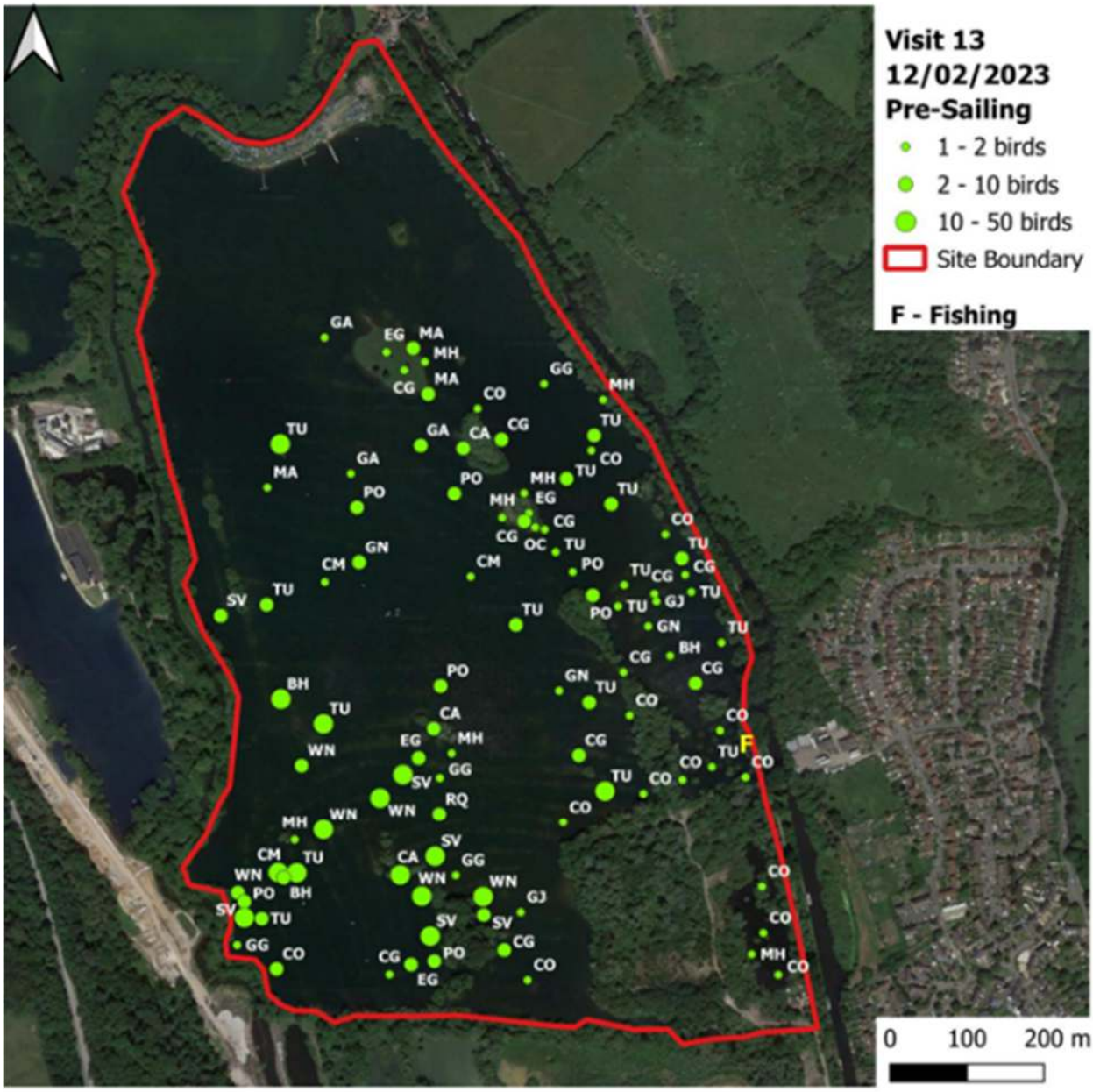


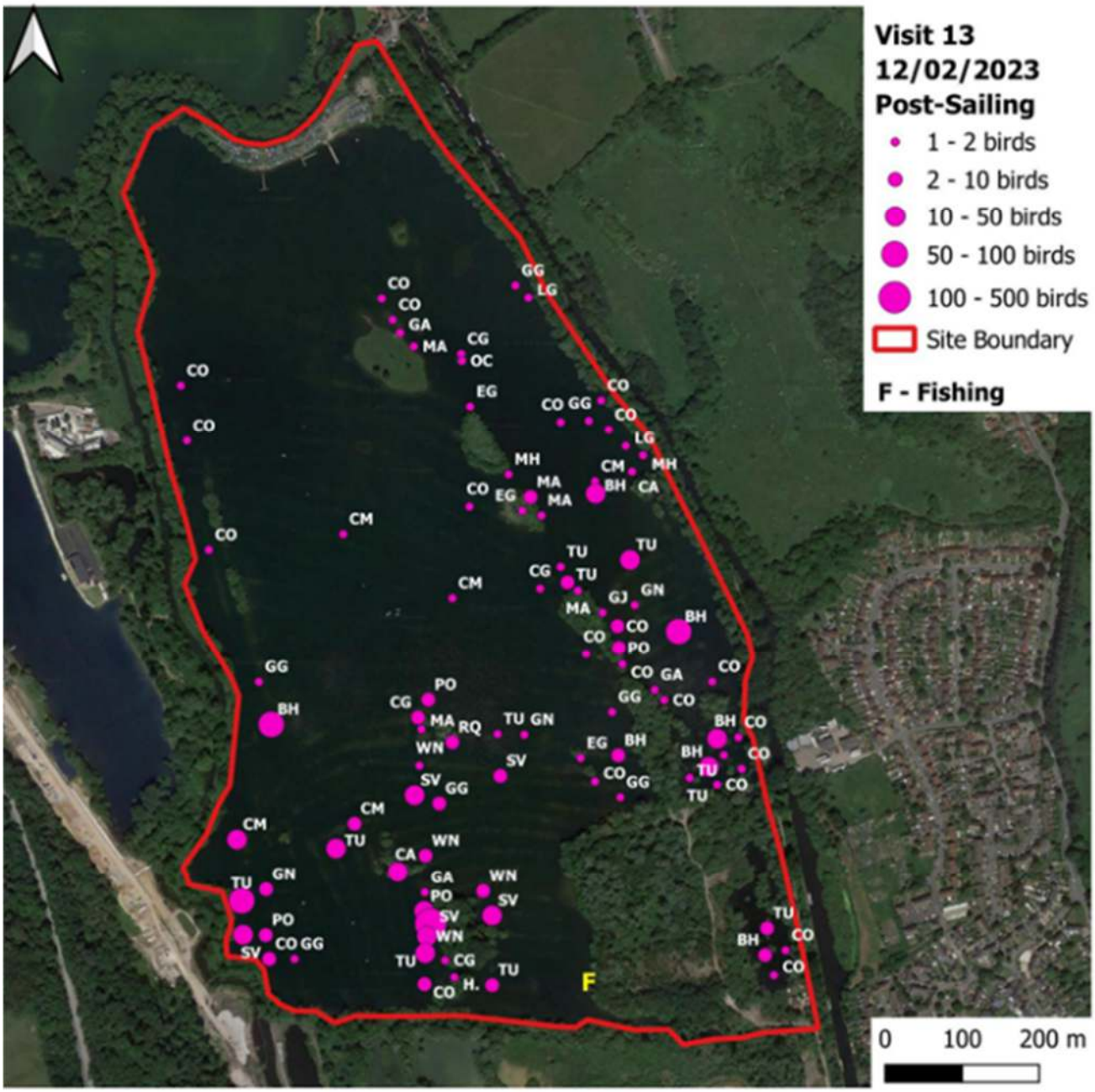

Visit 11
29/01/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
Site Boundary
F - Fishing
0
100
200 m

