Walthamstow Wetlands
Bird Monitoring Report
Year 4: April 2018 to March 2019

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Contents

London Wildlife Trust

London Wildlife 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.

Walthamstow Wetlands; Bird Monitoring Report Year 4: April 2018 to March 2019		
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Executive summary

London Wildlife Trust are now managing the Bird Monitoring Programme, as required for the Walthamstow Wetlands project planning overseen by the partnership of Waltham Forest Council, Thames Water, and the Trust.

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' distribution and the disturbance caused to them as a result of increased access to the Walthamstow Reservoirs for a five-year period following the start of the development phase. BSG were commissioned to deliver the first three years (2015-18) of monitoring and to produce an annual report which was completed in March 2018. Prior to the completion of the BSG monitoring period, London Wildlife Trust set out methodologies in line with those used by BSG Ecology and have adopted these since April 2018.

The Trust completed their first year of monitoring in March 2019 and for this report has produced a suite of distribution and disturbance maps that are comparable to the previous BSG documents. Bird distribution and disturbance have been monitored according to the pre-determined methodologies across the year. The results have been mapped and discussed in this report and will feed into the final report which will be created at the end of this five-year monitoring period, due in spring 2020.

The results from monitoring over 2018-19 largely show no significant changes that are of immediate concern and warranting the need for intervention. There have been positive and negative fluctuations in the numbers of waterfowl, though these peaks and troughs are largely similar to the previous years of survey pre-dating the site opening to the public and the consequent increase in visitors. They are likely to reflect natural variances influenced by a range of environmental and other factors within and without the Wetlands.

Nevertheless, the distribution of some waterfowl species at certain times has shown some indication of change with what appears to be a visible bias towards reservoir islands away from banks and open pathways. This change in distribution is likely to be multifaceted rather than a direct impact of visitor access, however we will continue to monitor in the same manner for the final year of survey to determine whether this pattern grows and/or represents a response to disturbance.

The majority of observed disturbance events (66%) occurred on permanently closed pathways or on seasonal access routes, caused by the surveyors, during the paths' closed periods. The remaining 34% that occurred on main pathways and seasonally open paths was made up of 101 recorded incidents, of which 36 affected species attributed to the SSSI and SPA designations. The majority of these 36 incidents were low-level disturbance events and deemed not significant. However, care needs to be taken to ensure that accumulative low-level disturbances do not become more significant.

This year of survey and the maps produced highlight a small number of areas which may benefit from future habitat enhancements or some level of screening, in particular, the south-west corner of Low Maynard, the banks of East Warwick and the southern corner.

This data and report is only based on the four key species for which the Wetlands' SPA and SSSI is designated. However, the Trust is mindful of other bird species for which Walthamstow Wetlands is important and will monitor the site and liaise with key experts, to help ensure management of the site takes due account of its bird fauna.

1. Introduction

1.1. Site context

The Walthamstow Wetlands project is transforming a collection of operational reservoirs, essential to London's water supply, and which were previously inaccessible to the public, into a nature reserve that serves as a landmark visitor attraction. Not only will the Wetlands continue to be internationally important for wildlife but they will also provide a significant educational and recreational resource for people living in and around the Lee Valley and beyond.

Walthamstow Wetlands encompasses Reservoirs 1, 2, 3, 4 & 5, 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.[1]

The site encompasses the Walthamstow Reservoirs Site of Special Scientific Interest (SSSI), contributes towards the Lee Valley Special Protection Area (SPA), and part of a larger Site of Metropolitan Importance for Nature Conservation (site M071 *The Lee Valley*).

The Lee Valley SPA is designated for its importance for overwintering shoveler *Anas clypeata,* gadwall *Anas strepera,* and bittern *Botaurus stellaris,* with both gadwall and shoveler occurring on the Wetlands throughout the year in varying numbers. The SSSI designation outlines the site's importance as a breeding ground 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 and coot; and winter roosting cormorant. The Wetlands also fall within the Lee Valley Ramsar site designated under the Convention on Wetlands of International Importance, 1971.

