Walthamstow Wetlands
Bird Monitoring Report
Year 6: April 2020 to March 2021

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London Wildlife Trust; summary

London Wildlife Trust ('the Trust'), a registered charity founded in 1981, is dedicated to protecting the capital's wildlife and wild spaces, and engaging Londoners in nature through community engagement, education, access to our nature reserves and campaigning. Our vision is a city rich in biodiversity, where all people treasure wildlife and natural spaces and where access to quality natural green space is a right for all.

Our role is becoming ever more important in a city facing climate change, economic recession and a growing population, where people are increasingly disconnected from their natural environment. The Trust has a strong history of community engagement projects that target disadvantaged groups and those under-represented in nature conservation such as mental health service users, young people, and people with disabilities.

London Wildlife Trust has been engaged since 2014 as the delivery partner for Walthamstow Wetlands. In partnership with London Borough of Waltham Forest and Thames Water, the landowner of the operational reservoirs supplying 3.5 million customers with water.

Walthamstow Wetlands; Bird Monitoring Report *Year 6: April 2020 to March 2021*	
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Executive summary

London Wildlife Trust ('the Trust') continued monitoring 'key species'[1] for the sixth consecutive year; beyond the five-year monitoring plan required by the Habitat Regulations Assessment and after discharging Planning Conditions 20 & 21 for Walthamstow Wetlands. This is due to the Trust recognising some changes to distribution and populations of species since the site opened in 2017 and the essential need for long-term monitoring.

These apparent distributional shifts have been reported to the Wetlands Partners (Thames Water and London Borough of Waltham Forest) and Natural England, together with recommendations for future consideration. At the time of submitting, August 2020, they were not deemed to be of such significance as to require any major remedial actions to be taken. However, since then, the Trust has introduced a seasonal closure of the path between Low and High Maynard for winter 2021/22[2] and introduced a more rigorous visitor behaviour survey.

The Bird Monitoring Programme was originally established by BSG Ecology as part of the planning application and Habitat Regulations Assessment requirements for the Wetlands' Development Programme in 2014. It was determined that project partners should monitor the Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA) designated 'key species', their distribution and the disturbance caused to them as a result of increased access to the Walthamstow Reservoirs for a five-year period. Since, several documents have been produced pre-and post-opening in October 2017, BSG Ecology were contracted to deliver the first three years of the Bird Impact Management Plan, with London Wildlife Trust delivering the last two years. The last two of which were the fifth and final annual Bird Monitoring Report (2019-20) and the two-year Visitor Monitoring Report submitted to Natural England and the Walthamstow Wetlands Partners to conclude the initial five-year monitoring period.

The Trust and its volunteers have been collecting bird disturbance and distribution data and have produced reports in a similar layout to the proceeding BSG reports. Replicating the survey methodology, QGIS mapping, and report style and layout provides a more consistent and comparable data set across the six-year survey period. The Trust has also collected and collated additional data to support and better understand visitor behaviour, particularly occurrence of joggers and cyclists, as they arguably cause more disturbance incidents.

2020 was exceptional in many ways, and the Wetlands already remarkable popularity since opening increased significantly[3], with an average visitor increase of 124% between April 2020 and March 2021 than the previous year. The Trust's response to the COVID-19 pandemic, curtailing most activities, including surveying across its portfolio of reserves, consequently has impacted this report's findings with no breeding data collected. There were also a few site-specific measures implemented in response to COVID-19, such as the closure of the East Warwick bund January 2021 onwards, introduction of a one-way system and the pause of angling activity.

Despite this new-found popularity, targeted visitor monitoring shows that the vast majority of visitors adhere to the site's rules and its sensitivities, with misbehaviour occurring in low numbers. It is accepted that any significant increase in visits will cause disturbance in itself regardless if visitors are behaving appropriately or not. However, the sensitive areas identified by the HRA that are used

[1] Key species refers to gadwall, shoveler, pochard, tufted duck, and grey heron.
[2] The seasonal closure will occur for no less than five years and reviewed in 2025 as recommended in Year Five report.
[3] The Wetlands remained open throughout COVID-19 pandemic as the partnership were anxious not to deny residents access to green space.

by SPA or SSSI species have largely been protected from disturbance through the design of the seasonal path closing procedures.

For the most part, there has been little clear change in the distribution of focal bird species within the reservoirs, and the distribution of SPA duck species has remained consistent when considering the entire six-year monitoring period. Some of the observed shifts in the previous report have been unfounded, for example, there was a concern that tufted ducks had moved to Reservoir Four and Five from both the Warwicks due to visitor disturbance, however, they had favoured the Warwicks again this year. Fluctuations and slight distribution changes are normal and long-term monitoring is essential for decision making.

Nevertheless, there were a few distributional shifts in SPA and SSSI species recorded this year, most notably significant numbers of gadwall using the Reservoir Three reedbed, proving the value of habitat provision but also significant numbers of wintering pochard favouring West Warwick. This will require continued monitoring, but this could possibly be a response to disturbance caused by visitors on other reservoirs as West Warwick is permit access only. Increased visitor access is unlikely to be the only driving factor of this decline, but it is now a component of a longer downward trend on site. Efforts to mitigate losses have been made and the Trust have introduced a winter closure to the path between the Maynard's which will remain in place for at least five years for review.

Given the international conservation importance of the Wetlands, the Trust will continue monitoring key bird populations and distributions and will present findings in future annual monitoring reports, as the Trust is acutely mindful that we and our partners need to ensure that minor changes do not accumulate into larger irreversible issues, particularly as the surrounding development in Tottenham Hale and Blackhorse Road is nearing completion, and visitor numbers are likely to increase in future years.

The Trust has now completed the sixth consecutive year of monitoring and this report presents the data from 2020-2021 and provides comparison to the previous 5-year survey period.

1. Introduction

1.1 Site context

The Walthamstow Wetlands project was established in 2014. Its aim was to transform a set of 10 operational reservoirs owned by Thames Water, that have national and international designations for resident and migratory waterfowl, into a publicly accessible nature reserve for people to immerse themselves in and celebrate urban nature conservation.

An application to the then Heritage Lottery Fund to deliver the initial stages of the project was approved in July 2014 and led to a number of enhancement and restoration works, including habitat creation and access improvements. The site opened to the public in October 2017 and has since welcomed its one-millionth visitor in May 2020 and since then, unprecedented numbers visited during 2020 (average 124% increase compared to the previous year). However, at the time of writing, with restrictions easing, visitor numbers have dropped to almost pre-COVID-19 levels. It is worth noting these numbers still far exceed the anticipated projected figure of 230,000 visits after five years.

Walthamstow Wetlands encompasses Reservoirs One, Two, Three, Four & Five, East and West Warwick Reservoirs (all in the southern portion of the site), Low Maynard, High Maynard and Lockwood Reservoirs (in the northern portion), as well as tracts or edges of the Coppermill Stream, River Lee, and Lea Navigation, and a network of vegetated embankments and other terrestrial habitats – trees, scrub, grassland - covering approximately 211 hectares in the Lower Lee Valley.

The site encompasses the Walthamstow Reservoirs Site of Special Scientific Interest (SSSI), contributes towards the Lee Valley Special Protection Area (SPA), and forms part of a larger Site of Metropolitan Importance for Nature Conservation (site M071 *The Lee Valley*).[4] The Wetlands also falls within the Lee Valley Ramsar site designated in 2000 under the Convention on Wetlands of International Importance, 1971.

The Lee Valley SPA is designated for its importance for overwintering waterfowl, namely shoveler *Anas clypeata*, gadwall *Mareca strepera*, but also bittern *Botaurus stellaris*. Gadwall and shoveler however, occur on the Wetlands throughout the year in varying numbers. The SSSI designation outlines the site's importance as a breeding site for grey heron *Ardea cinerea*, tufted duck *Aythya fuligula* and pochard *Aythya farina*. Furthermore, the SSSI also identified the importance of the site for post-breeding tufted duck, over-wintering tufted duck, shoveler, pochard, great crested grebe *Podiceps cristatus* coot *Fulica atra*, and winter roosting cormorant *Phalacrocorax carbo ssp*. *sinensis*.

Prior to opening the Wetlands to the public, BSG Ecology undertook a survey to inform the Habitats Regulation Assessment (HRA) process and to guide the planning application conditions (BSG Ecology, 2014). This initial survey was used to inform long-term patterns of waterfowl distribution on site and the seasonal access constraints (e.g. through path closures) around Walthamstow Wetlands upon opening to the public.

Walthamstow Wetlands received planning consent in June 2014, subject to a number of Conditions and sub conditions, several of which relate to ecology, and which have resulted in a requirement for monitoring of the bird community present. Predominantly, these are based on the recommendations of the HRA Report.

[4] The boundaries of the Wetlands do not entirely align with those of the SSSI and SPA. It falls entirely within the SMINC.

1.2 Planning Conditions

Planning Condition 20 for Walthamstow Wetlands states:
'Prior to the commencement of development, a bird impact management plan shall be submitted to and approved in writing by the Local Planning Authority. This management plan will address any potential impact on birds within the SSSI, SPA and Ramsar areas resulting from visitors to the site by addressing:

- *The collection of visitor monitoring data for a minimum period of five years from the commencement of development*
- *The collection of bird monitoring data for a period of no less than five years from the commencement of development*
- *Details of the process by which bird monitoring and visitor monitoring data will be assessed by the relevant parties*
- *Details of the means by which any negative impacts will be mitigated and how any required mitigation measures will be implemented in relation to geographical location, design and timeframe factor*

The approved scheme shall be implemented in accordance with the approved details unless any variation is agreed in writing.'

Planning Condition 21 states:
'the development shall be carried out in accordance with the mitigation measures contained in the Walthamstow Reservoirs report reference 6342 01_HRA_R_020414 (Walthamstow Wetlands Bird Monitoring Report, BSG Ecology – April 2014) and the approved scheme shall be implemented in accordance with the approved details unless any variation is agreed in writing.'

In order to achieve the discharge of the planning conditions, a Five Year Bird Impact Management Plan (BIMP) was compiled (Waltham Forest Council, 2014), and submitted to Natural England and the Walthamstow Wetlands Board.

BSG Ecology were contracted to deliver the first three years of the plan, the results of which are available in the BSG Bird Monitoring Reports for 2015-16, 2016-17 and 2017-18. London Wildlife Trust adopted the delivery of the five-year BIMP for 2018- 20 and has completed the fifth and final year.

1.3 Aims of study

The aim of this report is to address Section 4 of the BIMP. To achieve this, it considers the sixth year (April 2020 to March 2021) of monitoring data and identifies whether there is evidence of:

- Any significant reduction in the extent and distribution of the habitats used by key species;
- Any changes to the structure and function of the habitats used by key species;
- Any changes to supporting processes upon which the habitats of key species rely;
- Any significant reduction in the populations of key species using the site as a result of increase recreational use;
- Any significant changes to the distribution of key species within the site as a result of increased recreational use.