E.13 VISIT 12 – 07/02/2022 – NON-SAILING DAY

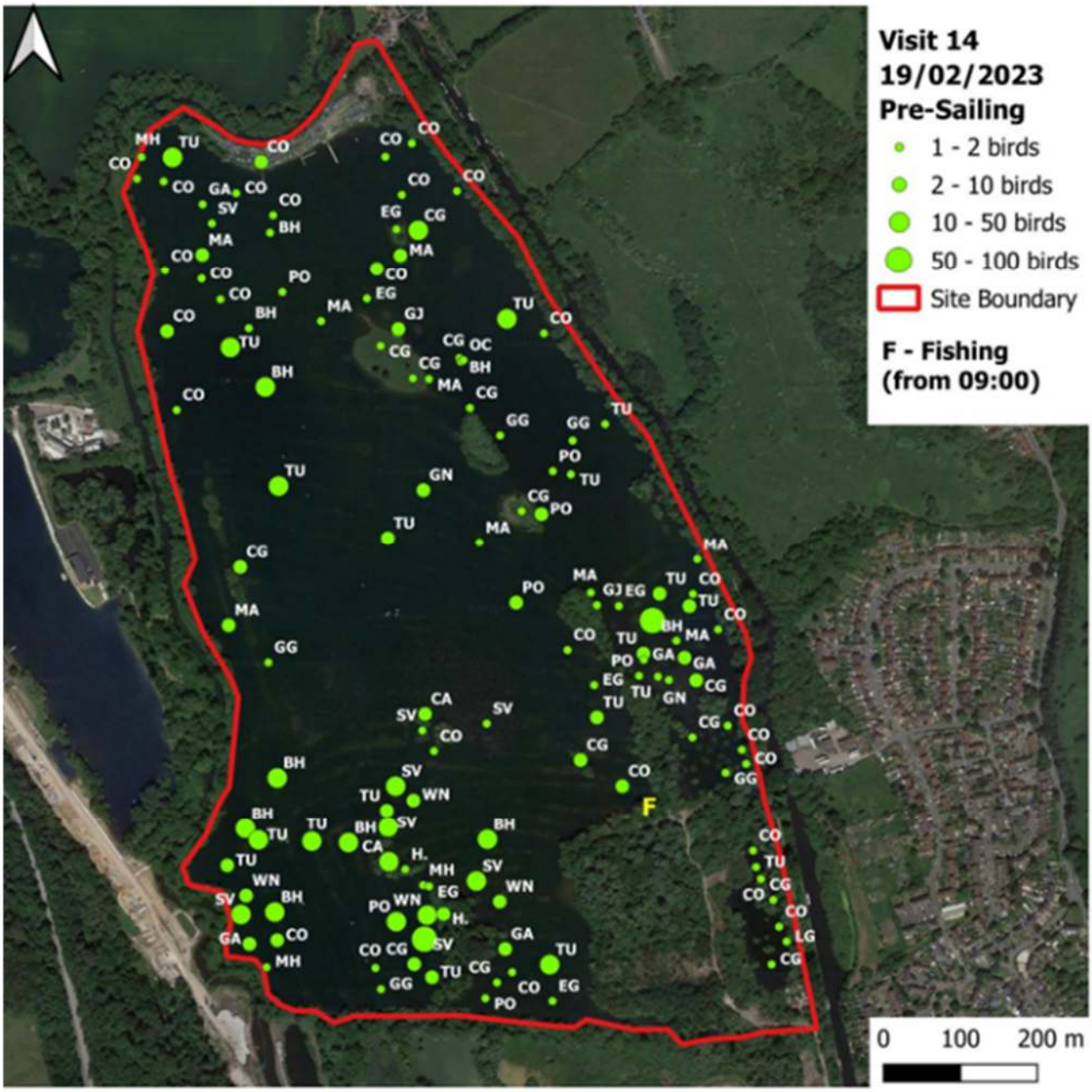


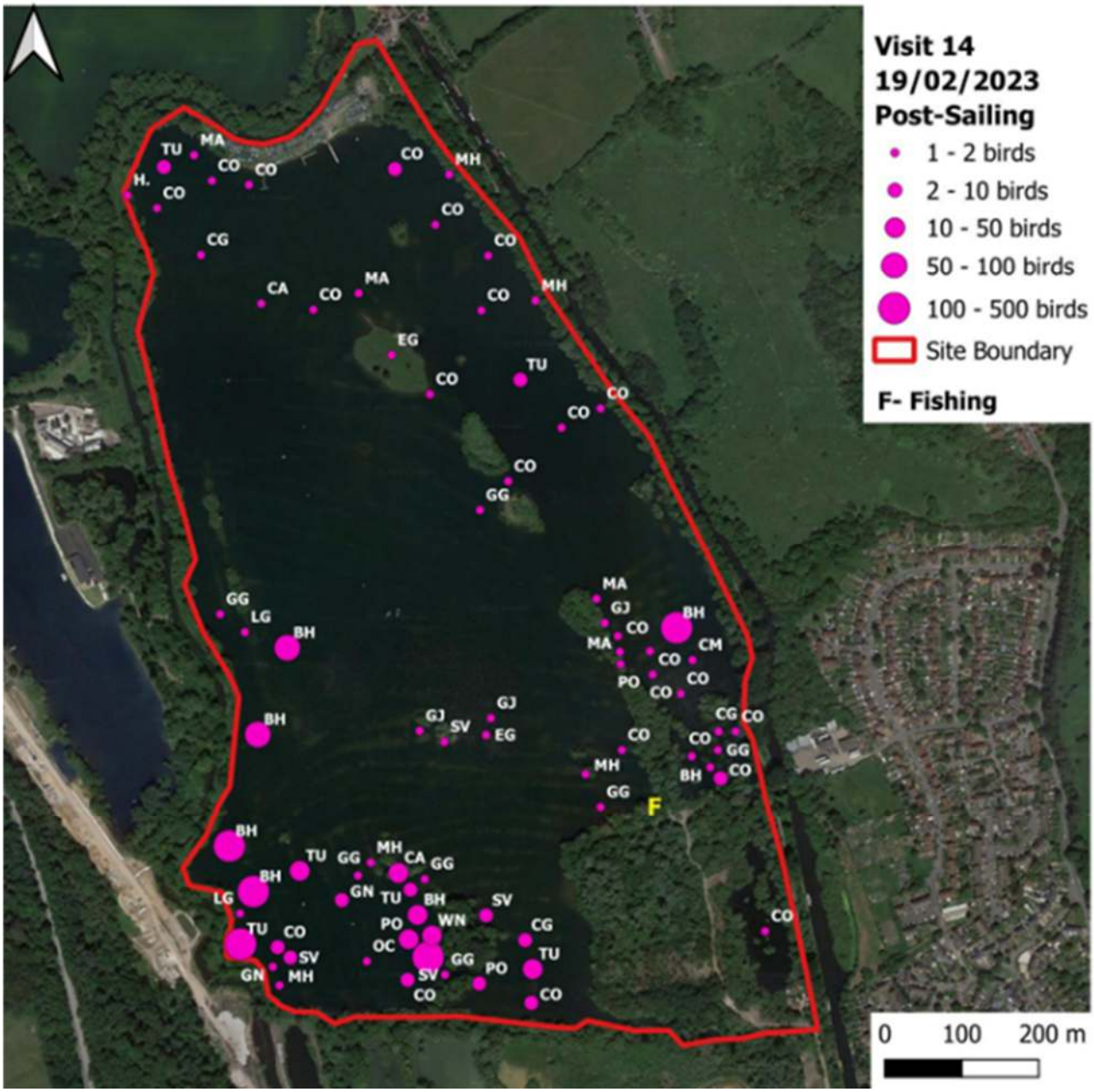
E.14 VISIT 13 – 12/02/2022 – SAILING DAY



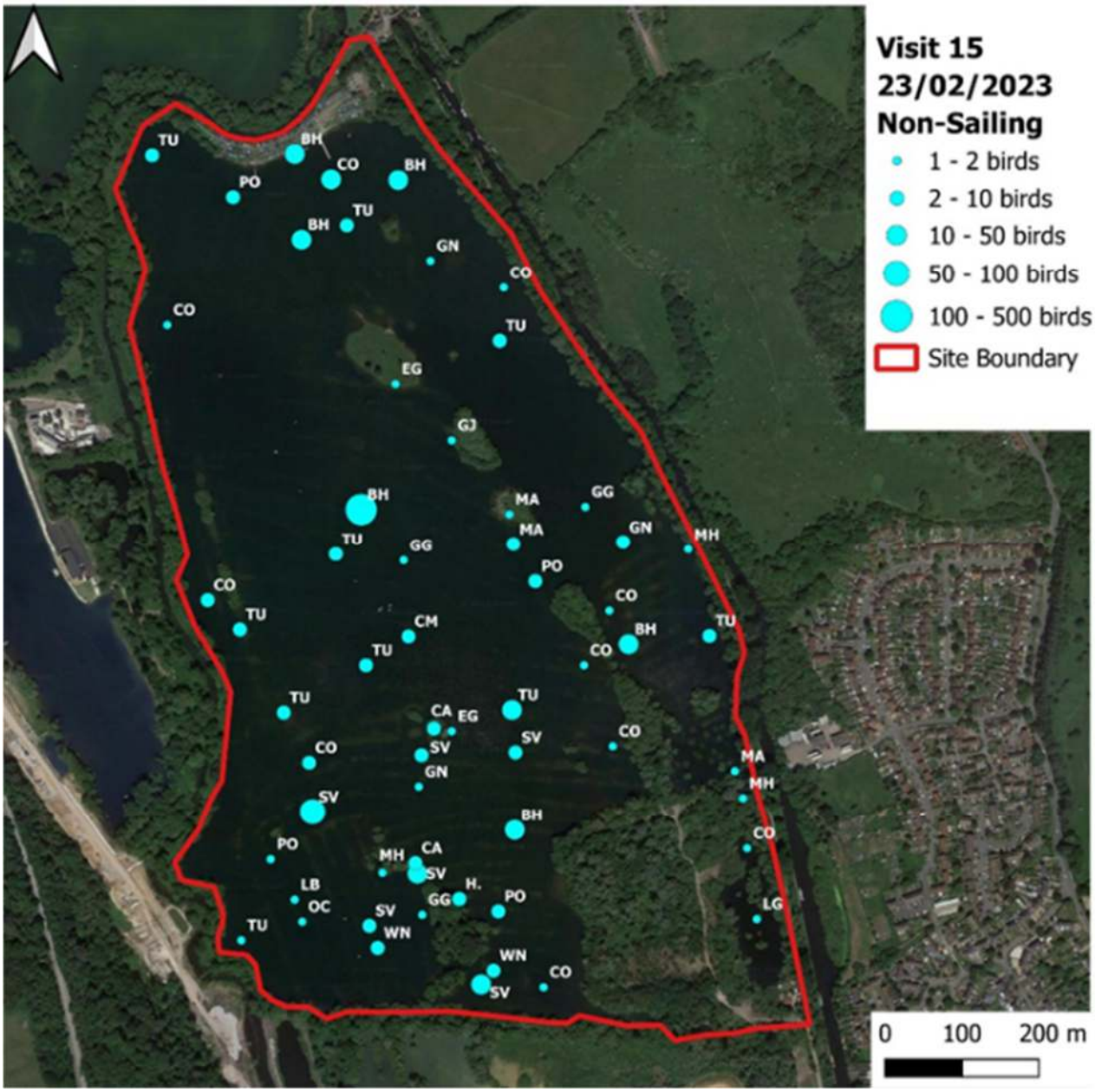

Visit 13
12/02/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
F - Fishing
F
0
100
200 m