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 (see *Walthamstow Reservoirs, Walthamstow Wetlands Project* 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, 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 (*Walthamstow Wetlands Bird Monitoring Report,* BSG Ecology, 2014).

An application to the National 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 Wetlands opened to the public in October 2017 and welcomed over 400,000 visits in the first year.

[1] For ease of reading Reservoirs 1-5 are referred to as One, Two, Three, Four, and Five in the report text.

1.2. 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 as best possible. These key areas for features of importance has been directed by the results of preliminary site surveys (see *Walthamstow Wetlands Bird Monitoring Report*, BSG Ecology, 2014) and agreed by Natural England. Consequently, the seasonal access map has been drawn up and agreed by partners with Natural England (See appendix 2).

The primary access route 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 east of the Coppermill Stream until the entrance exit at Coppermill Lane. This also give access to the eastern bank of East Warwick Reservoir. 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).

The secondary routes are closed during sensitive periods for the key species, for example the pathway east of reservoirs Four and Five is closed from June to November (as a minimum) to limit disturbance to post-breeding aggregations of tufted duck. These paths are walking routes only; no cycling or jogging is permitted on the seasonal paths.

A further set of paths are closed to the general public all year round, including the whole of those around West Warwick, the western bank of East Warwick and the eastern side of Reservoirs Four and Five. These pathways, however, are accessible throughout the year for Thames Water staff, London Wildlife Trust staff – for example to survey or lead guided walks – continued access for anglers, and a limited number of birdwatchers, through a permit scheme.

As in previous years of the survey, permit-holding birdwatchers and anglers are present throughout the year and have access to the whole reservoir complex. 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 throughout the year across the entire site either as individuals, pairs or small groups of 5+ when a notable bird was on site. Angler numbers were greatest around reservoirs Two, Three, Five and the Low Maynard. Reservoir preference for angling differs slightly from the previous years due to Reservoir One experiencing low stock numbers following a fish kill in 2017.

Bird watchers are no longer able to purchase one day permits from the Thames Water fisheries office to access the site during fisheries opening hours. Instead they have free access but only during the Wetlands opening hours (09.30-17.00), which are more restricted than before.

1.3. 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, the Bird Impact Management Plan (Waltham Forest Council, 2014), was submitted to Natural England and the Walthamstow Wetlands Board.

London Wildlife Trust have adopted the delivery of the five-year Bird Impact Management Plan (BIMP), now in its fourth year. BSG Ecology were contracted to deliver the first three years of monitoring and reporting after which the Trust is required to continue from April 2018 as the Wetlands' conservation delivery partner.

1.4. Aims of study

The aim of the report is to address Section 4 of the Bird impact Management Plan. To achieve this it considers the fourth year (April 2018 to March 2019) 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 increased recreational use;
- Any significant changes to the distribution of key species within the site as a result of increased recreational use.

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 *Anas strepera*, shoveler *A. 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 ferina*
- 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 was 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 approach to monitoring 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 1-3 (2015-18). This ensures that ornithological data will be collected in a consistent manner as best possible, and direct comparison of bird distribution within the area is possible.

Data are recorded using the same grid system, and consistent basic information is collected during each monitoring visit. The survey area includes all the reservoirs within Walthamstow Wetlands (see Figure 1). A 50 x 50m grid is overlain onto a digitised map of the survey area using GIS. Each reservoir has been assigned a letter code (consistent with the baseline assessment), 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 (as was done for the baseline survey).

The route around the site is varied so that each reservoir is sampled as representatively as possible during the 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. 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 routes. Effort is also taken to carry out the surveys during a range of different weather conditions, although conditions that could make recording problematic or inaccurate (e.g. prolonged heavy rain or snow, dense mist or fog) are avoided.

The breeding season is taken as April, May and June. The post-breeding (moult) season (tufted duck only) is taken as August and September. The overwinter season is taken as October to March inclusive.

On **one visit per month** all waterfowl species are counted (as individuals) and mapped using the grid system, including those using islands and the immediate shoreline.