1.4 Mitigating for enhanced access

Access throughout the Wetlands by visitors is passively controlled via a network of seasonal gates and footpaths. This ensures visitor disturbance in areas sensitive to the Ramsar, SPA and SSSI features during key periods of the year is avoided or minimised as best as possible. These key areas for features of importance have been directed by the results of preliminary site surveys in the HRA Report and agreed by Natural England. Consequently, the seasonal access map has been drawn up and agreed by the Walthamstow Wetlands Board and Natural England (See Appendix 2).

The primary access path through the north of site, open at all times of the year, runs from the Wetlands' entrance gate north of High Maynard, along the east bank of Lockwood and west of Low Maynard to the entrance at Forest Road. For the south side of the Wetlands, the continuation of this path runs alongside the west of the Coppermill Stream to the gate at Coppermill Lane. This path is open to all site visitors, including cyclists and joggers, and is commonly used during the day as a cut-through between the reserve and sites to the north and south (such as Walthamstow Marshes). This also give access to the eastern bank of East Warwick Reservoir which is a walking route only.

The secondary paths are closed during sensitive periods to reduce disturbance, especially to the key species related to the site's designations. For example, the pathway west of Reservoirs Four and Five is closed from August to March to limit disturbance to post-breeding aggregations of tufted duck. All secondary pathways are walking routes only; no cycling or jogging is permitted on these paths.

A further set of paths are closed to the general public all year round, including those around West Warwick, the western bank of East Warwick and Lockwood and the eastern side of Reservoirs Four and Five. These paths, however, are accessible throughout the year for Thames Water and London Wildlife Trust staff to deliver work and as continued access for anglers. A limited amount of birdwatchers, through a permit scheme, also have access to these paths. They regularly use all paths and visit the majority of the reservoirs and are not restricted by seasonal path closures. Bird watchers occurred in low numbers across the entire site throughout the year, either as individuals, pairs or when a notable bird was on site in small groups of five or more. Angler numbers were greatest around Reservoirs Two, Three, Five and Low Maynard.

Since opening Walthamstow Wetlands to the general public, birdwatchers are no longer able to purchase one day permits from the Thames Water fisheries office to access the site during fisheries opening hours. They now apply to an annual permit scheme, issued by the Trust, giving them access to the Wetlands during the fishery's operational hours (07.00-sunset). Birders without permits are restricted to official Wetlands opening hours (09.30–17.00) and limited pathway access.

The way in which the Wetlands was originally promoted and infrastructure that was initially installed led to some usage behaviours not anticipated in the early stages. However, the liaison with birdwatcher representatives, together with the partners' own observations, resulted in some subsequent changes to the site management, signage and barriers. This is an on-going development as the Wetlands partnership adapts to the needs and behaviours of its wildlife, and all other site users.

2. Methods

2.1 Identification of focal species

The Trust has followed the methodology set out and implemented by BSG Ecology since 2015. The rationale for the determination of the focal species for the monitoring is set out in this section.

The Lee Valley SPA was designated due to its importance for three bird species; over-wintering gadwall *Mareca stepera*, shoveler *Anas clypeata*, and bittern *Botaurus stellaris.* The SPA area includes the Walthamstow Reservoirs SSSI (and hence the Wetlands).

Bittern is an occasional visitor to the Walthamstow Reservoirs; all records relate to the winter period. Regular winter roosting sites of bittern have been identified elsewhere within the Lee Valley SPA (Harris, 2006), and Walthamstow is not currently one of the regular resources used by the SPA population. As the frequency of visits by bittern is low, disturbance directly as a result of increased recreational use of Walthamstow Wetlands would be difficult to measure; it is not subject of detailed consideration in this report. Nevertheless, circumstances may change in the future which would require its monitoring.

The other two SPA citation species – gadwall and shoveler - do occur with regularity, and detailed consideration is given to data collected with regard to them.

The SSSI citation lists several further bird species that meet thresholds of national importance, or for which the site is notable, namely:

- Breeding grey heron *Ardea cinerea*
    - A heronry survey was conducted by BSG Ecology in 2013 (Walthamstow Wetlands Bird Monitoring Report BSG Ecology, 2013) which identified that grey herons within the heronries did not show any reaction to people on the banks and that the majority of herons foraged off site. It was, therefore, considered that detailed monitoring of the grey heron population was unnecessary.

- Breeding tufted duck *Aythya fuligula*
- Breeding pochard *Aythya farina*
- Post-breeding tufted duck
- Overwintering tufted duck, shoveler, pochard, great crested grebe *Podiceps cristatus*, and coot *Fulica atra*
    - Although both over-wintering great crested grebe and coot were identified within the SSSI citation and are present on site in large numbers, neither occurs in nationally important numbers (i.e. over 1% of British population), and baseline work had not identified any evidence that either species were particularly affected by periodic disturbance at the site. They are therefore not considered focal species.

- Winter roosting cormorant *Phalacrocorax carbo ssp*. *sinensis*, *carbo* and hybrids
    - Although winter roosting cormorant is identified within the SSSI citation, and the species is present on site in large numbers, it is not currently deemed of conservation concern. It was, therefore, considered that detailed monitoring of apparent effects on cormorant was unnecessary.

Therefore the focal species for monitoring considered in detail in this report are:

- Breeding tufted duck, gadwall, shoveler and pochard

- Post-breeding (moulting) tufted duck
- Over-wintering gadwall, shoveler, tufted duck and pochard.

2.2 Field survey

The monitoring methodology is based on the approach set out in the discharge of condition 20 (see 1.3) and is the same as that undertaken for years 1- 5 (2015-20). This ensures that ornithological data are being collected in a consistent manner as best possible, and direct comparison of bird distribution within the area is possible minimising bias.

Data are recorded using a grid system (see Figure 1a & b), and consistent basic information is collected during each monitoring visit. The survey area includes all the reservoirs within Walthamstow Wetlands (see Figure 1). The grid system consists of a 50 x 50m digitised grid of the survey area created using QGIS. Each reservoir has been assigned a letter code with all component grid squares sequentially numbered in rows from the north-west to the south-east corner to enable standardised recording and distribution mapping of bird species. This is consistent with that undertaken in the baseline survey.

The order in which the reservoirs are surveyed is varied so that each one is not always surveyed at the same time of day. Monitoring is undertaken during the Wetlands opening hours for public access (09.30-17.00). Where possible one survey per month is undertaken during weekend days to capture a full representation of how the birds respond to the Wetlands' visitors and activities.[5] Visitor numbers are generally higher at weekends than mid-week. The aim of this is to give information on any response of waterfowl to the presence of larger groups using the designated access paths. Effort is also taken to carry out the surveys during a range of different weather conditions, although conditions that made recording problematic or inaccurate (e.g. prolonged heavy rain, snow, dense mist or fog) were avoided.

Two visits are made per month. During the first visit of each month, all waterfowl species are counted (as individuals) and mapped using the grid system, including those using islands and the immediate shoreline.

On the second visit of the month, a targeted disturbance monitoring survey in undertaken. A full count of all waterfowl species is carried out whilst also recording disturbance events. This enables a more detailed understanding of how visitors may be disturbing the range of waterfowl present, whilst still providing detailed information on the distribution and numbers of the target species.

Any recreational or operational activity or external noise is recorded, together with details of the approximate location from which it originates (e.g. the adjacent grid squares using the grid system) for all visits. Any apparent behavioural response by waterfowl to these events (including details of the species and numbers involved) is recorded using a 9-point scale:

1. No behavioural response noted
2. Bird(s) becoming alert but showing no other signs of avoidance
3. Birds swimming slowly away from the activity / moving into fringing vegetation
4. Birds swimming rapidly away from activity source
5. Birds flushing and submerging / making short flight over the water surface and resettling further from the activity source (but typically within 50m)

[5] Weekend and weekday surveys alternate monthly. Two weekend surveys followed by two weekday surveys and so on.

6. Birds making a directional flight away from the activity source but resettling within visual distance of the surveyor
7. Birds flying a considerable distance from the activity source but apparently resettling elsewhere on the site
8. Birds making prolonged wheeling flights before (apparently) resettling on a different part of the site
9. Birds apparently leaving the site and not returning.

The cause of disturbance is recorded and classified using these terms and definitions:

Surveyor	The persons undertaking the bird disturbance survey
Angler	Persons partaking in fishing at water's edge
Visitor	Member of the public walking around the wetlands
Vehicle	A vehicle permitted to be on site, e.g. Thames Water, London Wildlife Trust or contractor's vehicle
Operations	Persons or actions relating to Thames Water operations, not in a vehicle
Cyclist	Persons on a bicycle
Jogger	Persons moving at speed, above a walking pace. Also includes running
Train	Train on railway passing through site, West Anglia Mainline or Gospel Oak to Barking line

A bespoke survey form is used for each visit to capture the above information and to ensure consistency of recording (see Appendix 1).

For the purposes of monitoring the relevant key species, the breeding season is taken as the months April, May and June; the post-breeding (moult) season is taken as August and September; and the overwinter season is taken as October to March inclusive.

2.3 Additional data

Normally, this would include additional surveys such as the Breeding Bird Survey and a ringing programme that requires two visits per year to the heronries. Also, national schemes including BTO Heronries Census of apparently occupied nests (AON) and BTO's Wetland Bird Survey. All surveying was suspended, and these did not take place in response to COVID-19. The Wetland Bird Survey counts resumed in October, which is the first month of the winter core counts.

The Trust undertook additional monthly visitor behaviour surveys during the over-wintering period, recording visitor behaviours, including inappropriate behaviours, that occur on restricted paths and on the water's edge. The monitoring methodology is based on the approach set out by the bird monitoring, where surveyors followed set routes, across various times of the day and days of the week plotting visitor behaviour and patterns across the reserve using a gid system. Where possible, this survey was carried out on the same day as the disturbance monitoring survey.

A dedicated group – the Walthamstow Birders – provide a detailed update on birds seen at Walthamstow Reservoirs on their website (143 species in 2019, 148 in 2020). Information on date, numbers, locations, and other details may also be added. This was referred to when data is lacking during the survey suspension periods.

3. Results and interpretation

The results of the 2020/2021 surveys have been considered alongside the baseline data as presented in the HRA (BSG Ecology, 2014) and the previous 5 years of monitoring (BSG 2015 - 2018 and LWT 2018-2020).

The distribution of the key species has been compared to their distributions recorded during the baseline surveys and the previous year's monitoring.