E.15 VISIT 14 – 19/02/2022 – SAILING DAY

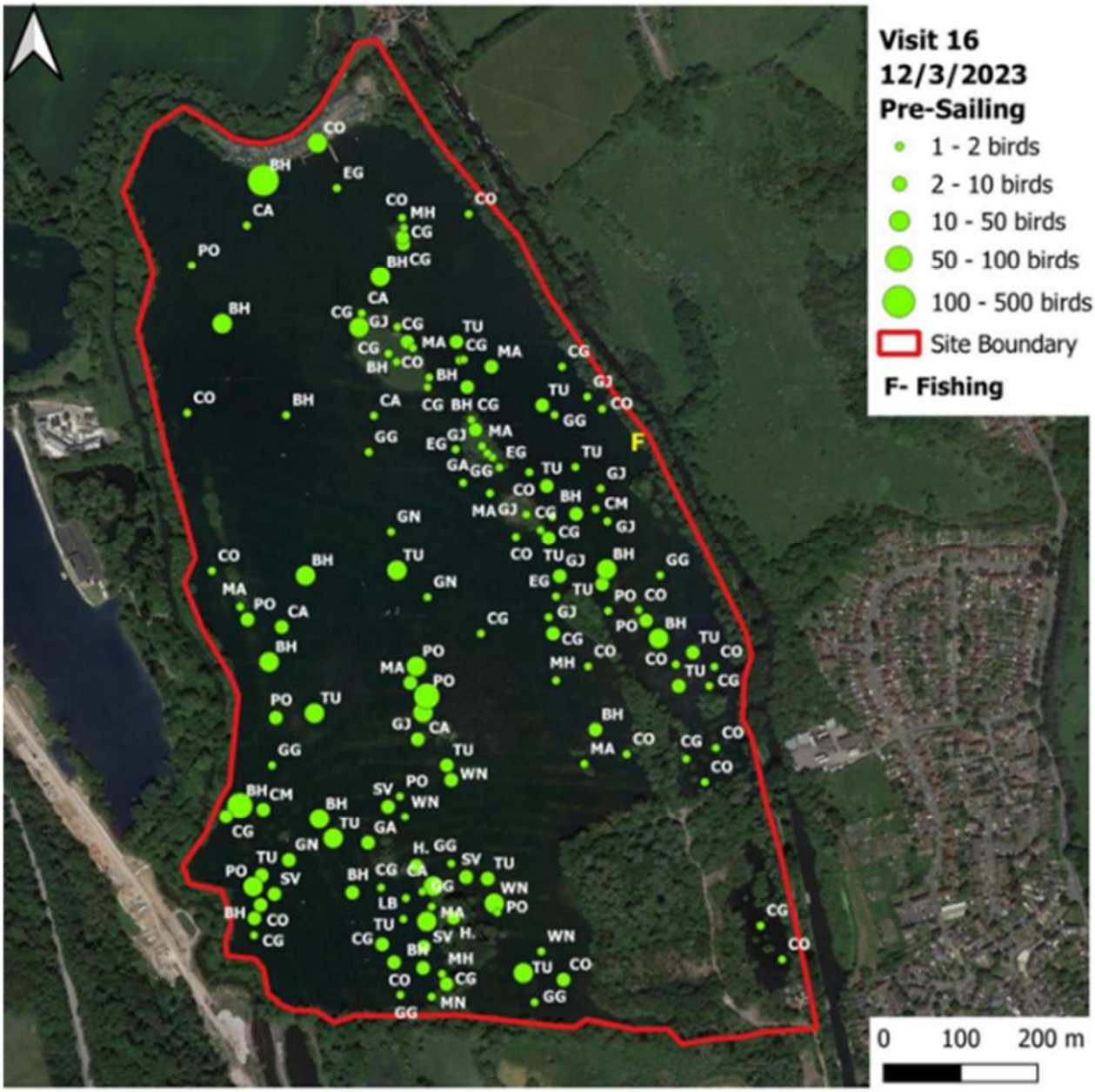


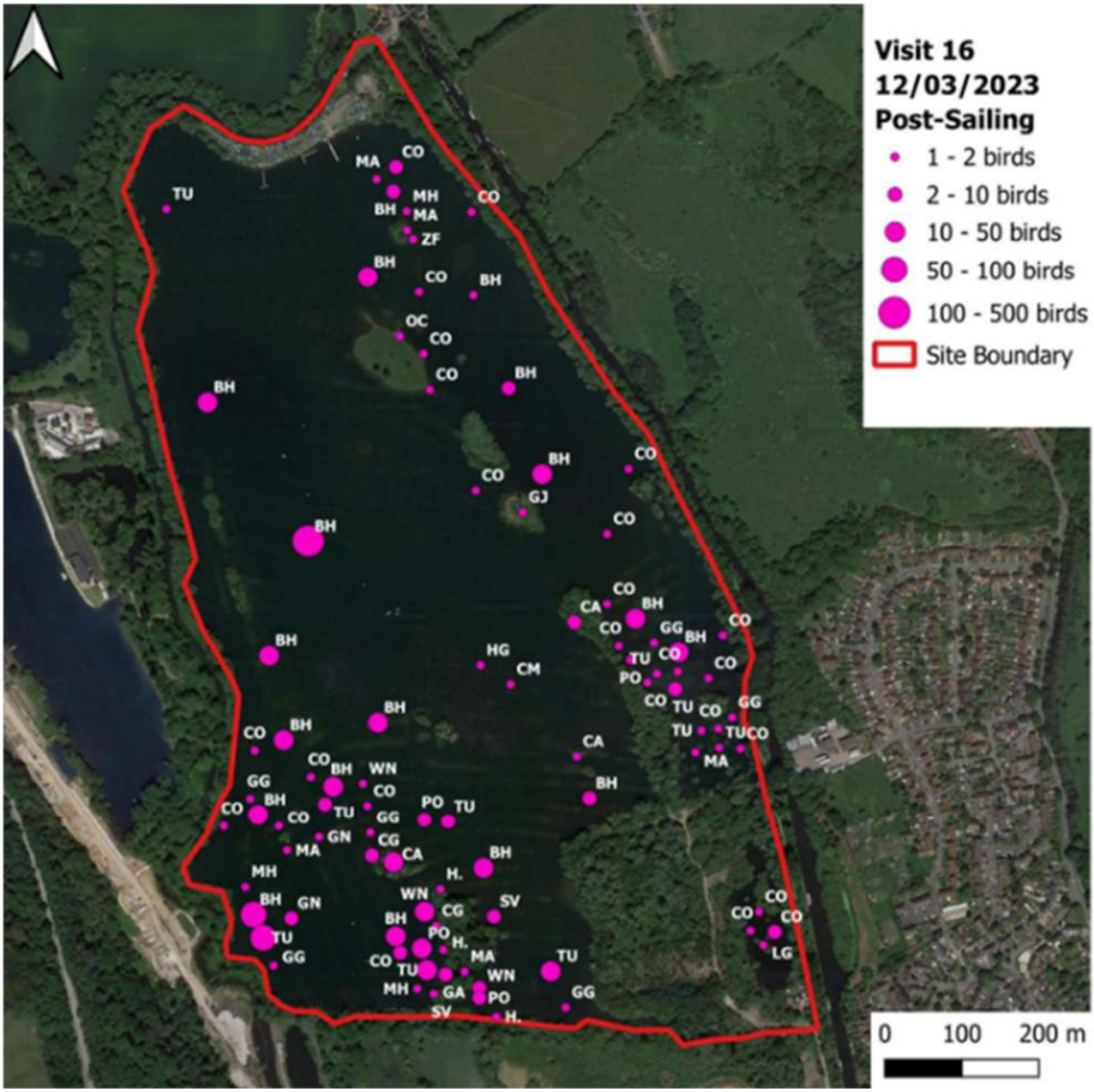

Visit 14
19/02/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
F- Fishing
0
100
200 m
F