The **second visit** in the month is a targeted disturbance monitoring survey. Disturbance surveys have altered from the previous methodology to better record the nature of visitor access and behaviours. This was in response to gaining a better understanding of visitor use patterns once the site opened. Surveyors walk the site undertaking a full count of all waterfowl species whilst also recording disturbance events. This enables a more detailed understanding of how large groups of visitors may be affecting the range of waterfowl present, whilst still providing detailed information on the distribution and numbers of the target species. If a guided walk is not undertaken or not followed for another reason a full species count is undertaken in that month.

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 / movinginto 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 50 m).
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 or London Wildlife Trust van
Operations	Persons or actions relating to Thames Water operations, not in a vehicle.
Cyclist	Persons on a bicycling
Jogger	Persons moving at speed, above a walking pace. Also includes running.
Train	Train on train line 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).

Full dates, weather conditions, the presence of public and survey times are shown, as an example in the appendix.

2.3 Changes and additions to the pre-determined methodology.

In addition, London Wildlife Trust undertook additional surveys to extend the research. Breeding Bird Surveys, Grey Heron Census – both BTO co-ordinated surveys - and Tufted Duck Point Counts were carried out as outlined here:

A breeding bird survey was undertaken during the 2018 breeding season. A transect route that incorporates all of the reservoirs north and south of Ferry Lane was walked every two weeks during the months of April – July (inclusive). Birds undertaking any behaviour in relation to breeding were identified and their location was recorded using BTO species codes and additional breeding codes. The numbers of young were also recorded. The data collected during these surveys is referenced in this report.

A Grey Heron Census was conducted during the 2018 breeding season in line with the BTO methodology. Each of the three islands known to have breeding grey heron was circumnavigated on the nearest possible pathway and surveyors used telescopes to count apparently occupied nests (AON). Three counts were taken during the breeding months. In addition, on site staff have been facilitating a ringing program that requires two visits per year to the heronries through which, more accurate nest counts have been taken. Data collected during the ringing efforts have been referenced in this report.

Specific Tufted Duck Point Counts (TDPC) were taken during the post-breeding moult period across the site. On a weekly basis the surveyor walked a pre-determined route that offered the most advantageous view of the waterfowl aggregations and counted numbers of tufted duck per reservoir using a click counter. The combined peak count from those surveys have been referenced in this report.

3. Results and Interpretation

3.1 Changes in habitats for key species

There have been several temporary changes to the habitats for key species during this monitoring period, principally due to the operational nature of the reservoirs.

East Warwick Reservoir was drained down for tunnel repairs and repair works on the concrete banks for a period of eight months from 4th January to 1st October 2018. Lockwood Reservoir was also drained down for 12 weeks from 4th January to 1st April 2018.

Water levels were significantly lower during the drain downs, exposing more shore line, often patches of shingle or sand, and enlarged the surface areas of the islands. This might have been either preferential or deleterious for some or all of the bird species where this occurred.

The West Anglia Main Line has been subject to major widening works during 2016-18, with new tracks laid and bridges rebuilt between West and East Warwick reservoirs and Tottenham Hale station. This began prior to this year's survey period and ended in July 2018. The works included Network Rail's contractors' heavy machinery travelling through site on a regular basis as well as machinery operating on the railway. Thames Water arranged surveys of this disturbance in a separate report.

In June 2018 a break out of botulism affected the waterfowl on site, with a number of birds lost over a 4 week period. This mainly affected non-key species such as greylag geese and Canadian geese.

3.2 Breeding Season *(April to June inclusive)*

3.2.1 Tufted duck (Figure 2)

A peak breeding season count of 261 tufted duck was recorded in April 2018. This is the combination of both males and females as data on the sexes was not recorded in 2018. During the BSG periods of monitoring, peak counts for breeding season were as follows; 349 in April 2017, 255 in April 2016 and 395 in June 2015.

Tufted duck were present in all reservoirs throughout breeding season with East Warwick having the highest count of 67. High and Low Maynard had peaks of 48 and Reservoir One a peak of 46. Birds were relatively well distributed across the site and the peak count on East Warwick is in line with all previous years' surveys.