3.1 Presence of visitors within the site

Year six was an unprecedented year with record numbers of visits as a coincidental warm spring during the first public lockdown led to a significant and immediate increase in visits, averaging an 145% increase over the course of the survey year when compared to the previous year. The site received 748,508 visits during this period, far higher than 338,341, and 353,033 recorded in years four and five. Almost half (47%) of these visits were on weekend days. The previous figures already exceeded the projected figure of 230,000 visits per annum within five years. At the time of writing, with restrictions easing, visitor numbers have dropped to almost pre-COVID-19 levels.

Lee Valley SPA has been cited as vulnerable to the 'threat' of human recreational pressure by the JNCC and much of the Lee Valley would have felt this pressure during this unprecedented period. To manage this, the Partnership provided additional resources for staffing, introduced a one-way system, and restricted all visitor access to the sites 'core' areas[6] and public opening hours only, suspending permit holder activities, as per government guidelines. These core areas have limited access to most of the reservoir edges, with just 44% and 39% accessible during summer (April – July inclusive) and winter (August – March inclusive) respectively to potentially cause disturbance to birds on the water. The south portion is largely screened with either vegetation or has the Coppermill Stream on the western edge of Reservoir One to act as a buffer, although audible disturbance could occur.

Whether these mitigations were effective in reducing disturbance is difficult to measure due to lack of recording at this time. However, it appeared to be a good breeding year for many duck species; tufted, pochard and shelduck all had higher breeding success than recent years.

However, the increased recreational pressure did not come without consequences; a crowd barrier was installed in January 13th 2020 to prevent visitors accessing the normally freely accessible east bank of East Warwick, in response to erosion caused by high footfall and poor weather during the preceding winter period. Closing access to the bank will likely reduce disturbance along the east bank of East Warwick as it is a popular route (27% of visitors using the main path choose to walk along the bank) that lacks screening. The north and southern tips of East Warwick were also identified as potential high disturbance points in year 5 and would benefit from some level of screening. Reviewing potential bird distribution changes on East Warwick in response to this closure will be an interesting case study to feature in the year 7 report to see if it reinforces this suggestion for mitigation.

[6] The Primary and Secondary routes outlined in 1.4.

3.1.1. Gate Counter data

As seen in previous years, the south portion of the reserve was considerably more visited, receiving 61% of visits, even with the lack of usual facilities (café and toilets) during the COVID-19 pandemic lockdown.

For the first time since opening, the main gate (entrance with car park and visitor centre) was not the most used gate, instead Coppermill at the southern end was, receiving 34% of all visits. This is possibly due to the closing of the public car park[7] and the Coppermill end being better connected with other green spaces such as Walthamstow Marshes for people on foot. The remaining use of entrances was as follows, Main gate (28%), Maynard (21%) and Lockwood (17%).

3.1.2. Field Survey

The majority of visitors recorded were walkers (67%), followed by cyclists (12%), anglers (6%) and joggers (6%) that visited in small groups, averaging a group of two.

As illustrated in Figures 2a and 2b, the primary routes were the most popular routes with 45% of recorded visitors using the main path on the south side and 26% on the north side path. 27% and 25% of these visitors that were using the main path chose to use the raised bank. The south side winter secondary route held 16% of visitor records and its northern counterpart, the Maynard arm had just 5% of visitor counts. The closed winter secondary route on the south side had 3% of visitor counts but this was largely made up of anglers (54%) and staff (27%) who are permitted on the path throughout the year.

During surveys, the number of rule-breaking incidents were rare; 24 cases of visitors by the water's edge, three dogs and a drone were recorded. Although, joggers and cyclists were observed using the restricted banks and the open secondary path, this occurred in very low numbers (no more than five incidents) for each activity type. Although the vast majority of people adhered to site rules, seasonal paths and path restrictions, surveys are snapshots in time and incidents do occur.

The additional visitor behaviour surveys showed that the site rules and seasonal paths that were in place to protect the sensitivities of the site were largely adhered to and were an effective way of managing visitors.

3.2 Changes in habitats used by key species

The operational nature of the reservoirs means that water levels fluctuate according to the needs of water production and not as would be found in a naturally occurring waterbody. There were no Thames Water 'draw downs' in this survey period that had any notable impact on the key species.

However, there were a few other large maintenance projects; Barhale carried out tunnel cleaning works on the north-east corner of East Warwick, north-west corner of Reservoir Four and south-west corner of High Maynard bunds from February for a period of two months. The works included heavy vehicles moving through site on a regular basis as well as machinery operating on the tunnels.

The works on site have the potential to have resulted in disturbance of the key bird species but will not result in a change in the quality or extent of habitat across the reservoirs.

[7] Car park remained open for blue badge holders only. This was to ensure the Wetlands did not encourage visitors to travel as per government guidelines.

Various habitat creation work has taken place as part of the ongoing improvement of the site for nature. Aquatic engineering, transplanted reed onto the Reservoir One island (as previous planting failed) from the establish reedbed in November 2020 to increase the extent of reedbed cover. There were also plans to transplant reeds from the Reservoir Three reedbed, however the presence of significant numbers of gadwall prevented this.

Thames Water created scrapes, swales and three ponds along with planting several hedgerows immediately north of the East Warwick Reservoir during November to December, but in the context of the reservoirs this is small scale and unlikely to impact designated species.

The marginal vegetation (a mixture of reed and sedges) eastern edge of Reservoirs Two and Three were excessively cut in January 2021 by Thames Water grounds team contractors, for bund inspection, possibly leading to loss of habitat for breeding waterfowl and songbirds such as reed warbler and reed bunting. Since then, it has been agreed that this will be managed on a rotational cut to ensure there is intact habitat for breeding birds.

It is worth noting, that the large, vegetated raft installed on East Warwick in 2019 unintentionally attracted a breeding colony of black-headed gull (ten pairs) and common tern (eight pairs) and the two rafts on Lockwood provided nesting habitat for tufted duck and pochard. However, the four tern rafts on West Warwick, also introduced through the Environment Agency's' National Environment Programme did not attract nesting terns during the 2020 breeding season.

3.3 Breeding season (April to June inclusive)

No breeding counts were conducted due to suspension in surveying in response to COVID-19 restrictions. However, data supplied by the Walthamstow Birders includes 18 pochard broods (up from previous years) and an entry of at least 18 tufted duck broods. As tufted duck are late breeders, and the timing of this record, it is thought there could have been more broods.

No broods of shoveler or gadwall were observed.

3.4 Post-breeding period (August to September inclusive)[8]

3.4.1 Tufted duck (Figure 3)

The peak counts for tufted duck present during the moult was 2,037 on 23rd August 2020. The peak count for females was 230 on the same date (although predicted to be slightly higher than this as sex was undetermined for 365 individuals) while the male peak count came earlier on 5th August with 1,798. Previous surveys have shown that the later arrival of females is common as their moult period is marginally later, which is attributed to breeding behaviour. Peak counts from previous surveys include a low of 1,979 in 2018 to a high of 3,026 in 2015. The average population over the six-year monitoring period is 2,544 tufted duck present during the post-breeding moult.

Moulting tufted duck were recorded on all reservoirs and as with all previous years of monitoring Reservoirs Four and Five were of high value that, when combined, attributed to over 49% of the total season's records. Reservoir Four had a peak of 452 on 5th August and Reservoir Five 546 on 16th September. East Warwick, Low Maynard and High Maynard all had populations that followed the seasonal pattern of higher numbers in August and a gradual reduction throughout September. Combined, these three reservoirs attributed 34% (the same as the 5th year of reporting) of the

[8] Final post-breeding count was conducted on 1st October due to staff/volunteer availability.

seasonal total records. As seen previously, Reservoirs One, Two & Three and West Warwick all had low uptake in this monitoring period.

Although of low uptake, increased numbers of tufted duck were recorded using Reservoirs One, Two and Three than last year, where just four individuals were counted on Reservoir One during 2019 whereas 77 in 2020. This aligns with records in years before 2019. Lockwood also saw an increased distribution on last year; more similar to that of previous years with 63% more counts than 2019. However, a reduced distribution on Low Maynard is observed as seen in 2018-19, it is worth noting it held very similar numbers throughout to the more widely distributed population of last year (702 vs 733).

3.5 Over–wintering period (October to March inclusive)

3.5.1 Gadwall (Figure 4)

Over-wintering gadwall recorded a peak of 80 on 11th February 2021. Down from the previous year, with a peak count of 92, however still significantly higher than the remaining peak counts during the initial five-year survey period with the third highest peak count of 58 in 2019 and the lowest of 30 in 2017. This raises the six-year average to 57.

Previously, the distribution of over-wintering gadwall was broadly the same across the five-year period, however, there have been a few observed changes in habitat use during this reporting period. High Maynard and Reservoir Five still remained significant for over-wintering gadwall with peaks of 31 and 38 respectively and accounting for 26% and 15% of the season's total records. However, fewer Gadwall were recorded using Reservoir Five throughout the season, particularly around the eastern island which has been important historically. Instead, significant numbers of gadwall were observed using the secluded reedbed pools in Reservoir Three with a peak count of 31 and numbers remained significant throughout the winter period, accounting for 21% of records. In previous years, it has been noted that Reservoir Two and Three were not used by significant numbers regularly, this shift in distribution is possibly explained by the habitat provision of reedbed (and reedmace, sedges and other vegetation) which has established itself over the six-year monitoring period providing isolated pools in which gadwall are able to hide. The possibility of undercounting gadwall was highlighted in the previous report, which seems likely given the high counts during this survey period.

It is worth noting, visitors use the path immediately adjacent to this area during this time of year (as well as Woolley's hide that overlooks part of the pools) but as it is visually screened by woody vegetation (trees and shrubs), marginal vegetation (phragmites), with the addition of a fence for much of its perimeter, no disturbance from recreational activity was recorded. Other flighty species such as moorhen and teal were also observed using this area.

Counts remained similar on East Warwick and an increase in records on Lockwood was observed, particularly the North and North-Western portions, which are restricted to the public.

3.5.2 Shoveler (Figure 5)

Shoveler had a peak count of 132 recorded on 1st October 2020.[9] Just one less than 2019's peak count of 133. Previous counts for the five-year period were a low of 15 in 2017 and a high of 141 on 23rd October 2018, however, it is worth noting that 199 were recorded in the baseline year of 2012.

[9] Peak count recorded during late final post-breeding count, however falls within over-wintering period.

Significant numbers of shoveler were first counted on 16th September at 116 with numbers peaking early October, and numbers sharply falling to almost single digits (average 10) from mid-October onwards that stayed throughout the entire winter period. This short stay was also observed during year five, but the poorly timed East Warwick island renovation works was thought to have caused the early departure of the majority of shoveler. However, no works took place during this period this year and it is difficult to say the cause.