E.16 VISIT 15 – 23/02/2022 – NON-SAILING DAY

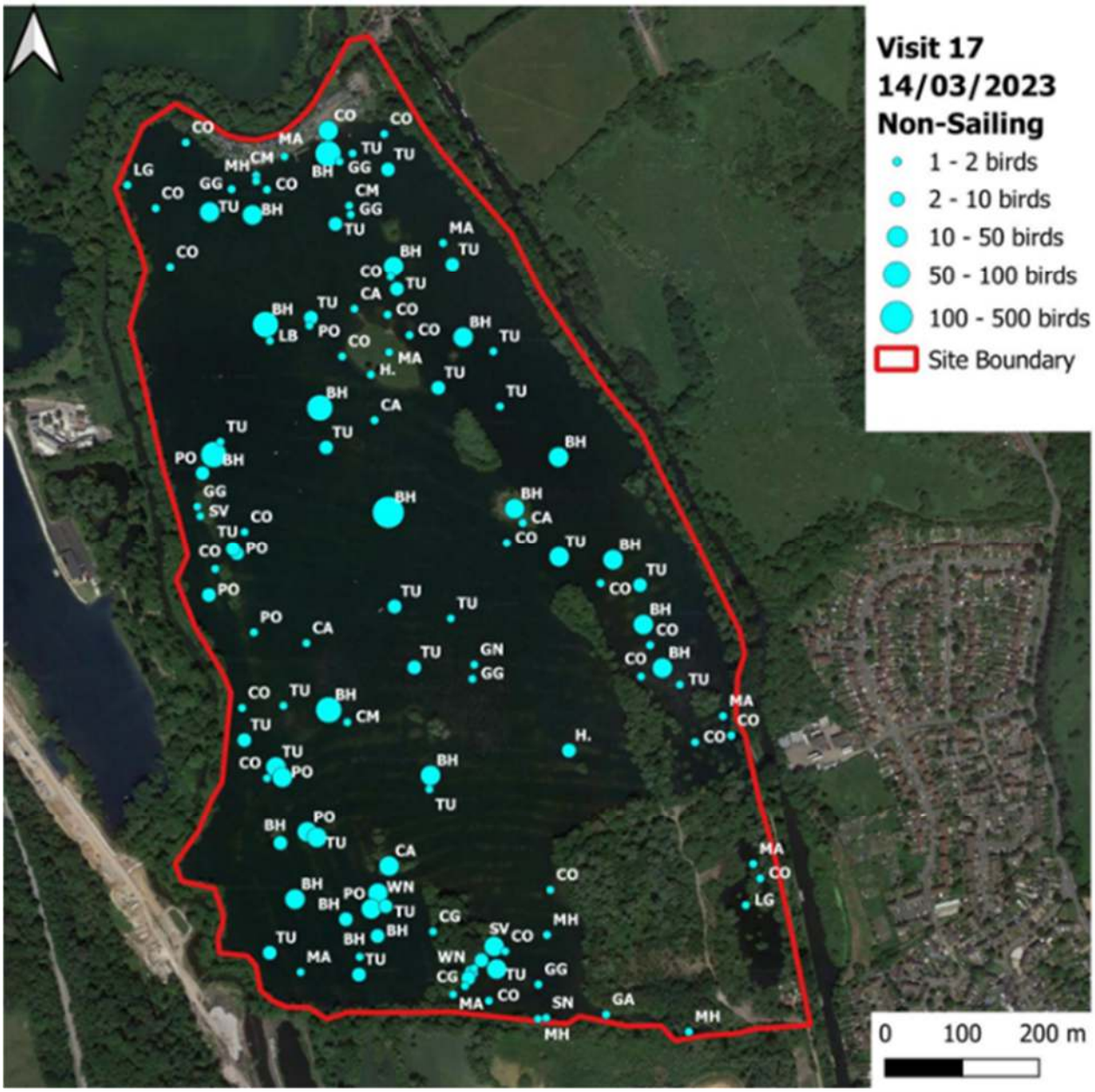


E.17 VISIT 16 – 12/03/2022 – SAILING DAY

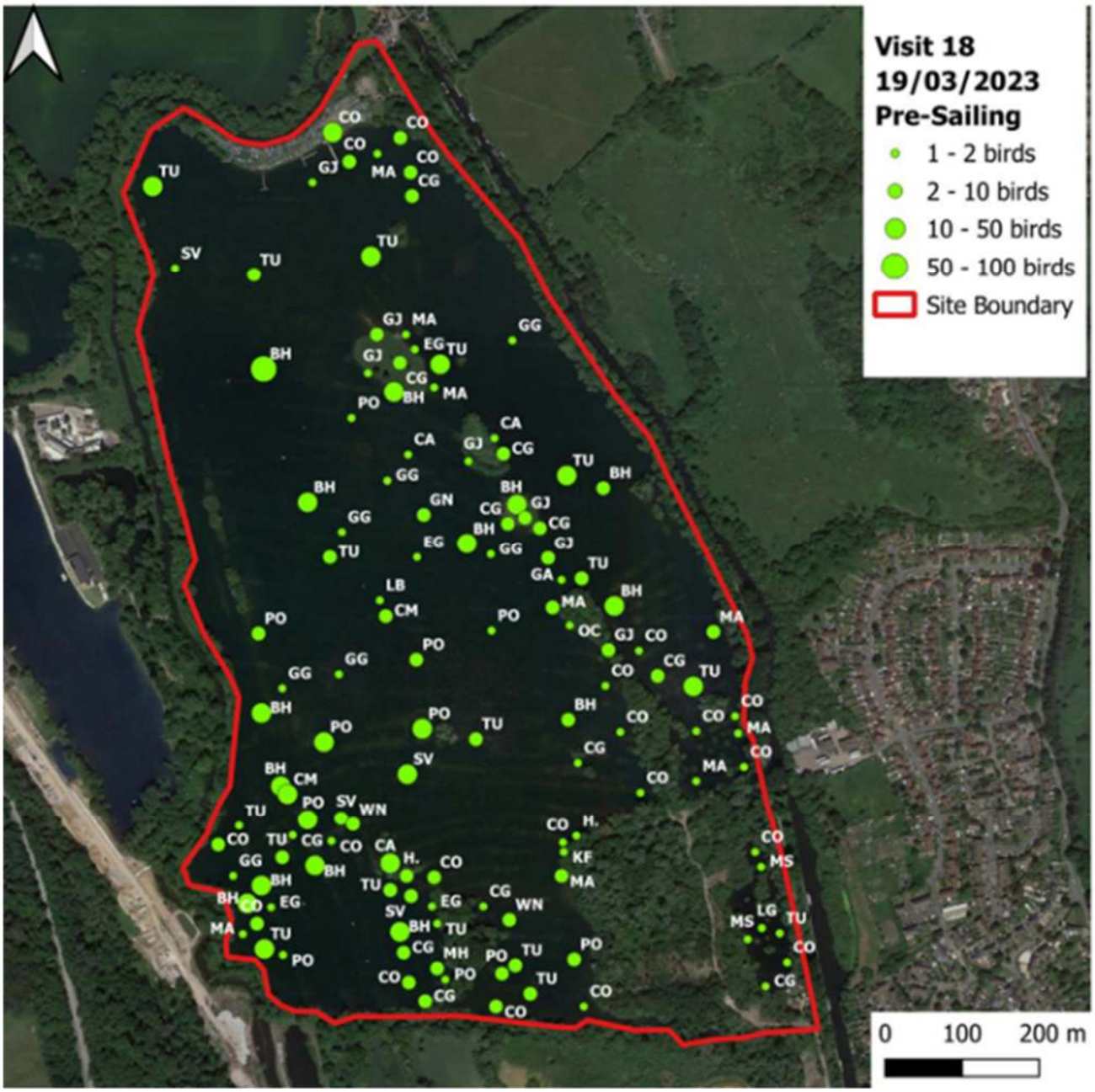


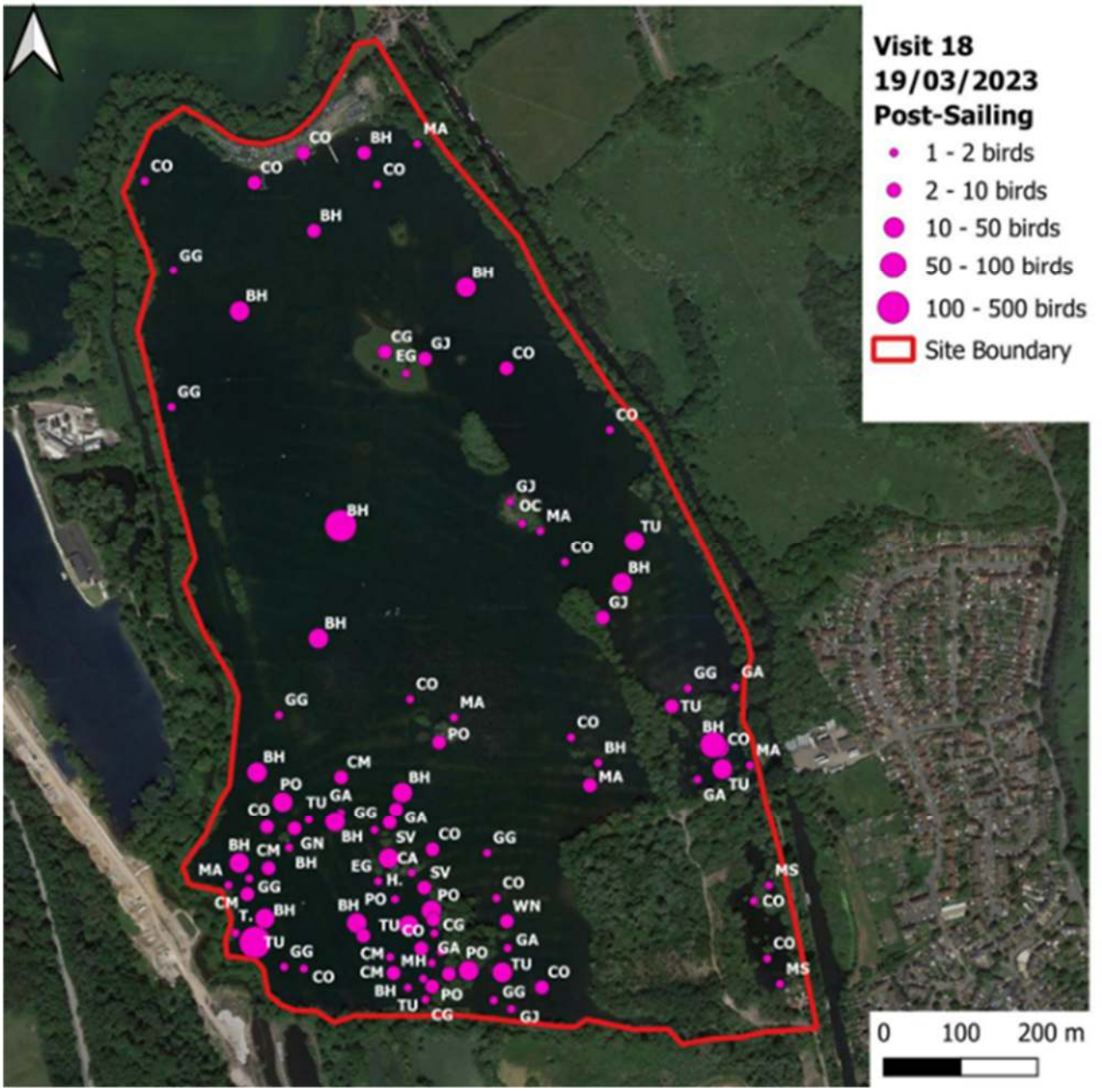

Visit 16
12/03/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
0
100
200 m

E.18 VISIT 17 – 14/03/2022 – NON-SAILING DAY

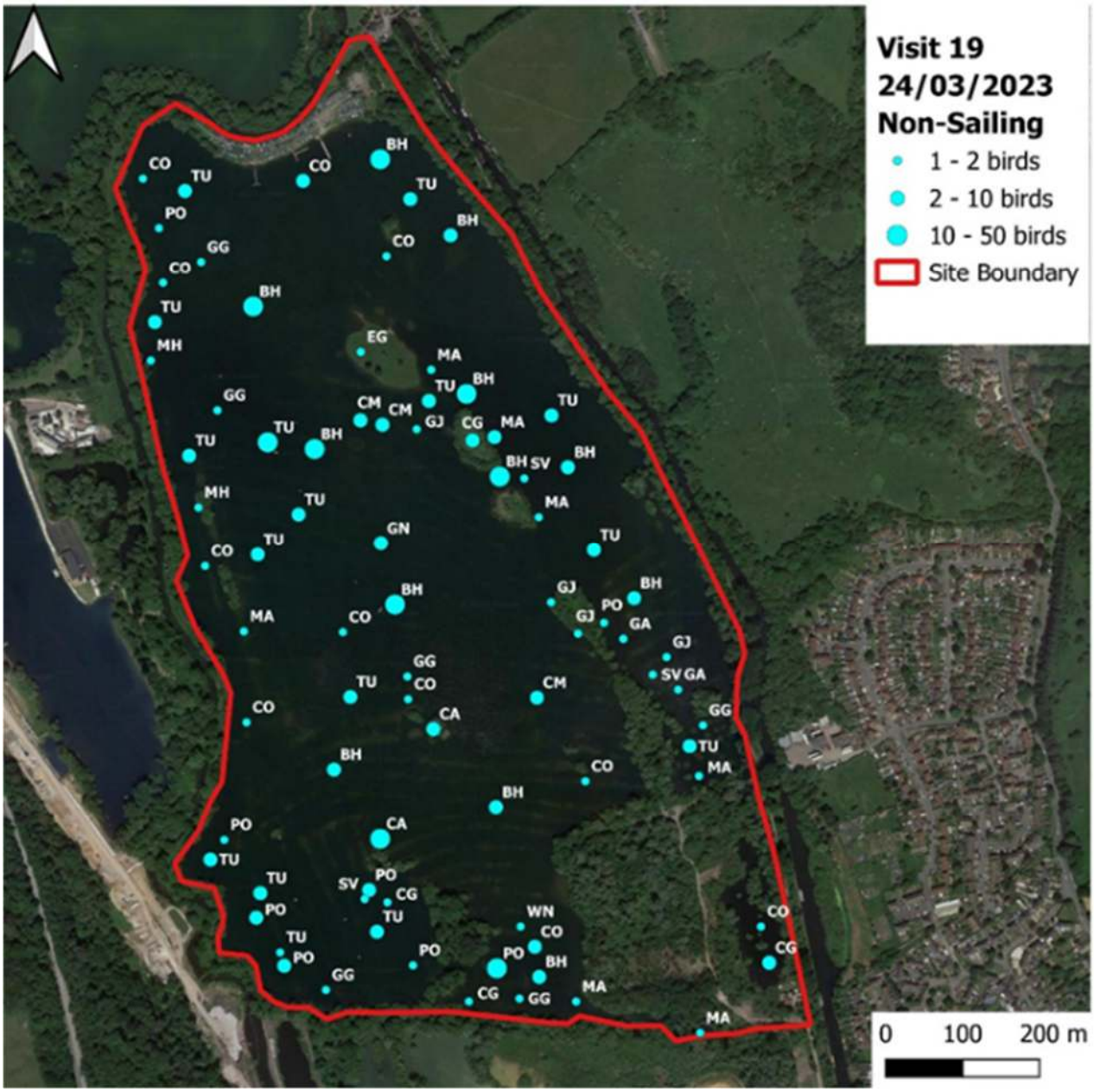


E.19 VISIT 18 – 19/03/2022 – SAILING DAY




Visit 18
19/03/2023
Post-Sailing
1 - 2 birds
2 - 10 birds
10 - 50 birds
50 - 100 birds
100 - 500 birds
Site Boundary
0
100
200 m

E.20 VISIT 19 – 24/03/2022 – NON-SAILING DAY



APPENDIX F DISTURBANCE DATA DESCRIPTIVE STATISTICS

Key to Table F.1:

Descriptor	Definition
Count (n)	Number of counts (visits 0-19)
Max	Maximum count (visits 0-19)
Median exc v0	Median of visits 1-19 (excluding visit 0)
Median undisturbed all	Median all - visits 0-19 pre- or non-sailing
Median undisturbed selected	Median selected - pre-sailing surveys defined as valid for disturbance analysis
Median disturbed all	Median all - visits 0-19 post-sailing
Median disturbed selected	Median selected - post-sailing surveys defined as valid for disturbance analysis
%difference disturbed all	Percentage difference between the median all - disturbed and undisturbed
% disturbed selected	Percentage difference between the median selected - disturbed and undisturbed

For these data tables the following key has been used to signify the notable status, if any, of the different species.

Key
Bold - WCA Schedule 1 species
BoCC, 5 red-listed species
BoCC, 5 amber-listed species
*NERC-S41 listed species
Not a regular part of the winter assemblage

Table F.1 Peak count, maximum count, and medians for non-disturbed and disturbed counts

Code	English Name	count (n)	Max	Median exc v0	Median undisturbed all	Median undisturbed selected	Median disturbed all	Median disturbed selected	% difference disturbed all	% disturbed selected
BH	Black-headed Gull	29	919	223	216.5	223	218	224	101	100
CA	Cormorant	29	40	11	8	12	7	16	88	133
CG	Canada Goose	24	75	10	12	35	6	7	50	20
CM	Common Gull	22	44	3.5	4.5	4	1.5	1.5	33	38
CO	Coot	29	75	41	41.5	43	39	40	94	93
EG	Egyptian Goose	23	16	4	4	4	4	4	100	100
GA	Gadwall	22	26	5	6	5	5	4.5	83	90
GB	Great Black-backed Gull	5	4	3	3	3	1		33	0
GD	Goosander	1	1	1	1	1				
GG	Great Crested Grebe	28	14	8	8	5	8	8	100	160
GJ	Greylag Goose	14	110	5	7	6	3	3	43	50
GN	Goldeneye	27	13	6	4	5.5	6	6.5	150	118
H.	Grey Heron	24	18	1.5	2	2	1	1	50	50
HG	Herring Gull	4	40	4.5	6		1	1	17	
KF	Kingfisher	3	2	1	1	1				

L.	Lapwing	5	65	2	17	2	32		188	0
LB	Lesser Black-backed Gull	8	20	2	2	1.5				
LG	Little Grebe	20	7	2	2	2	3	2.5	150	125
MA	Mallard	29	26	12	16	16	9	9	56	56
MH	Moorhen	28	10	3	3	3	2.5	3	83	100
MN	Mandarin Duck	2	1	1	1	1	1	1	100	100
MS	Mute Swan	4	4	3	2	2.5	4	4	200	160
OC	Oystercatcher	9	2	2	2	2	2	2	100	100
PO	Pochard	29	182	78	81	78	60	60	74	77
PT	Pintail	1	2		2					
RQ	Red-crested Pochard	7	6	5	5	5	3	3	60	60
SN	Snipe	1	1	1	1	1			0	0
SV	Shoveler	29	315	67	67	67	49	86	73	128
SY	Smew	7	1	1	1	1	1	1	100	100
T.	Teal	6	25	2	4	2	2	2	50	100
TU	Tufted Duck	29	455	147	155.5	145	144	144	93	99
WA	Water Rail	1	1	1	1				0	
WN	Wigeon	29	77	27	29	26.5	23	23	79	87

Table F.2 *Analysis of pre- and post-sailing counts for the qualifying dates with percentage change per date, a tally of count increases and decreases, and the likely percentage change with statistical confidence level (P99 to P50) - only P95 has been reported in the data analysis where relevant.*

	Before Sailing or No Sailing								After Sailing								Increase / decrease (% of larger count)										0	1	2	3
Row Labels	3.1	7.1	11	13	14.1	16.1	18.1	Grand Total	3.2	7.2	11.2	13.2	14.2	16.2	18.2	Grand Total	3	7	11	13	14	16	18	Count increase	Count decrease	P99	P95	P75	P50
BH	30	72	101	34	210	464	409	1320	106	87	218	224	677	784	549	2645	72%	17%	54%	85%	69%	41%	26%	7	0	85%	72%	69%	54%
CA	4	1	5	27	25	40	36	138	5	0	4	16	16	31	24	96	20%	-100%	-20%	-41%	-36%	-23%	-33%	1	6	20%	-20%	-23%	-33%
CG	44	12	75	35	51	70	53	340	0	1	11	10	7	6	11	46	-100%	-92%	-85%	-71%	-86%	-91%	-79%	0	7	-71%	-79%	-85%	-86%
CM	3	1	1	18	0	11	20	54	1	0	1	44	1	2	17	66	-67%	-100%	0%	59%	100%	-82%	-15%	2	4	100%	59%	0%	-15%
CO	49	35	53	21	59	47	75	339	39	16	40	34	55	45	66	295	-20%	-54%	-25%	38%	-7%	-4%	-12%	1	6	38%	-4%	-7%	-12%
EG	2	16	4	13	10	7	7	59	0	5	5	4	4	0	4	22	-100%	-69%	20%	-69%	-60%	-100%	-43%	1	6	20%	-43%	-60%	-69%
ET	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
GA	4	0	0	7	14	6	1	32	4	2	0	5	0	3	12	26	0%	-100%	0%	-29%	-100%	-50%	-92%	2	3	100%	92%	0%	0%
GB	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0%	-100%	0%	0%	0%	0%	0%	0	1	0%	0%	0%	0%
GD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
GG	10	4	3	5	5	11	11	49	8	5	1	12	9	8	12	55	-20%	20%	-67%	58%	44%	-27%	8%	4	3	58%	44%	20%	8%
GJ	0	0	6	2	4	22	25	59	0	0	0	1	4	2	10	17	0%	0%	-100%	-50%	0%	-91%	-60%	0	4	0%	0%	0%	-50%
GN	2	5	12	8	7	13	3	50	6	3	2	9	6	7	8	41	67%	-40%	-83%	11%	-14%	-46%	63%	3	4	67%	63%	11%	-14%
H.	2	1	5	0	6	18	5	37	1	1	0	1	1	3	1	8	-50%	0%	-100%	100%	-83%	-83%	-80%	1	5	100%	0%	-50%	-80%
HG	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0%	0%	0%	0%	0%	100%	0%	1	0	100%	0%	0%	0%
KF	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	-100%	0	1	0%	0%	0%	0%
L.	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-100%	0%	0%	0%	0%	0%	0%	0	1	0%	0%	0%	0%

Row Labels	Before Sailing or No Sailing								After Sailing								Increase / decrease (% of larger count)							Count increase	Count decrease	0	1	2	3
	3.1	7.1	11	13	14.1	16.1	18.1	Grand Total	3.2	7.2	11.2	13.2	14.2	16.2	18.2	Grand Total	3	7	11	13	14	16	18			P99	P95	P75	P50
LB	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	-100%	-100%	0	2	0%	0%	0%	0%
LG	1	2	2	0	1	0	1	7	0	0	2	3	3	1	0	9	-100%	-100%	0%	100%	67%	100%	-100%	3	3	100%	100%	67%	0%
MA	16	4	4	14	21	19	21	99	9	12	9	10	6	12	13	71	-44%	67%	56%	-29%	-71%	-37%	-38%	2	5	67%	56%	-29%	-37%
MH	3	2	6	10	3	3	3	30	3	0	3	2	5	3	1	17	0%	-100%	-50%	-80%	40%	0%	-67%	1	4	40%	0%	0%	-50%
MN	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0%	0%	0%	0%	0%	-100%	100%	1	1	100%	0%	0%	0%
MS	0	0	0	0	0	0	4	4	0	0	0	0	0	0	4	4	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
OC	0	0	0	2	2	0	2	6	0	0	0	2	2	2	1	7	0%	0%	0%	0%	0%	100%	-50%	1	1	100%	0%	0%	0%
PO	158	135	78	32	30	99	84	616	182	172	57	43	45	60	72	631	13%	22%	-27%	26%	33%	-39%	-14%	4	3	33%	26%	22%	13%
PT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
RQ	0	6	0	5	0	0	0	11	0	0	0	3	0	0	0	3	0%	-100%	0%	-40%	0%	0%	0%	0	2	0%	0%	0%	0%
SN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
SV	62	34	201	134	198	33	35	697	49	92	87	200	130	5	17	580	-21%	63%	-57%	33%	-34%	-85%	-51%	2	5	63%	33%	-21%	-34%
SY	0	1	1	0	0	0	0	2	0	1	1	0	0	0	0	2	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
T.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0%	0%	0%	0%	0%	0%	100%	1	0	100%	0%	0%	0%
TU	226	125	164	110	141	120	175	1061	322	67	74	144	196	122	220	1145	30%	-46%	-55%	24%	28%	2%	20%	5	2	30%	28%	24%	20%
WA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0%	0	0	0%	0%	0%	0%
WN	0	9	24	77	36	42	13	201	0	0	29	42	19	27	7	124	0%	-100%	17%	-45%	-47%	-36%	-46%	1	5	17%	0%	-36%	-45%

APPENDIX G FORM USED TO RECORD DISTURBANCE

BROADWATER LAKE DISTUBANCE VP

Page of

VP Location (& NGR)						Date		Surveyor	
Time Start			Time Finish						
Weather	Time	Cloud	Precipitation	Wind (Direction & Strength)	Visibility (1< 200m to 4 > 2km)	Ice Cover	Additional Weather & Survey Notes		
Start									
Midpoint									
Finish									

Reg #	Time	Species	Number	Disturbance Type & Number	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
e.g. 1	*10:25*	*MA*	*6*	*SB x 5*	*4*	*75*	*No*	*Birds flew S to behind islands*

Key to Disturbance Types

PB - Power Boat
SB - Sailing Boat
WS - Other Water Sports - specify (e.g. windsurfing)
OB - Observer-based
WA - Walker/birder, etc
AN - Anglers
AC - Aircraft
HC -Helicopter
CO - Construction work (e.g. HS2)
OT - Other - specify (e.g. raptor)
UK - Unknown

Key to 'Birds Reaction to Disturbance'

0 - No Reaction
1 - Increased vigilance
2 - Birds swam slowly away from disturbance
3 - Birds swam rapidly away from disturbance
4 - Bird flew < 50m from disturbance (direct flight - DF)
5 - Birds flew 50 - 100m from disturbance (DF)
6 - Birds flew >100m from disturbance (DF)
7 - Birds flew around Site before settling back on Lake
8 - Birds appeared to leave Site (give direction taken in notes if known)

Prefix Number with minus sign (-) if birds arriving from another location (on or outside Lake)

Show on map approx areas of disturbance and map all bird disturbance

V1.0

APPENDIX H DISTURBANCE DATA (MODIFIED FROM DATA COLLECTED IN THE FIELD)

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
2	27/11/2022	1	JD	4	09:03	TU	155	SB	5	2	300	No	
2	27/11/2022	1	JD	10	09:04	TU	25	SB	14	2	30	Partially	After race ended
2	27/11/2022	1	JD	11	09:04	GN	4	SB	14	2	30	Partially	
2	27/11/2022	1	JD	2	09:25	HG	6	SB	2	4	>1000	No	
2	27/11/2022	1	JD	3	09:25	LB	2	SB	2	4	>1000	No	
2	27/11/2022	1	JD	5	09:35	TU	155	SB	8	2	50	Partially	After race ended
2	27/11/2022	1	JD	6	09:35	GG	3	SB	8	2	30	Partially	After race ended
2	27/11/2022	1	JD	7	09:35	BH	2	SB	14	4	1000	Partially	After race ended
2	27/11/2022	1	JD	8	09:35	CO	8	SB	16	2	30	Partially	After race ended
2	27/11/2022	1	JD	9	09:35	PO	1	SB	8	2	250	Partially	After race ended
2	27/11/2022	1	JD	12	12:40			SECOND RACE STARTED					
2	27/11/2022	1	JD	13	12:43	TU	8	SB	16	4	800	No	Dropped onto lake to north
2	27/11/2022	1	JD	14	12:44	TU	3	SB	16	4	>1000	No	Flew off to east over peninsula
2	27/11/2022	1	JD	15	12:48	TU	6	SB	16	4	>1000	No	Flew off to north
2	27/11/2022	1	JD	16	12:52	TU	13	SB	16	4	>1000	No	Flew off to north
2	27/11/2022	1	JD	17	12:54	TU	2	SB	16	4	>1000	No	Flew off to north
2	27/11/2022	1	JD	18	12:55			SECOND RACE FINISHED					
2	27/11/2022	1	JD	19	13:04	CA	2	None		-2		Yes	Moved back onto course post-race
2	27/11/2022	1	JD	20	13:06	TU	6	None		-4	>1000	No	Flew off to north