Although shoveler stay was brief, similar distribution is observed with all records on the southern portion of the reserve. Almost all records were on East Warwick (49%), Reservoir 4 (26%) and Reservoir 5 (25%) with notable peak counts on East Warwick and Reservoir 4 with single rafts of 69 and 79 respectively. East Warwick was the only reservoir to consistently hold low numbers of shoveler throughout the over-wintering period, particularly gathering on and around the island (showing the value of the renovation work). There were undoubtedly more individuals using the inner pool of it, which is not visible from the survey points, that were missed from counts. Significant numbers were also seen in using the north-western corner of East Warwick, away from public access.

3.5.3 Tufted duck (Figure 6)

The peak count for tufted duck during the winter period was 1,055 on 17th October 2020. Up from the previous year (2019) of 791, which was the lowest count of the five year - monitoring period. Other peaks within the five-year period were a high of 1,610 in 2016 to 1,141 in 2018. The peak count recorded in October isn't surprising, given it is the first overwintering count after the post-breeding period. Numbers declined to an average of 406 for the remaining eight overwinter surveys. Sex was not recorded for the over-wintering period.

Tufted duck was present and well distributed on all reservoirs with East Warwick the favoured reservoir with 20% of the over-wintering records, a much higher proportion than what was recorded during year 5 (11%) but similar to that of previous years that noted East Warwick holding the greatest densities.

Other reservoirs used by the largest numbers of birds are as follows; Low Maynard (16%), Reservoir Five (13%) and Reservoir Two & Three (11%). Reservoir One held considerably less of the overwintering population with just 2% of counts here.

Although the peak count was recorded on Low Maynard (237), East Warwick held the most consistent population of tufted ducks throughout the whole period hence the highest percentage of counts.

The same high-density cluster of birds were counted to the north of Reservoir Two as seen last year, as described before this corner is sheltered from disturbance by vegetation, operational infrastructure and angling platforms thereby reducing the proximity of visitor presence. Aggregations were also recorded towards the northern end of East Warwick as seen in previous years.

Again, birds generally favoured the edges on the largest reservoirs without islands, as seen on Lockwood and Reservoir Four. Large reservoirs with islands (East Warwick, Reservoir Five and High Maynard) all showed a more evenly distributed population with birds also gathering around the islands.

The year five report identified a slight distributional change between pre- and post-opening years. Since opening, Reservoirs Four and Five accumulated the higher percentage of the population

instead of the Warwick's which held the most pre-opening, indicating this move could be attributed to lack of visitors on the seasonally closed path adjacent to Reservoir Four and Five. However, this year, the Warwick's once again held the highest percentage of overwintering tufted ducks. Demonstrating that fluctuations in distribution (as well as population) is expected and although important to recognise, it is too early to draw conclusions about potential visitor disturbance. It is more likely the East Warwick Island renovation works caused the reduction in numbers using the Warwick's during 2019.

3.5.4 Pochard (Figure 7)

A peak count of 65 pochard was recorded on 4th December 2020. Slightly higher than year 5 peak count of 58 and similar to year 4 but still considerably lower than pre-opening years with the highest peak of 240 in year 1, followed by 191 in three and 123 in year two. The average peak over-wintering counts is 124 birds through years 1 to 6. This continues the overall decline in the population, and although the peak is higher than 2019's the average overwinter population was 33 down from the previous year of 36.

The population of pochard were recorded on all reservoirs, and as seen in previous years, pochard were largely absent from Lockwood, with a single record but unusually this was the same for Reservoirs Four and Five with a combined three records. However, it has been previously noted these reservoirs are not significant for over-wintering pochard.

A significant relative increase of birds favouring West Warwick over other reservoirs is observed with 43% of records held. Reversely East Warwick, Reservoir One and Four experienced significantly reduced records (3%, 8% and <1% respectively). This could possibly be a redistribution in response to disturbance from visitors as West Warwick is permit access only. Despite this shift in distribution from many of the reservoirs, High Maynard (20%) still held high densities (relative to peak count), which has been a stronghold for over wintering pochard in all years of monitoring with aggregations around the northern island. The reduced distribution on open water on the Maynard's in recent years remains.

3.6 Other species

3.6.1 Breeding grey heron

No counts were taken during this period due to COVID-19 restrictions.

3.6.2 Winter roosting cormorant

A peak count of 78 wintering cormorant was recorded on 17th November 2020 which is the lowest since recording. Previous peaks were a low of 90 in 2018 to a high of 322 in 2016. As highlighted in previous reports, the 2020 peak is considerably lower than previous years though this is thought to be due to a disparity in methodologies. Birds roosting on islands were not counted in 2018, 2019 and 2020.

Separate cormorant roost counts were conducted on 22nd January and 16th January, with counts 117 and 126 respectively, higher than that of day counts, as it is thought the cormorants feed elsewhere during the day. Although lower than pre-opening reports this figure is higher than years 2018 - 20.

3.6.3 Over-wintering great crested grebe

A peak of 61 great crested grebe was recorded on 17th October 2020. Higher than the 2019 peak count of 53 in the same month, October, last year. The lowest peak count was 40 in 2017 and the

highest was 70 in 2016. Great crested grebes were often recorded on all reservoirs for most of the survey days.

3.6.4 Over-wintering coot

Coots were widespread and abundant across all the reservoirs during the 2020/21 over-winter surveys. A peak of 523 on 17th October 2020, slightly down on last year's peak count of 533 just four days apart. The lowest annual peak count was 496 in 2016 and the highest was 1,027 in 2015. It remains one of the most numerous species on site.

3.7 Disturbance data

A total of 77 disturbance events were recorded during the surveys. The total figure is considerably lower than previous years as five fewer disturbance counts were carried out due to suspension of surveying during covid-19 lockdown periods. Figure 8 illustrates the disturbance events that occurred during the 2020-21 monitoring period, caused by stimuli surveyor, visitors and contractors. All 77 were negative.

The high disturbance areas are areas where multiple disturbance (four or more) events occurred or disturbance events greater than level 6 occurred. Low disturbance areas are areas where three or less disturbance events occurred at that grid cell or where disturbance level 5 events occurred.

The most frequent cause of disturbance was, as in all years, the surveyors' presence whilst undertaking the survey and is to be expected as the surveyors spend time on the banks (including in restricted areas) to conduct counts. Surveyors were responsible for 91% (or 69 incidents) of the recorded events, 82% (or 56 incidents) of which were low level, where the response is no greater than 'birds swimming rapidly away from activity source' and typically to a distance of no more than 10m either into surrounding vegetation or away from the shore.

Species impacted by surveyor disturbance were often tufted duck and coot (28 and 17 respectively) which made up almost 60% of disturbance events. This is unsurprising given that they are the most abundant and widespread of species at the reservoir complex.

Of the high level disturbance events (nine incidents) caused by the surveyor only three affected the designated species which were gadwall and heron; which are both flighty species.

Whilst the most common cause of disturbance was the surveyor, it is important to remember that a surveyor mimics the behaviour of a typical pedestrian visitor and should be taken as such whilst analysing the distribution of disturbance. Of the 69 incidents caused by surveyors, 39, or 57%, of them occurred on pathways restricted to the public. Surveyor presence on closed seasonal paths or restricted banks 'surprises' birds that have not habituated to consistent visitor presence and caused two new high disturbance points on Reservoir Five, overlapping with identified sensitive areas of the SPA. This is because for year six of reporting, varying monitoring routes were introduced in attempt to increase survey coverage. This meant surveyors walked new routes that were not previously walked, triggering new disturbance points (also seen on west bank of Lockwood). However, since it has been recognised that varying monitoring route led to surveying effort bias, it has been agreed to revert back to original monitoring route for consistency[10]. Although it is difficult to compare the data because of this, it does highlight the importance of restricted paths, particular in areas that have

[10] Some parts of the reservoirs were surveys more frequently than others.

been identified to have sensitive SPA or SSSI features considering surveyors as a proxy for visitor presence.

The remaining 8% of events (7 incidents) were caused by visitors (7%), contractors (1%) and anglers (1%). Of those 7 incidents, only two were high level, both of which were caused by visitors.

Disturbance events in the 2020-21 year occurred on all reservoirs except Reservoir One and are fairly distributed around site. The distribution of events that are in line with previous years were the northern tip of High Maynard and although not recorded, the western edge of High Maynard. This edge, often has feeding/resting coots, gulls, and geese out of the water on the grassy banks which are disturbed by surveyor presence and in response, often move back into the water.

Across all years there are several similarities in the data that show an absence of disturbance incidents which include the central core of the site; Reservoir One and Two & Three. This may be a result of high level of vegetative screening (trees, scrub lined banks and marginal emergent vegetation) as was the design in the landscaping of the site to help protect birds from disturbance.

4. Conclusions

The aim of this analysis is to identify any changes in key species abundance and/or distribution and whether or not there is a recognised and significant causal link between those changes and the introduction and promotion of wider public access to the site.

In isolation, the results of the 2020-21 survey show only a limited snapshot of the abundance and distribution of key species and how they responded to disturbance stimuli during surveys.

4.1 Populations

Fluctuations of bird populations is an entirely natural process with any number of potential driving factors, from limited food availability to wider climatic changes or habitat alterations. Due to this variation, it is far more useful to assess whether there are changes in bird distribution within the Wetlands unless regional context can be provided.

Regional context was investigated in the year 5 report findings, as part of a desk study WeBS data was analysed at nine other waterbodies within the Lee Valley SPA catchment and the South West London Water Bodies SPA to identify if trends were similar across the region. These were chosen based on their relevance to populations of key species and predominance of open water. Outcomes varied depending on key species, but it was found fluctuating populations of tufted duck is in keeping with other waterbodies, the Wetlands gadwall population showed relative stability compared to some other sites but the decline in the winter population of pochard remains a concern, particularly as it was found at other sites that the populations were either stable or gradually increasing. Increased visitor access is unlikely to be the only driving factor of pochard decline, but it is now a component of a longer downward trend on site. The populations counted during this reporting period were very similar to last year's findings, and thus its conclusions remain relevant, see London Wildlife Trust (2019). *Walthamstow Wetlands Bird Monitoring Report 2019-20* for further details.

4.2 Distribution

For the most part there has been no clear or significant change in the overall distribution of focal bird species within the reservoirs, and the distribution of SPA duck species has remained consistent during the entire monitoring period. Some species have shifted slightly throughout but have often returned the following year, as seen with returning wintering tufted ducks to the Warwick's this reporting year and although the sensitive areas identified by the HRA that are used by SPA or SSSI species have largely been protected from disturbance through the design of the seasonal path controls, the need for long-term monitoring essential.