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
2	27/11/2022	1	JD	21	13:07	MA	5	None		-2			Swam north toward Midway Isle
2	27/11/2022	1	JD	22	13:07	TU	12	None		-2			Swam north toward Midway Isle
2	27/11/2022	1	JD	23	13:11	TU	13	None		-2			Swam north toward Midway Isle
2	27/11/2022	1	JD	24	13:11	PO	5	None		-2			Swam north toward Midway Isle
2	27/11/2022	1	JD	25	13:13	TU	5	None		-2			Swam north of Midway Isle onto course
2	27/11/2022	1	JD	26	13:14	PO	2	None		-2			Swam north of Midway Isle onto course
2	27/11/2022	1	JD	27	13:14	TU	4	None		-2			Swam north of Midway Isle onto course
2	27/11/2022	1	JD	28	13:20	GG	3	None		-2			Swam out west onto course from E Islands
2	27/11/2022	1	JD	29	13:20	TU	5	None		-4		No	Flew N off-site
2	27/11/2022	1	JD	30	13:23	SV	2	None		-2			2 Drakes appeared E of Midway
2	27/11/2022	1	JD	31	13:26	CO	6	None		-2			Swam out onto course
2	27/11/2022	1	JD	32	13:26	GG	3	None		-2			Swam out onto course
2	27/11/2022	1	JD	1	09.22-09:25	TU	30	SB	2	2	350	No	Moved to SW corner
3	04/12/2022	1	JD	1	09:07	SV	2	WA	1	4	50	No	
3	04/12/2022	1	JD	2	09:15	TU	60	SB	2	2	50	No	Moving SW (boat prep)
3	04/12/2022	1	JD	3	09:18	BH	1	SB	4	4	200	No	(Boat prep)
3	04/12/2022	1	JD	4	09:20	TU	2	SB	5	4	300	No	Flew S to join others on water NW of peninsula (Boat Prep)
3	04/12/2022	1	JD	5	09:21	TU	2	SB	5	4		No	(Boat prep)

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
3	04/12/2022	1	JD	6	09:23	CG	2	SB	5	4		No	(Boat prep)
3	04/12/2022	3	BH	1	09:32	PO	8	UK		8	600	No	Appeared to land on Pit to N
3	04/12/2022	3	BH	2	09:32	PO	3	UK		8	800	No	Appeared to land on Pit to N
3	04/12/2022	1	JD	7	09:32	TU	4	PB	1	4		No	
3	04/12/2022	1	JD	8	09:33	TU	4	PB	1	4		No	
3	04/12/2022	1	JD	9	09:33	Mixed flock of TU/PO	16	PB	1	4		No	Flew off east
3	04/12/2022	1	JD	10	09:33	TU	20	PB	1	2	20	No	E of Midway
3	04/12/2022	1	JD	11	09:33	PO	12	PB	1	2	20	No	E of Midway
3	04/12/2022	1	JD	12	09:34	TU	10	PB	1	2	20	No	E of Midway
3	04/12/2022	3	BH	3	09:39	CG	8	UK		6	400	No	
3	04/12/2022	3	BH	4	09:41	MA	1	UK		?	-	-	Thought to be relocating
3	04/12/2022	3	BH	5	09:49	First Sailing boats out							
3	04/12/2022	1	JD	13	09:50	Sailing Boats X 17 (on water)							
3	04/12/2022	1	JD	1	09:50	BH	50	PB	1	3	20	Yes	
3	04/12/2022	3	BH	6	09:52	BH	1	SB	?	6	400	No	
3	04/12/2022	1	JD	4	09:52	PO	30	PB	1	6	250	No	
3	04/12/2022	1	JD	5	09:52	TU	80	PB	1	6	250	No	
3	04/12/2022	1	JD	14	09:54	SV	4	AC	1	4	500	No	Flew off NE
3	04/12/2022	3	BH	7	09:55	BH	1	SB	1	6	400	No	
3	04/12/2022	3	BH	8	09:55	GG	2	SB	1	2	200	No	
3	04/12/2022	1	JD	15	09:56	GG	1	SB	10			No	

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
3	04/12/2022	1	JD	2	09:57	CO	6	SB	10	6	20	Yes	
3	04/12/2022	1	JD	3	09:57	CO	6	SB	10	6	20	Yes	
3	04/12/2022	1	JD	16	10:01	Mixed flock of TU/PO	40	SB	14	1	10	No	E of Midway - Birds bunching
3	04/12/2022	1	JD	17	10:03	TU	4	SB	17	4	300	No	SW
3	04/12/2022	1	JD	6	10:05	PO	15	PB/SB	?	5	100	No	
3	04/12/2022	1	JD	7	10:08	PO	1	PB/SB	?	5	100	No	
3	04/12/2022	1	JD	8	10:08	MA	6	PB/SB	?	5	100	No	
3	04/12/2022	1	JD	9	10:08	EG	4	PB/SB	?	5	100	No	
3	04/12/2022	3	BH	9	10:09	CA	1	UK		?	-	N/a	Probably not disturbance
3	04/12/2022	1	JD	18	10:10	TU	44	SB	17	2	200	No	Swam SW from west of Midway
3	04/12/2022	1	JD	19	10:10	GN	4	SB	17	1	200	No	Swam SW from east of Midway
3	04/12/2022	1		20	10:15	Mixed flock of TU/PO	24	SB	1	4	250	No	Circled and landed in SW corner - SB (headed south to turn at buoy E of Midway)
3	04/12/2022	3	BH	10	10:18	CG	8	UK		8	800	No	Probably not disturbance
3	04/12/2022	3	BH	11	10:25	TU	3	SB		8	800	No	
3	04/12/2022	1		21	10:25	Mixed flock of TU/PO	50	SB	5	4	250	No	Swimming SW then turned to take off into wind looping anti clockwise to fly to SW - SB (headed south to turn at buoy E of Midway)
3	04/12/2022	3	BH	12	10:27	Mixed flock of TU/PO	50	SB	5	7	200	Yes	Flying around before landing

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
3	04/12/2022	3	BH	13	10:30	PO	1	SB	5	8	800	No	
7	08/01/2023	3	BH	1	08:22	Safety Boat out							
7	08/01/2023	1	JD	1	08:50	BH	40	AC	1	4	50	No	Dispersed W-SW
7	08/01/2023	1	JD	3	09:18	CO	6	SB	?	6	20	No	
7	08/01/2023	1	JD	4	09:20	CO	7	SB	?	7	30	No	
7	08/01/2023	3	BH	2	09:31	TU	3	UK		5	50	No	
7	08/01/2023	3	BH	3	09:34	GJ	7	UK		?	-	-	Flew over SW - Not sure if disturbance related
7	08/01/2023	3	BH	4	09:50	Safety Boat							
7	08/01/2023	1	JD	2	09:50	BH	50	PB	1	3	20	Yes	
7	08/01/2023	2	MC	1	09:50	BH	50	PB	1	3	20	Yes	
7	08/01/2023	2	MC	4	09:52	PO	30	PB	1	6	250	No	
7	08/01/2023	2	MC	5	09:52	TU	80	PB	1	6	250	No	
7	08/01/2023	3	BH	5	09:54	MA	3	UK		6	250	No	Cause of movement unknown
7	08/01/2023	3	BH	6	09:56	Sailing started							
7	08/01/2023	2	MC	2	09:57	CO	6	SB	?	6	20	Yes	
7	08/01/2023	2	MC	3	09:57	CO	6	SB	?	6	20	Yes	
7	08/01/2023	3	BH	7	10:02	EG	4	SB	1	5	50	Yes	
7	08/01/2023	3	BH	8	10:04	EG	2	SB	6	1	0	N/a	No disturbance
7	08/01/2023	2	MC	6	10:05	PO	15	PB/SB	?	5	100	No	
7	08/01/2023	2	MC	7	10:08	PO	1	PB/SB	?	5	100	No	
7	08/01/2023	2	MC	8	10:08	MA	6	PB/SB	?	5	100	No	
7	08/01/2023	2	MC	9	10:08	EG	4	PB/SB	?	5	100	No	
7	08/01/2023	3	BH	9	10:48	PO	1	SB	1	6	500	No	

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
11	29/01/2023	3	BH	1	09:40	Raceboat out							
11	29/01/2023	3	BH	4	09:40	Safety Boat							
11	29/01/2023	3	BH	2	09:43	TU	3	OT (Raceboat)	1	3	100	No	
11	29/01/2023	3	BH	3	09:43	GG	1	UK (Boats?)		3	50	No	
11	29/01/2023	3	BH	5	09:53	First Sailing boats out							
11	29/01/2023	3	BH	6	09:59	CA	1	UK		?	?	?	Probably just flying S
11	29/01/2023	3	BH	7	10:00	Sailing Boats x 20							
11	29/01/2023	3	BH	8	10:05	SV	31	UK		7	100	Yes	Flying around before landing
11	29/01/2023	3	BH	9	10:17	Mixed flock of TU/PO	100	SB		8	>1000	No	Appeared to drop onto Troy Lake
11	29/01/2023	3	BH	10	10:19	Safety Boat							
11	29/01/2023	3	BH	11	10:35	SV	5	SB		8	>1000	No	Appeared to drop onto Troy Lake
11	29/01/2023	3	BH	12	10:37	CO	1	SB	1	4	50	N/a	
13	12/02/2023	4	MC	13	09:15	GN	ALL	PB/SB		6	250m	No	Disappeared
13	12/02/2023	3	BH	1	09:18	TU	6	SB		6	400+	No	Flew S
13	12/02/2023	4	MC	1	09:20	All	ALL	PB	1	2	?	?	Vigilance and paddle towards cover - PB switched on
13	12/02/2023	4	MC	2	09:20	EG	1	PB	1	8	>1000	Yes	Fly N
13	12/02/2023	4	MC	3	09:20	GG	3	PB/SB		2	100	No	Popped up 100m s and the other NW
13	12/02/2023	4	MC	4	09:20	GD	5	PB/SB		3	300	No	Already moving in that direction sped up

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
13	12/02/2023	3	BH	2	09:21	Safety Boat & Race Boat out							
13	12/02/2023	3	BH	3	09:21	PO	1	PB/OT (Raceboat)		6	40	No	Flew SW
13	12/02/2023	2	JH	1	09:21	TU	4	PB		8	300+	N/r	Flew S behind VP
13	12/02/2023	3	BH	4	09:23	CG	2	UK		6	200+	No	
13	12/02/2023	3	BH	5	09:25	MA	1	UK		6	100+	No	
13	12/02/2023	4	MC	6	09:27	CO	5	PB	1	3	100	Partial	Toward bank
13	12/02/2023	4	MC	7	09:27	CG	3	PB	1	6	200	No	Towards open water in front of viewpoint 4
13	12/02/2023	3	BH	6	09:30	LG	1	UK		5	100	No	
13	12/02/2023	2	JH	2	09:30	MA	2	PB	1	5	100+	N/r	Flew in from N of Lake
13	12/02/2023	4	MC	3	09:31	MA	1	Flew in		5	?	No	From N landed on big island
13	12/02/2023	3	BH	7	09:34	LG	1	UK		4	50	No	
13	12/02/2023	4	MC	8	09:35	TU	ALL	PB/SB		3	300	No	General migration of all birds swimming towards SW
13	12/02/2023	2	JH	3	09:37	TU	4	AC		5	100+	N/r	Flew in from N of Lake
13	12/02/2023	4	MC	4	09:37	MA	ALL	PB/SB		6	200	No	
13	12/02/2023	3	BH	8	09:38	EG	4	UK		6	100+	No	
13	12/02/2023	4	MC	9	09:44	TU	3	PB/SB		6	400		Were all floating alone
13	12/02/2023	4	MC	10	09:45	CG	2	PB/SB		8	?	Yes	Returned to previous location on NW bank
13	12/02/2023	4	MC	11	09:50	MA	1	PB/SB		8	?	No	
13	12/02/2023	3	BH	9	09:56	MA	2	UK		5	100+	No	
13	12/02/2023	2	JH	4	09:58	SV	8	AC		6	100+	N/r	Headed NE

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
13	12/02/2023	3	BH	10	10:00	Safety Boat & Race Boat out							
13	12/02/2023	2	JH	5	10:00	TU	2	SB		6	100+	N/r	Headed SE off Lake
13	12/02/2023	4	MC	6	10:00	TU	2	PB/SB		8	?	No	
13	12/02/2023	3	BH	11	10:08	ET	1	UK (not boats)		4	<50	No	
13	12/02/2023	2	JH	6	10:10	GN	5	SB		6	100	N/r	Came to S End of Lake
13	12/02/2023	4	MC	7	10:10	CG	3	PB/SB		8	?	No	Honking when sail boat close by
13	12/02/2023	4	MC	8	10:11	TU	2	PB/SB		8	?	No	
13	12/02/2023	3	BH	12	10:12	GA	1	UK		?	-	-	
13	12/02/2023	3	BH	13	10:14	OC	1	OT (Raptor)		1	0	N/a	Buzzard
13	12/02/2023	2	JH	7	10:15	TU	17	AC		5	100	N/r	Came to S End of Lake
13	12/02/2023	4	MC	8	10:18	MA	2	PB/SB		8	?	No	
13	12/02/2023	2	JH	8	10:20	RQ	1	AC	1	3	50+	N/r	
13	12/02/2023	4	MC	9	10:23	CO	3	PB/SB		8	?	No	
13	12/02/2023	3	BH	16	10:26	OC	2	UK		7	200+	Yes	
13	12/02/2023	3	BH	14	10:28	OC	2	SB	10	6	300+	No	Possibly due to boats
13	12/02/2023	2	JH	9	10:30	SV	8	AC	1	5	50+	N/r	Came to S End of Lake
13	12/02/2023	3	BH	15	10:33	TU	4	SB		6	400+	No	
13	12/02/2023	2	JH	10	10:37	TU	9	AC	1	5	100	N/r	Came to S End of Lake
13	12/02/2023	2	JH	11	10:37	TU	12	AC	1	5	50	N/r	Came to S End of Lake
13	12/02/2023	3	BH	17	10:46	OC	2	UK		7	400	Yes	
13	12/02/2023	4	MC	18	11:03	MA	2	PB/SB		5	100	No	

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
13	12/02/2023	4	MC	19	11:10	TU	3	PB/SB		8	?	No	While boats were in the southern part of the course
13	12/02/2023	3	BH	18	11:11	MA	2	OB	1	6	400+	No	
13	12/02/2023	4	MC	21	11:19	Mixed flock of TU/PO	50	PB/SB		7	?	No	
13	12/02/2023	3	BH	19	11:20	GJ	1	UK		7	400+	No	Had flown in 10mins earlier on its own
14	12/03/2023	3	BH	1	08:55	Safety Boat							
14	13/02/2023	3	BH	1	09:15	TU	2	PB	1	6	400+	No	Birds flew to NW corner of Lake
14	13/02/2023	3	BH	2	09:15	OC	2	PB	1	1	500+	No	Birds heard alarming in flight - not seen
14	19/02/2023	3	JH	1	09:15	SV	99	PB	1	6	200	No	
14	19/02/2023	3	JH	2	09:20	TU	100	PB	1	6	100+	No	
14	19/02/2023	3	JH	3	09:20	GN	6	PB	1	6	100	No	
14	13/02/2023	3	BH	3	09:23	TU	2	UK		3	200	No	Birds swimming South
14	13/02/2023	3	BH	4	09:23	CO	3	UK		3	200	No	Birds swimming South
14	13/02/2023	3	BH	5	09:23	MA	2	PB	1	1	-	-	
14	13/02/2023	3	BH	6	09:39	CG	3	SB	1	2	<100	No	
14	13/02/2023	3	BH	7	09:44	MA	2	SB	1	8	400+	No	Appeared to land on R. Colne to north
14	13/02/2023	3	BH	8	10:25	CG	5	UK (Boats?)		8	300	No	
14	13/02/2023	3	BH	9	10:50	CG	2	PB/SB	2	1	-	-	
14	19/02/2023	2	JH	4	11:00	SV	2	AC	1	5	50	No	Flew SE
16	12/03/2023	1	JD	1	08:54:00	MH	1	PB	1	3	100	No	
16	12/03/2023	1	JD	2	08:54:00	GG	2	PB	1	3	100	No	
16	12/03/2023	3	BH	2	09:10	CG	4	PB	1	1	0	N/a	

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
16	12/03/2023	1	JD	3	09:10:00	TU	14	PB	1	6	300	No	
16	12/03/2023	1	JD	4	09:10:00	GD	3	PB	1	5	150	No	
16	12/03/2023	1	JD	5	09:10:00	SV	18	PB	1	5	50	No	
16	12/03/2023	1	JD	6	09:10:00	PO	15	PB	1	6	300	No	
16	12/03/2023	3	BH	3	09:37	MA	2	HC	1	4	20	No	
16	12/03/2023	3	BH	4	09:48	Safety Boat							
16	12/03/2023	3	BH	5	09:48	CO	3	PB	1	3	10	No	
16	12/03/2023	3	BH	6	09:48	BH	2	PB	1	6	100	No	
16	12/03/2023	3	BH	7	09:49	CG	2	PB	1	2	<10	N/a	
16	12/03/2023	3	BH	8	09:49	MA	2	PB	1	2	20	No	
16	12/03/2023	3	BH	9	09:52	EG	2	PB	1	2	30	No	
16	12/03/2023	3	BH	10	09:54	MA	2	UK		8	200+	No	
16	12/03/2023	1	JD	7	09:55:00	All	50	UK		8	400	No	Flew north from around heronry islands
16	12/03/2023	2	JH	1	09:55	Mixed flock of TU/SV/WN	50	UK		5	200	Yes	
16	12/03/2023	3	BH	11	09:59	MA	1	SB	1	6	700	No	
16	12/03/2023	3	BH	12	10:00	MA	2	UK		8	700	No	Flew high N
16	12/03/2023	3	BH	13	10:00	TU	4	UK		7	500+	No	Flew high S - may have landed
16	12/03/2023	1	JD	8	10:05:00	TU	6	PB	1	7	300	No	
16	12/03/2023	3	BH	14	10:06	CO	1	SB	1	4	30	Yes	
16	12/03/2023	3	BH	15	10:06	MA	1	SB	1	6	100+	No	
16	12/03/2023	3	BH	16	10:09	CO	1	SB	1	4	20	Yes	
16	12/03/2023	3	BH	17	10:23	OC	2	UK		7	400	N/a	Flew up from S and landed on island 2B
16	12/03/2023	3	BH	18	10:25	EG	2	UK		8	400+	No	Flew NNE

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
16	12/03/2023	3	BH	19	10:42	MA	2	OB	1	6	150	No	Birds flushed when they saw observer
16	12/03/2023	2	JH	2	11:00	PO	50	UK		-5	-6	No	Flew in from N
16	12/03/2023	1	JD	9	10:20-25	BH	200	SB	16	6	150+	No	
18	19/03/2023	3	MC	1	09:18	BH	ALL	PB	1	7	up down	Yes	
18	19/03/2023	3	MC	2	09:20	TU	17	PB	1	7	200	No	
18	19/03/2023	3	MC	3	09:20	CG	7	PB	1	2	100	No	On pontoon before
18	19/03/2023	3	MC	4	09:27	TU	ALL	PB	1	5	400	No	
18	19/03/2023	3	MC	5	09:27	BH	ALL	PB	1	7	300	Yes	
18	19/03/2023	3	MC	6	09:53	CG	4	PB/SB		5	400	Partial 30%	
18	19/03/2023	3	MC	7	09:54	CG	2	PB/SB		7	?	No	
18	19/03/2023	3	MC	8	09:55	no birds left	ALL	PB/SB		7		5 MA 1 TU 10% CO 30% BH	With the exception of 10 BH on an island
18	19/03/2023	3	MC	9	10:07	BH	30	SB		7	200	No	Flew W - SB South of peninsula
18	19/03/2023	3	MC	10	10:12	BH	10	SB		7	300	Yes	Fly SW - sailboat between islands
18	19/03/2023	3	MC	11	10:28	GA	4			-7	?	No	Arrived from S
18	19/03/2023	3	MC	12	10:30	GA	4	PB/SB		6	?	No	Fly N
18	19/03/2023	3	MC	13	10:41	CG	2	PB/SB		6	?	No	Fly NE to corner
18	19/03/2023	3	MC	14	10:41	OC	2	PB/SB		7	400	No	Arrived from N then Flew S
18	19/03/2023	2	JH	1	09:15	CG	3	PB	1	6	100+	No	Flew
18	19/03/2023	2	JH	2	09:15	TU	2	PB	1	6	100+	No	Flew
18	19/03/2023	2	JH	3	09:15	BH	20	PB	1	6	100+	No	Flew

Visit No.	Date	VP Location	Observer	Reg #	Time	Species Code	Minimum Number	Disturbance Type	No. of Disturbance Type	Birds reaction to Disturbance	Displacement Distance (m)	Did birds return to area	Notes
18	19/03/2023	2	JH	4	09:15	GN	5	PB	1	3	?	No	Swam - original location unknown
18	19/03/2023	2	JH	5	09:25	TU	40	PB	1	3	50	No	Swam - came from far N open water
18	19/03/2023	2	JH	6	09:25	TU	20	PB	1	6	100+	No	Flew - came from far N open water
18	19/03/2023	2	JH	7	09:25	PO	33	PB	1	3	50	No	Swam - came from far N open water
18	19/03/2023	2	JH	8	09:40	TU	6	AC	1	6	100	No	Flew - Came from W bank to islands edge to E of VP
18	19/03/2023	1	JD	1	08:25	PO	6	WA		5	100	No	
18	19/03/2023	1	JD	2	08:25	WN	10	WA		5	100	No	
18	19/03/2023	1	JD	3	08:25	TU	4	WA		6	100	No	
18	19/03/2023	1	JD	4	09:15	TU	50	PB	1	3	100	No	Flew SW
18	19/03/2023	1	JD	5	09:15	GJ	2	PB	1	7	400	No	Flew SW
18	19/03/2023	1	JD	6	09:15	GD	3	PB		6	100	No	
18	19/03/2023	1	JD	7	09:15	PO	10	PB	1	6	300	No	
18	19/03/2023	1	JD	8	09:15	TU	50	PB	1	6	100	No	Flew SW
18	19/03/2023	1	JD	9	09:25	PO	6	PB	1	3	5	No	Tucked up onto midway
18	19/03/2023	1	JD	10	09:25	CM	3	PB	1	5	100	No	
18	19/03/2023	1	JD	11	09:25	LB	2	PB	1	8	500	No	
18	19/03/2023	1	JD	12	09:53	GD	7	SB		6	400		Landed west of second east island then were pushed off by sail boats landing in SW corner