Nevertheless, there were a few distributional shifts in SPA and SSSI species recorded this year that are of note., These are the significant numbers of gadwall using the Reservoir Three reedbed, proving the value of habitat provision, and the significant numbers of wintering pochard favouring West Warwick. These shifts will require continued monitoring, but the latter could possibly be a response to disturbance caused by visitors on other reservoirs as West Warwick is permit access only. Efforts to mitigate disturbance have been made and the Trust have introduced a winter closure to the path between the Maynard's which will remain in place for at least five years for review.

4.3 Visitor use

The addition of visitor monitoring shows that visitors on the whole adhere to the site's rules and sensitivities and the Wetlands design and its on-going management is able to absorb significant recreational use with the numbers and distributions of SPA or SSSI species remaining largely the same as the last two years, even during an unprecedented year of use, with double the annual visits for the post-breeding and over-wintering seasons. Although, limited breeding data was collected during 2020, it was seemingly a good breeding year for the Wetlands SSSI ducks, with more pochard and tufted duck broods recorded than in recent years.

The additional visitor disturbance mitigation recommendations outlined in the year five report, namely the screening of south-west corner of Low Maynard and the northern and southern tips of East Warwick will be carefully considered going forward. The temporary but lengthy closure of the East Warwick bank for public access (at the time of writing this remains closed) will be a good case study to support this suggestion, alongside the rigorous visitor monitoring to better understand visitor use of this pathway. This area, however, have to primarily take account of allowing Thames Water to maintain operational water supply and the physical integrity of the reservoir's banks (and the ability to inspect it) as required by the Reservoirs Act 1975. It is recognised that only measures that do not compromise this can only be considered. However, there may be an opportunity to implement at least some of this recommendation with the reopening of the East Warwick bank, keeping part of the crowd barrier to the south in place to prevent visitors immediately walking up the bank and retrofitting the planned move of the fence line to accommodate the newly installed accessible ramp with screening.

Although, visitor numbers are returning to almost pre-COVID-19 levels, it is essential for the Partnership to be aware that with much of the development in the surrounding area (Tottenham Hale and Blackhorse Road) is nearing completion, and visitor numbers are likely to increase in future years.

5. Monitoring in Year 7

Monitoring of disturbance and bird populations, along with targeted visitor monitoring should continue into year 7 (2021-22), to follow the method and data interpretation as set out in this report.

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7. **Figures** (overleaf)

Figure 1a; **Grid squares used for the survey** (south)

BSG | ecology

OFFICE: Oxford
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JOB REF: 7718.01

PROJECT TITLE
WALTHAMSTOW RESERVOIRS MONITORING YEAR 2

DRAWING TITLE
Figure 1b: Reservoirs and study grid (south)

DATE: 06.04.2017 CHECKED: PN SCALE: 1:5,000
DRAWN: COH APPROVED: OG STATUS: FINAL

LEGEND
50 x 50 m study grid

Figure 1b; Grid squares used for the survey (north)

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JOB REF: 7718,01

PROJECT TITLE
WALTHAMSTOW RESERVOIRS MONITORING
YEAR 2

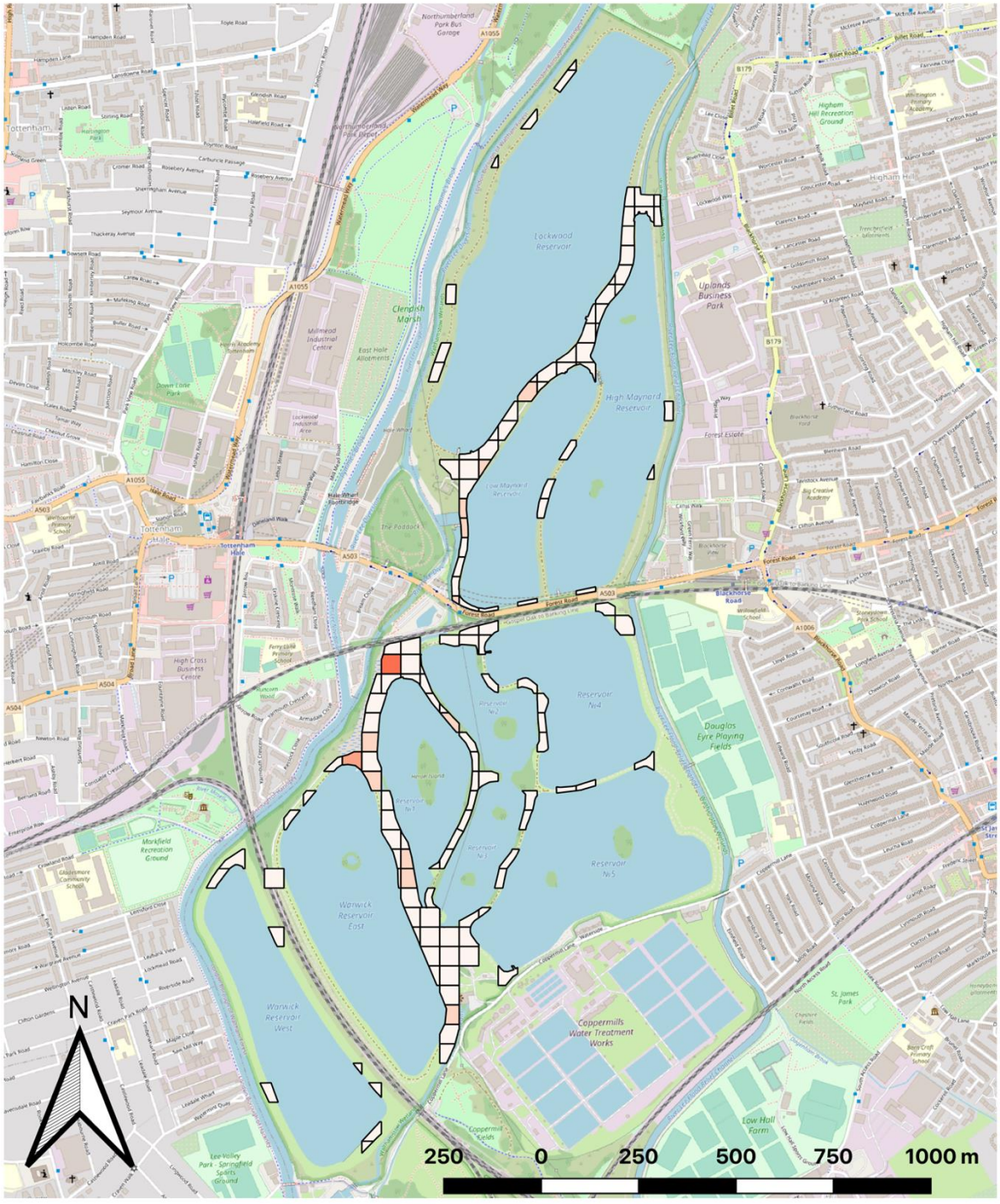
DRAWING TITLE
Figure 1a: Reservoirs and study grid (north)

DATE: 06.04.2017 CHECKED: PN SCALE: 1:5,000
DRAWN: COH APPROVED: OG STATUS: FINAL

LEGEND

50 x 50 m study grid

2a. Distribution of weekday visitors October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

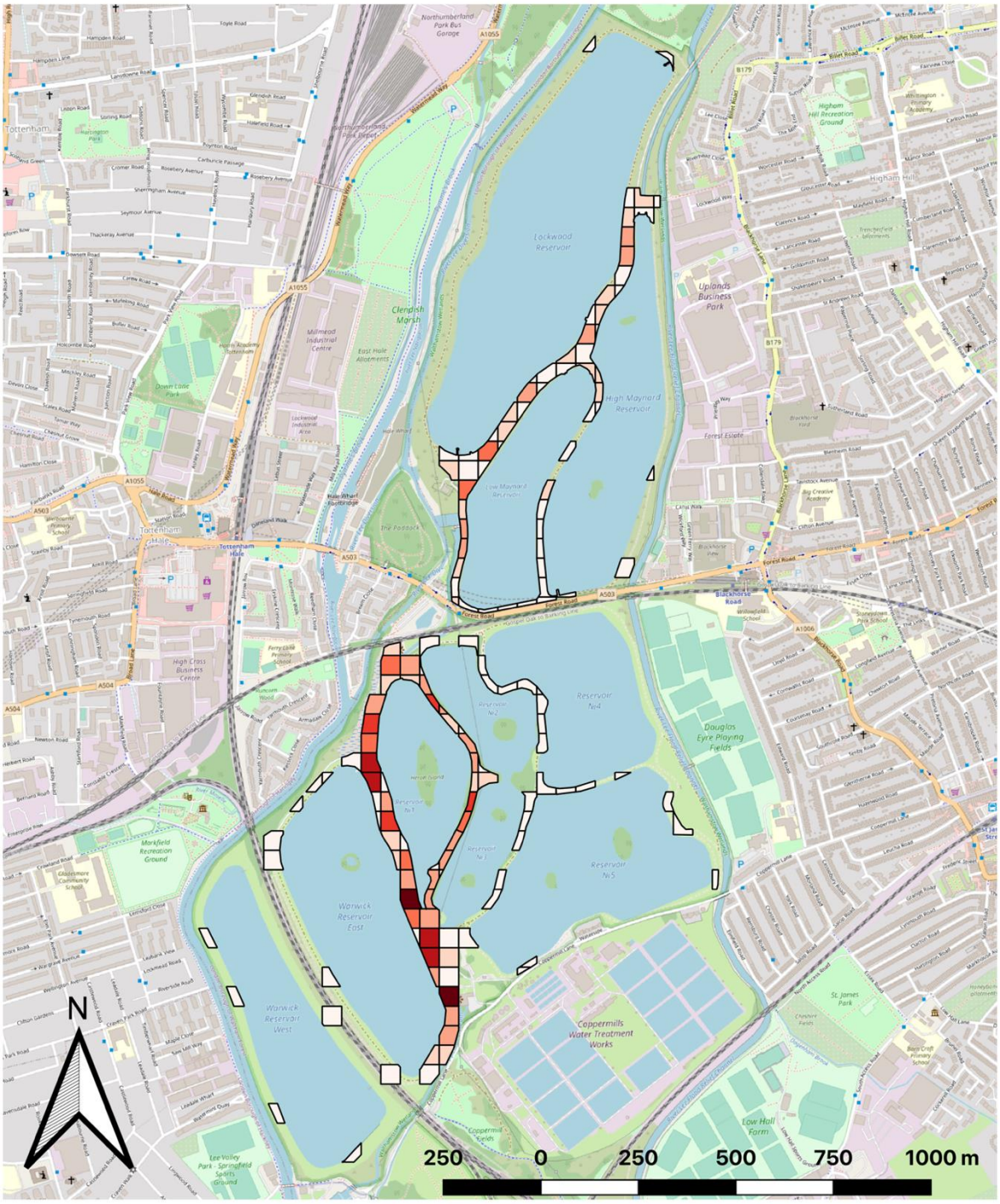
Figure 2a: Distribution of weekday visitors October to February inclusive