APPENDIX I ANALYSIS OF DISTURBANCE MONITORING

Table I.1 Reaction and numbers of each species responding to disturbance

Species Code	English Vernacular Name	Scientific Name	Disturbance Response									
			1	2	3	4	5	6	7	8	Un-known	Totals
CG	Canada Goose	Branta canadensis	6	12		2	4	18	2	18		62
GJ	Greylag Goose	Anser anser							3		7	10
EG	Egyptian Goose	Alopochen aegyptiaca	2	2			12	4		3		23
SV	Shoveler	Spatula clypeata				6	28	107	31	5		177
GA	Gadwall	Mareca strepera						4			1	5
WN	Wigeon	Mareca penelope										0
MA	Mallard	Anas platyrhynchos	2	3		2	19	10		9	1	46
RQ	Red-crested Pochard	Netta rufina			1							1
PO	Pochard	Aythya ferina		13	39		38	87		12		189
TU	Tufted Duck	Aythya fuligula		499	95	48	45	373	27	14		1101
GN	Goldeneye	Bucephala clangula	4	4	5			11				24
GD	Goosander	Mergus merganser			5		3	10				18
LG	Little Grebe	Tachybaptus ruficollis				1		1				2
GG	Great Crested Grebe	Podiceps cristatus		8	3						1	12
ET	Little Egret	Egretta garzetta				1						1
CA	Cormorant	Phalacrocorax carbo									2	2
MH	Moorhen	Gallinula chloropus			1							1
CO	Coot	Fulica atra		8	11	3		30	7	3		62
OC	Oystercatcher	Haematopus ostralegus	3						10			13
BH	Black-headed Gull	Chroicocephalus ridibundus			150	43		224	40			457
CM	Common Gull	Larus canus					3					3
HG	Herring Gull	Larus argentatus				6						6
LB	Lesser Black-backed Gull	Larus fuscus				2				2		4

Key to Disturbance Response

1 - Increased vigilance

2 - Birds swam slowly away from disturbance

3 - Birds swam rapidly away from disturbance

4 - Bird flew < 50m from disturbance (direct flight - DF)

5 - Birds flew 50 - 100m from disturbance (DF)

6 - Birds flew >100m from disturbance (DF)

7 - Birds flew around Site before settling back on Lake

8 - Birds appeared to leave Site

Table I.2 Summary analysis of species response to disturbance events - responses grouped and the percentage and number of each species responding in the grouped fashion is provided

English Vernacular Name	Percentage				Numbers of birds responding			
	Increased vigilance	Swim away	Fly on / around lake	Leave	Increased vigilance	Swim away	Fly on / around lake	Leave
Canada Goose	9.7	19.4	41.9	29.0	6	12	26	18
Greylag Goose	0.0	0.0	100.0	0.0	0.0	0	3	0
Egyptian Goose	8.7	8.7	69.6	13.0	2	2	16	3
Shoveler	0.0	0.0	97.2	2.8	0	0	172	5
Gadwall	0.0	0.0	100.0	0.0	0	0	4	0
Wigeon					0	0	0	0
Mallard	4.4	6.7	68.9	20.0	2	3	31	9
Red-crested Pochard	0.0	100.0	0.0	0.0	0	1	0	0
Pochard	0.0	27.5	66.1	6.3	0	52	125	12
Tufted Duck	0.0	54.0	44.8	1.3	0	594	493	14
Goldeneye	16.7	37.5	45.8	0.0	4	9	11	0
Goosander	0.0	27.8	72.2	0.0	0	5	13	0
Little Grebe	0.0	0.0	100.0	0.0	0	0	2	0
Great Crested Grebe	0.0	100.0	0.0	0.0	0	11	0	0
Little Egret	0.0	0.0	100.0	0.0	0	0	1	0
Cormorant					0	0	0	0
Moorhen	0.0	100.0	0.0	0.0	0	1	0	0
Coot	0.0	30.6	64.5	4.8	0	19	40	3
Oystercatcher	23.1	0.0	76.9	0.0	3	0	10	0
Black-headed Gull	0.0	32.8	67.2	0.0	0	150	307	0
Common Gull	0.0	0.0	100.0	0.0	0	0	3	0
Herring Gull	0.0	0.0	100.0	0.0	0	0	6	0
Lesser Black-backed Gull	0.0	0.0	50.0	50.0	0	0	2	2

APPENDIX J SPECIES RETURNED BY THE LOCAL RECORD CENTRES DATA SEARCHES

BTO Code	Common Name	Scientific Name
CG	Canada Goose	Branta canadensis
BY	Barnacle Goose	Branta leucopsis
GJ	Greylag Goose	Anser anser
MS	Mute Swan	Cygnus olor
AS	Black Swan	Cygnus atratus
EG	Egyptian Goose	Alopochen aegyptiaca
SU	Shelduck	Tadorna tadorna
MN	Mandarin Duck	Aix galericulata
SV	Shoveler	Spatula clypeata
GA	Gadwall	Mareca strepera
WN	Wigeon	Mareca penelope
MA	Mallard	Anas platyrhynchos
PT	Pintail	Anas acuta
T.	Teal	Anas crecca
RQ	Red-crested Pochard	Netta rufina
PO	Pochard	Aythya ferina
TU	Tufted Duck	Aythya fuligula
None	Ring-necked Duck	Aythya collaris
LN	Long-tailed Duck	Clangula hyemalis
GN	Goldeneye	Bucephala clangula
SY	Smew	Mergellus albellus
GD	Goosander	Mergus merganser
RM	Red-breasted Merganser	Mergus serrator
RY	Ruddy Duck	Oxyura jamaicensis
Q.	Quail	Coturnix coturnix
LA	Lady Amherst's Pheasant	Chrysolophus amherstiae
BN	Black-necked Grebe	Podiceps nigricollis
OR	White Stork	Ciconia ciconia
H.	Grey Heron	Ardea cinerea
HW	Great White Egret	Ardea alba
ET	Little Egret	Egretta garzetta
OP	Osprey	Pandion haliaetus
SH	Sparrowhawk	Accipiter nisus
KT	Red Kite	Milvus milvus
BZ	Buzzard	Buteo buteo
WA	Water Rail	Rallus aquaticus
MH	Moorhen	Gallinula chloropus
OC	Oystercatcher	Haematopus ostralegus
L. *	Lapwing	Vanellus vanellus
GV	Grey Plover	Pluvialis squatarola
LP	Little Ringed Plover	Charadrius dubius
SN	Snipe	Gallinago gallinago

BTO Code	Common Name	Scientific Name
CS	Common Sandpiper	Actitis hypoleucos
RK	Redshank	Tringa totanus
GK	Greenshank	Tringa nebularia
KI	Kittiwake	Rissa tridactyla
BH	Black-headed Gull	Chroicocephalus ridibundus
LU	Little Gull	Hydrocoloeus minutus
MU	Mediterranean Gull	Ichthyaetus melanocephalus
CM	Common Gull	Larus canus
CM	Common Gull	Larus canus
GB	Great Black-backed Gull	Larus marinus
IG	Iceland Gull	Larus glaucoides
HG *	Herring Gull	Larus argentatus
YC	Caspian Gull	Larus cachinnans
LB	Lesser Black-backed Gull	Larus fuscus
TE	Sandwich Tern	Thalasseus sandvicensis
CN	Common Tern	Sterna hirundo
SD	Stock Dove	Columba oenas
WP	Woodpigeon	Columba palumbus
TD *	Turtle Dove	Streptopelia turtur
CK *	Cuckoo	Cuculus canorus
TO	Tawny Owl	Strix aluco
LO	Little Owl	Athene noctua
SE	Short-eared Owl	Asio flammeus
SI	Swift	Apus apus
KF	Kingfisher	Alcedo atthis
LS *	Lesser Spotted Woodpecker	Dryobates minor
GS	Great Spotted Woodpecker	Dendrocopos major
G.	Green Woodpecker	Picus viridis
K.	Kestrel	Falco tinnunculus
HY	Hobby	Falco subbuteo
PE	Peregrine	Falco peregrinus
RI	Ring-necked Parakeet	Psittacula krameri
RO	Rook	Corvus frugilegus
WX	Waxwing	Bombycilla garrulus
CT	Coal Tit	Periparus ater
MT *	Marsh Tit	Poecile palustris
WT *	Willow Tit	Poecile montanus
BT	Blue Tit	Cyanistes caeruleus
GT	Great Tit	Parus major
S. *	Skylark	Alauda arvensis
SM	Sand Martin	Riparia riparia
SL	Swallow	Hirundo rustica
HM	House Martin	Delichon urbicum

BTO Code	Common Name	Scientific Name
CW	Cetti's Warbler	Cettia cetti
WW	Willow Warbler	Phylloscopus trochilus
SW	Sedge Warbler	Acrocephalus schoenobaenus
WH	Whitethroat	Sylvia communis
FC	Firecrest	Regulus ignicapilla
GC	Goldcrest	Regulus regulus
WR	Wren	Troglodytes troglodytes
NH	Nuthatch	Sitta europaea
TC	Treecreeper	Certhia familiaris
SG *	Starling	Sturnus vulgaris
FF	Fieldfare	Turdus pilaris
RE	Redwing	Turdus iliacus
ST *	Song Thrush	Turdus philomelos
M.	Mistle Thrush	Turdus viscivorus
SF *	Spotted Flycatcher	Muscicapa striata
R.	Robin	Erithacus rubecula
RT	Redstart	Phoenicurus phoenicurus
WC	Whinchat	Saxicola rubetra
SC	Stonechat	Saxicola rubicola
W.	Wheatear	Oenanthe oenanthe
HS *	House Sparrow	Passer domesticus
TS *	Tree Sparrow	Passer montanus
D. *	Dunnock	Prunella modularis
YW *	Yellow Wagtail	Motacilla flava
GL	Grey Wagtail	Motacilla cinerea
PW	Pied Wagtail	Motacilla alba
MP	Meadow Pipit	Anthus pratensis
TP *	Tree Pipit	Anthus trivialis
WI	Water Pipit	Anthus spinoletta
BL	Brambling	Fringilla montifringilla
HF *	Hawfinch	Coccothraustes coccothraustes
BF *	Bullfinch	Pyrrhula pyrrhula
GR	Greenfinch	Chloris chloris
LI *	Linnet	Linaria cannabina
FR	Common Redpoll	Acanthis flammea
LR *	Lesser Redpoll	Acanthis cabaret
GO	Goldfinch	Carduelis carduelis
CB *	Corn Bunting	Emberiza calandra
Y. *	Yellowhammer	Emberiza citrinella
RB *	Reed Bunting	Emberiza schoeniclus

Key:

Bold - Schedule 1

BoCC Red-listed

BoCC Amber-listed

BTO Code	Common Name	Scientific Name

* - NERC-S41

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