Key

1 - 10	40 - 50
10 - 20	50 - 60
20 - 30	60 - 67
30 - 40	

London Wildlife Trust

2b. Distribution of weekend visitors October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

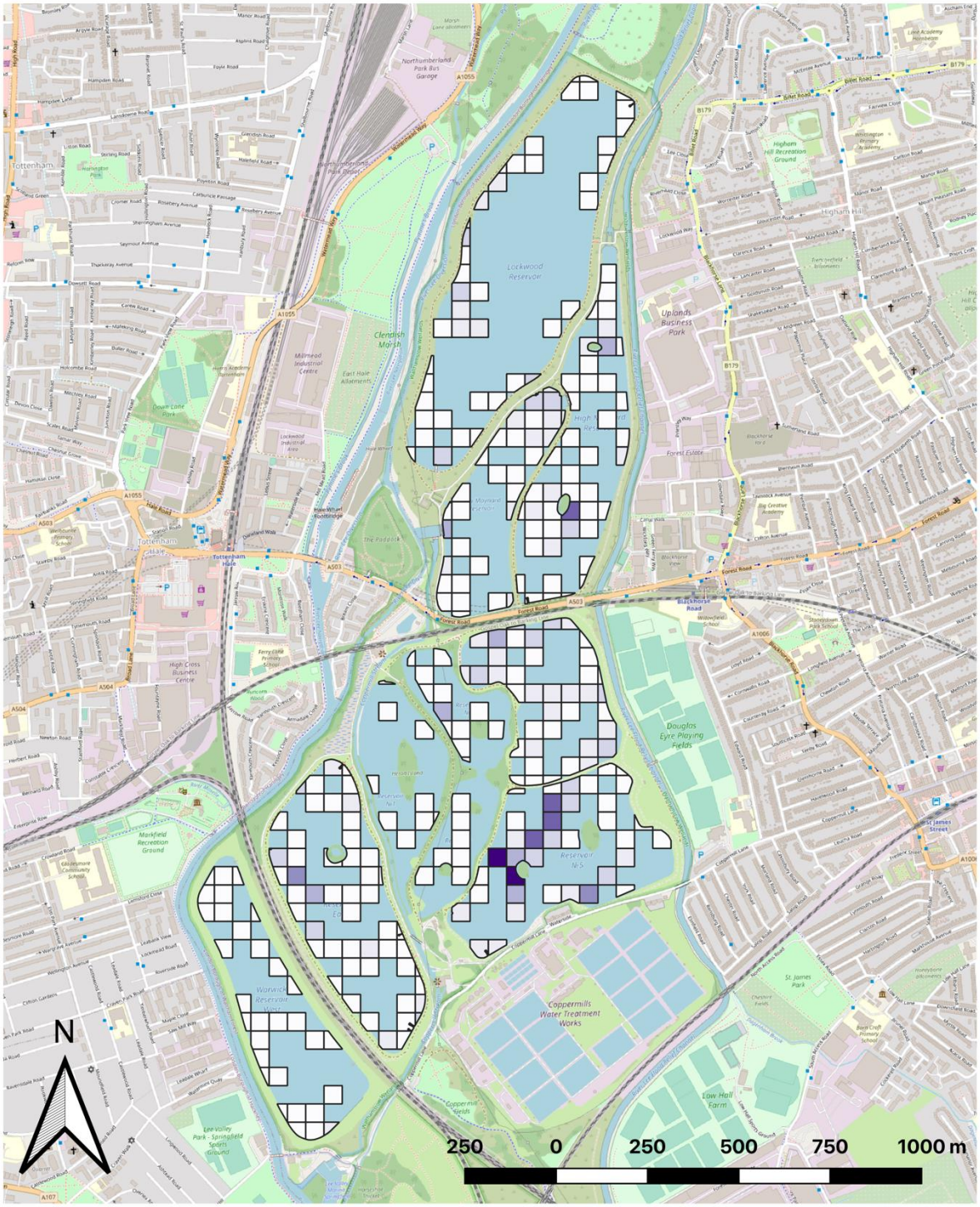
Figure 2b: Distribution of weekend visitors October to February inclusive

Key

1 - 10	40 - 50
10 - 20	50 - 60
20 - 30	60 - 67
30 - 40	

London Wildlife Trust

3. Distribution of post-breeding tufted duck August to September inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

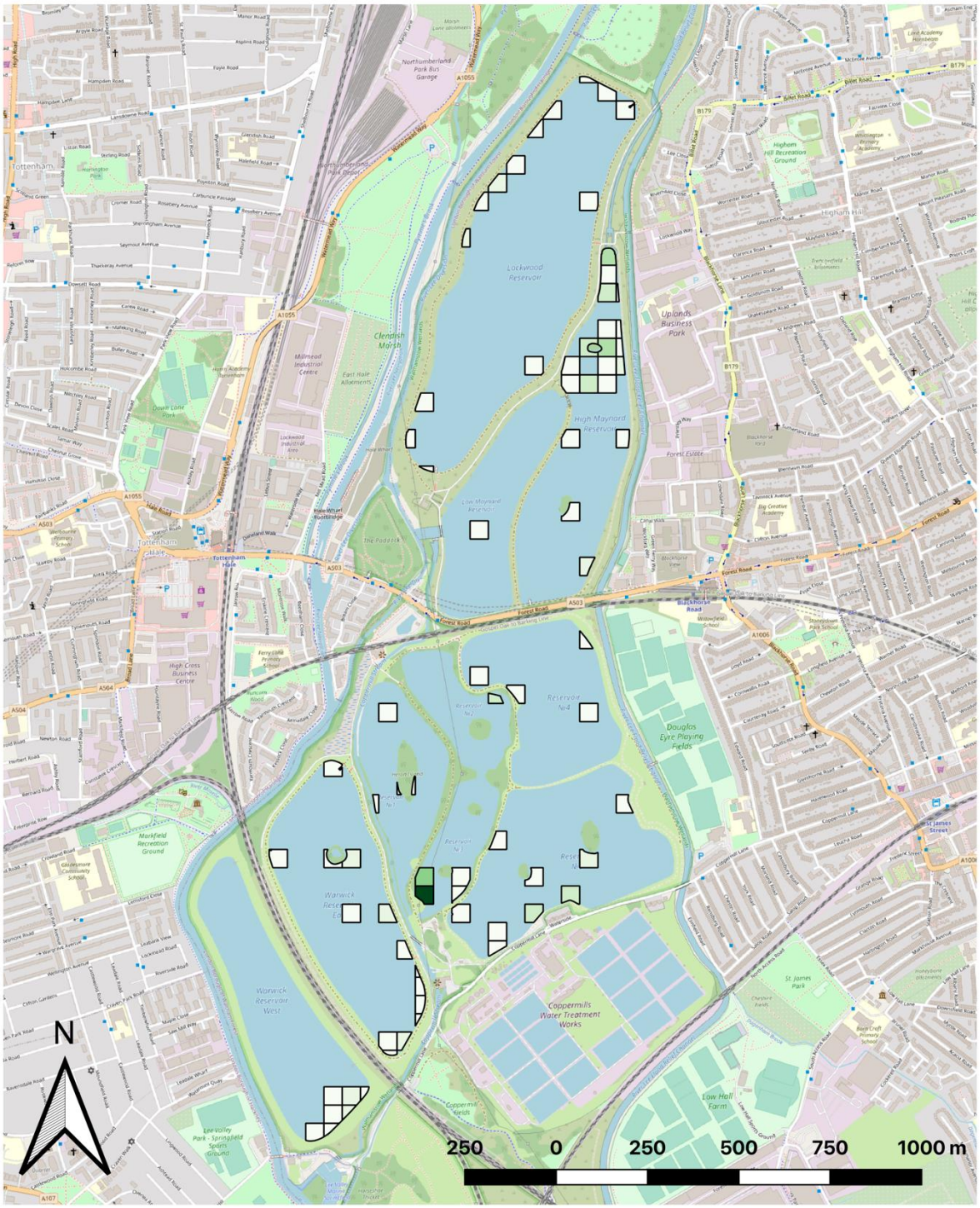
Figure 3: Distribution of tufted duck post-breeding August to September inclusive

Key

1 - 20	80 - 100
20 - 40	100 - 120
40 - 60	120 - 140
60 - 80	140 - 158

London Wildlife Trust

4. Distribution of over-wintering gadwall October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

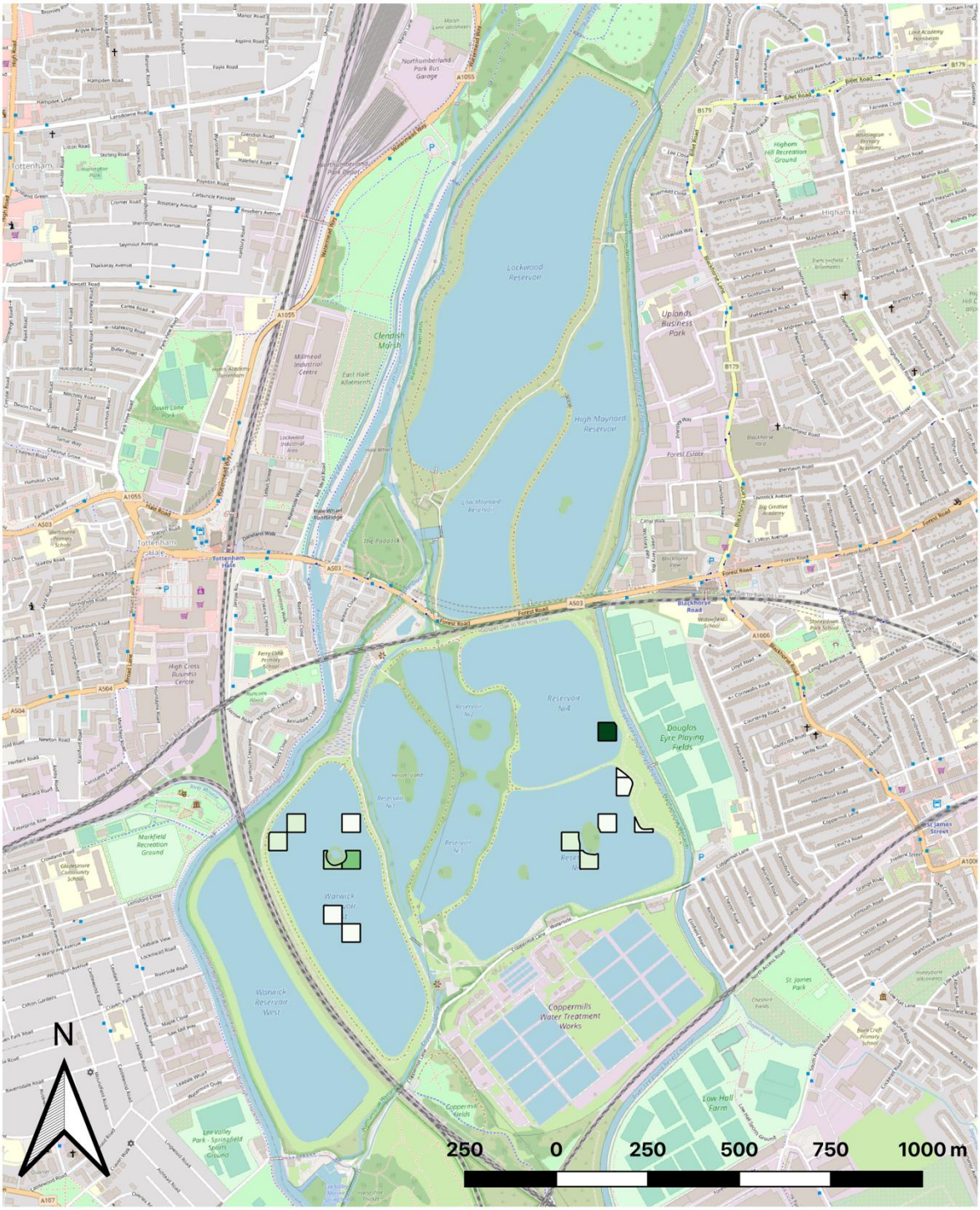
Figure 4: Distribution of gadwall over-wintering October to February inclusive

Key

1 - 8	32 - 40
8 - 16	40 - 48
16 - 24	48 - 56
24 - 32	

London Wildlife Trust

5. Distribution of over-wintering shoveler October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

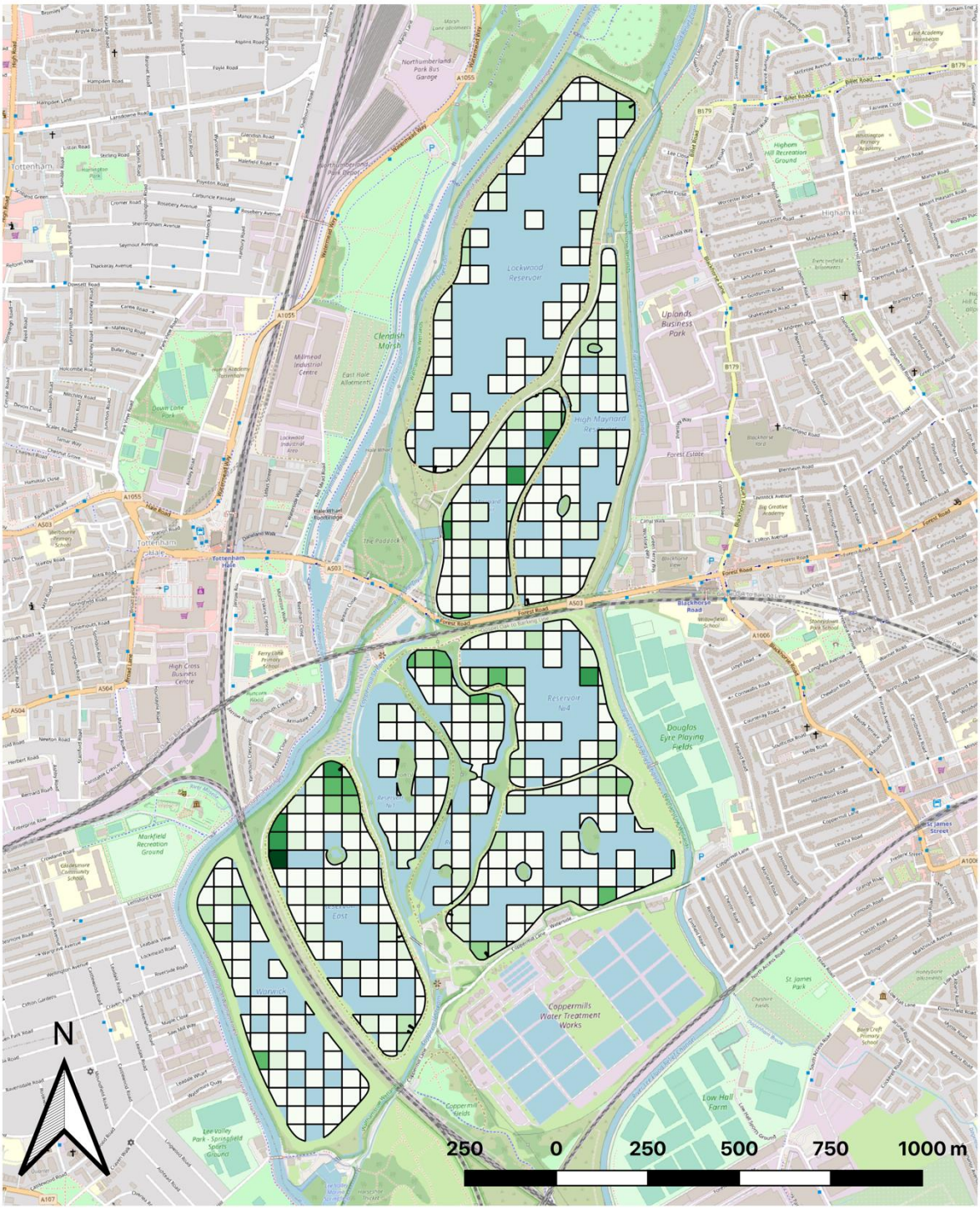
Figure 5: Distribution of shoveler over-wintering October to February inclusive

Key

1 - 8	32 - 40
8 - 16	40 - 48
16 - 24	48 - 56
24 - 32	

London Wildlife Trust

6. Distribution of over-wintering tufted duck October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

Figure 6: Distribution of tufted duck over-wintering October to February inclusive

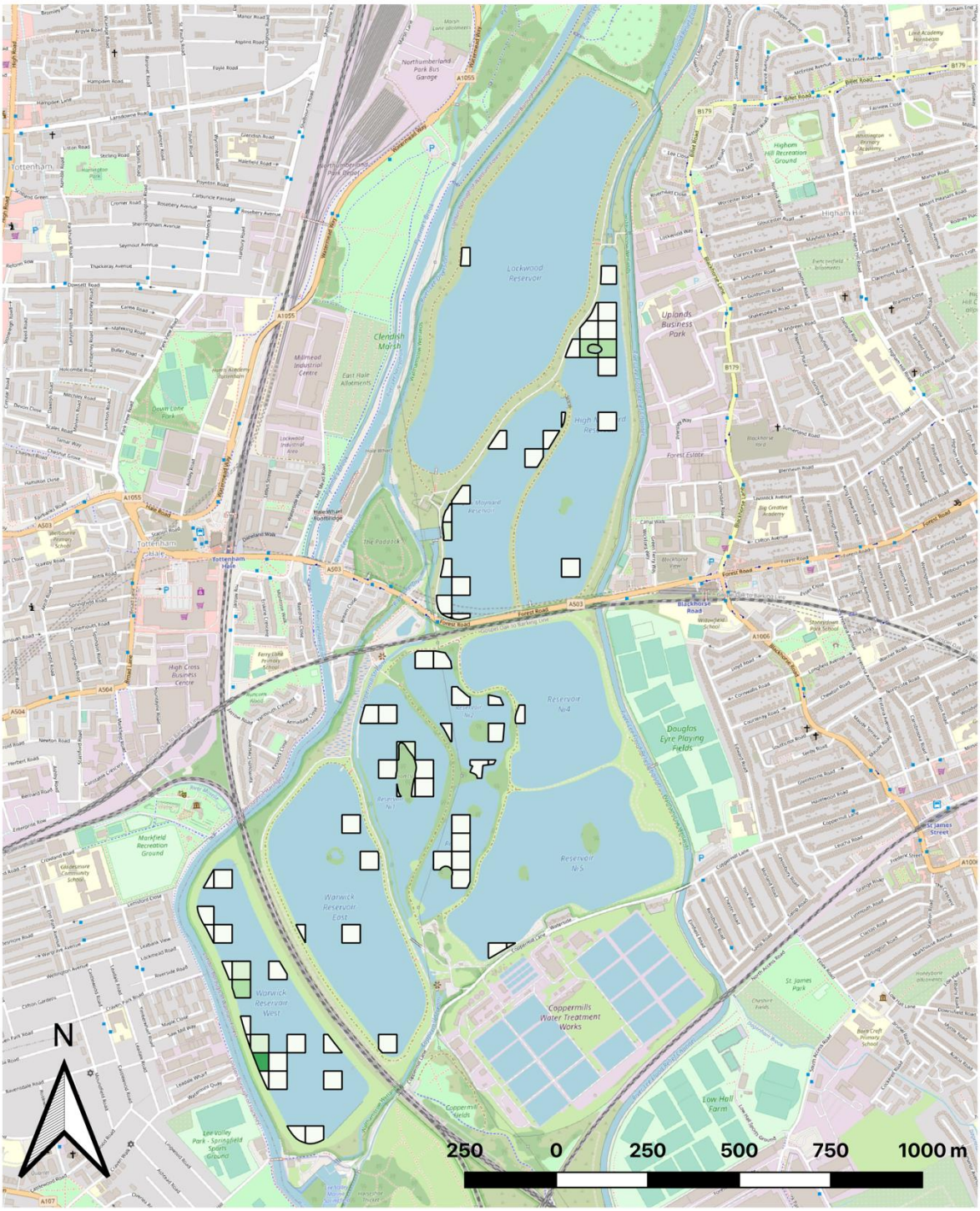
Key

1 - 10	40 - 50
10 - 20	50 - 60
20 - 30	60 - 70
30 - 40	70 - 76

London Wildlife Trust

Produced by the London Wildlife Trust

7. Distribution of over-wintering pochard October to February inclusive



WALTHAMSTOW WETLANDS MONITORING YEAR 6

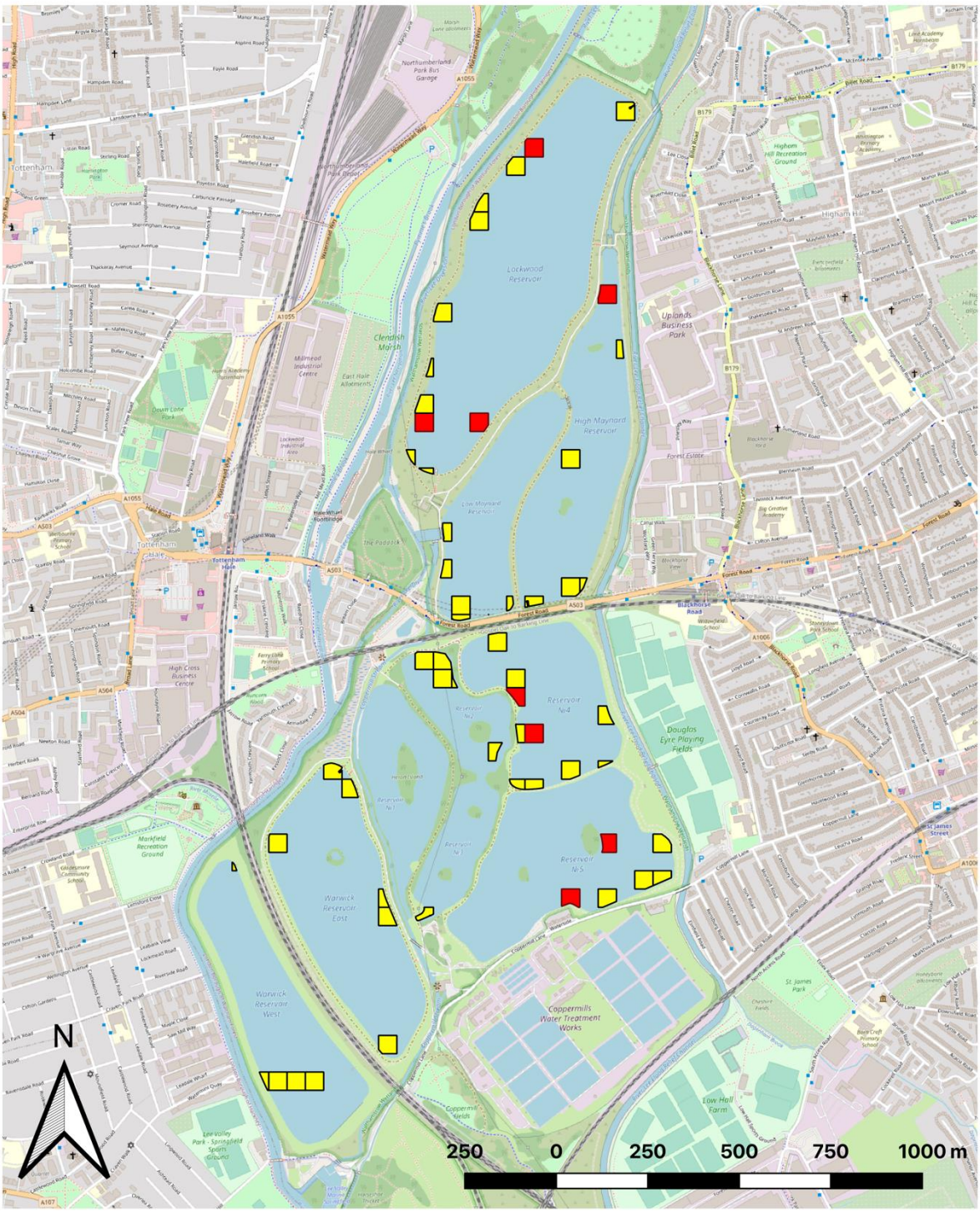
Figure 7: Distribution of pochard over-wintering October to February inclusive

Key

1 - 8	32 - 40
8 - 16	40 - 48
16 - 24	48 - 56
24 - 32	

London Wildlife Trust

8. Disturbance events recorded during Year 6



WALTHAMSTOW WETLANDS MONITORING YEAR 6

Figure 8: Disturbance events recorded during Year 6.

Key

High

Low

London Wildlife Trust

8. Appendices

Appendix 1: Example recording forms

Bird distribution and count survey form

This form is to be used from April to June (inclusive). For Tufted (TU), Pochard (PO), Shoveler (SV) & Gadwall (GA) please record male and female numbers in their respective columns. Do not fill in the 'Number' column for the afore-mentioned species as this will done when data is digitised. Please record anglers as much as practically possible.

Reservoir Count Form (Breeding Season)																	
Reservoir ID				Wind speed				Cloud Cover									
Date				Wind direction				Percentage Ice									
Observer				Precipitation				Condition of surface									
Start/end time				Temperature												Anglers	
Square	Species	Number	Female	Male	Square	Species	Number	Female	Male	Square	Species	Number	Female	Male		Square	

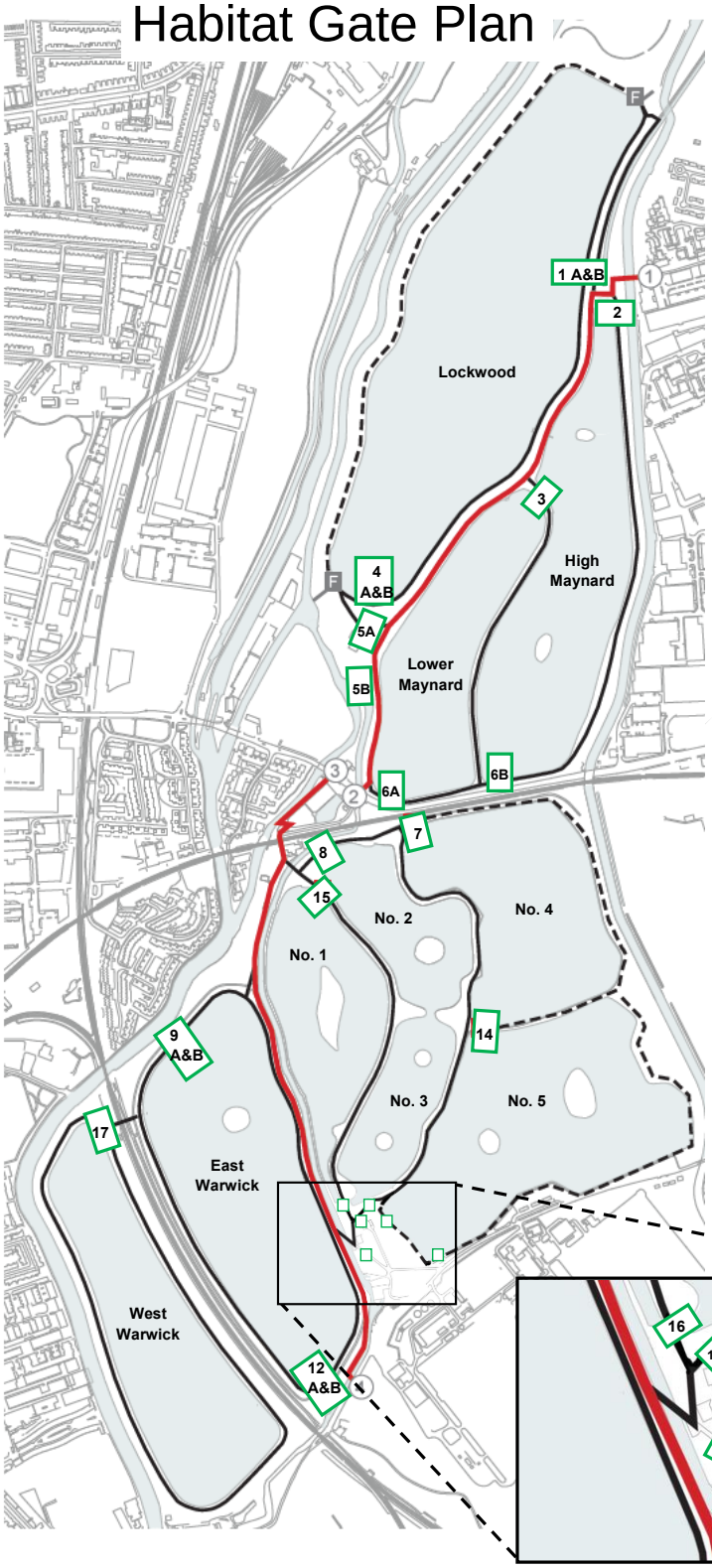
Disturbance recording form

Reservoir	Grid Squares/ Location	Time	Species	Neutral	Neg.	Pos.	Notes/Comments

Disturbance vector definitions

Surveyor	The persons undertaking the bird disturbance survey, generally singly or in pairs
Angler	Persons partaking in fishing at water's edge, generally occasional movement
Visitor	Member of the public walking around the wetlands, generally slow or gently paces, singly, small or occasionally large groups
Vehicle	A vehicle permitted to be on site, e.g., Thames Water or London Wildlife Trust van
Operations	Persons or actions relating to Thames Water operations, not in a vehicle
Cyclist	Persons on a bicycle, generally moving at pace
Jogger	Persons moving at speed, above a walking pace, often running.
Train	Train on embanked railway line passing through site, West Anglia Mainline or Gospel Oak to Barking line

Appendix 2. Seasonal access map 2020 onwards



GATE	OPEN	CLOSED
1 A & B	-	ALL
2		ALL
3	1st Apr – 30th Sept	1st Oct - 31st Mar
4 A & B	-	ALL
5 A & B	-	ALL
6A	1st Apr – 30th Sept	1st Oct - 31st Mar
6B		ALL
7	-	ALL
8	1st Apr – 31st Jun	1st Aug – 31st Mar
9 A & B		ALL
10 A	-	ALL
10 B	1st Apr – 31st Jun	1st Aug – 31st Mar
10 C	-	ALL
11	-	ALL
12 A & B	-	ALL
13	-	ALL
14	-	ALL
15	1st Aug – 29th Feb	1st Mar – 31st Jul
16	1st Aug – 29th Feb	1st Mar – 31st Jul
17	-	ALL

Appendix 3: Survey dates and conditions

Date	Average temperature (^{0}C)	Average wind speed (Beaufort)	Prevailing wind direction	Cloud cover (/8)	Rain event	Ice on reservoirs present
05.08.20	24	2		0		
23.08.20	19	3	E	7		
16.09.20						
01.10.20	12	3	WNW	7	Light drizzle early	
17.10.20	10	2	N	8		
04.11.20	8	2	E	0		
17.11.20	13	2	SW	5		
04.12.20	5	2	SW	8	Light rain	
19.12.20	11	4	NNE	8	Heavy showers	
03.01.21	5	3	NE	4	Brief shower in afternoon	
15.01.21	5	3	NE	7		
11.02.21	1	2	ESE	7	Light snow	Less than 5%
25.02.21	10	2	W	8		
14.03.21	No Count	No Count	No Count	No Count	No Count	No Count
28.03.21	No Count	No Count	No Count	No Count	No Count	No Count