There is possibly a slight reduction recorded in the extent of tufted duck towards the south of East Warwick, although the results are broadly similar to the Year 2 findings (2016-17). This mirrors the distribution of tufted over the whole site, with this year's findings more similar to that of Year 2 (2016) whilst Years 1 and 3 (2015, 2017) were more broadly similar in their distributions.

Additional breeding data was collected during targeted waterfowl breeding surveys for all waterfowl species. Of the tufted ducks seen during breeding season around 16 pairs fledged young with a noted good survival ratio.

3.2.2 Gadwall (Figure 3)

A peak count of 5 was recorded in April 2018. During the BSG periods of monitoring peak counts for breeding season were as follows; 14 in 2017, 9 in 2016, and 14 in 2015.

During the early part of the breeding season (18th April) gadwall individuals were distributed across West Warwick, East Warwick and High Maynard reservoirs with the remaining two birds on Reservoir One. In the latter part of the season (21st June) four birds were seen using High Maynard. This is similar to the distributions identified in previous years, although it does tend to fluctuate year-to-year without any clear trend of usage/prevalence to any particular area or reservoir.

Numbers of gadwall during breeding season has, as in previous years remained very low. Male and female ratios were not recorded during the 2018-19 monitoring, so it is impossible to infer an estimate of paired birds. However, the additional Breeding Bird Survey (BBS) did record three pairs of gadwall present during the survey period but witnessed no breeding behaviour.

3.2.3 Shoveler (Figure 4)

A peak count of 6 shoveler was recorded in April 2018. A total of 8 shoveler were recorded in 2017, 5 in 2016 and 3 in 2015. There is no noticeable trend concerning the distribution of the species between the years.

Shoveler were only recorded during one survey throughout the breeding season with 4 birds seen on Reservoir One and the remaining 2 on West Warwick on the 18 April 2018. Both male and female birds were seen during the survey. During the additional BBS both male and female birds were recorded, one pair over-summered but no breeding behaviour was recorded.

3.2.4 Pochard (Figure 5)

A peak count of 69 pochard was recorded in April 2018. The peak counts for previous years were as follows; 115 in 2017, 73 in 2016 and 105 in 2015.

Numbers of pochard were highest during the early part of the breeding season with a peak of 24 using Low Maynard Reservoir. Distribution was then relatively evenly spread, with 18 on East Warwick, 16 on Reservoir Three, 14 on High Maynard and 13 on Reservoir One. A single individual was noted on Reservoir Five. Pochard were not recorded from Lockwood, Reservoir Four and West Warwick.

The 2018 count and distribution is relatively similar to that of the 2016 survey which, in distribution terms, is reflective of the entire survey period. A noticeable change to all previous years is that during the season, birds were most frequently seen on and around the islands, notably around East Warwick, and fewer birds recorded near the banks of High Maynard and East Warwick, the latter excluding 2016. The southern end of Low Maynard seems to have a slight reduction in distribution. Whether this change is significant requires further survey.

The BBS recorded 8 pairs of pochard fledged 18+ young during the breeding period in 2018.

3.3 Post-breeding Period (*August to September inclusive*)

3.3.1 Tufted duck (Figure 6)

Peak counts of tufted duck present for the annual moult were 1,744 on 10th August 2018. The additional tufted duck point count (TDPC) survey numbers during the post

breeding moult showed a peak count of 1,979 on 22nd August 2018, arguably a more accurate figure. There was no data collected on the male to female ratio. In previous years the peak counts were as follows; 2,978 in 2017, 2,986 in 2016, and 3,026 in 2015. This represents an apparent decline which requires further analysis.

Moulting tufted duck were present on all reservoirs and distributed in a similar manner to the previous years, however, there is a noticeable difference in numbers. Like most years (excluding 2017) Reservoirs Four and Five had the highest aggregations, with peaks of 421 and 459 respectively, highlighting their importance for the annual moult. High Maynard (peak of 231), Low Maynard (peak of 258) and Lockwood reservoirs also had high numbers. Reservoirs One, Two and Three all had numbers below 20 individuals, illustrating their relative lack of importance for the annual moult.

There was seemingly less distribution across Lockwood, Low Maynard and West Warwick than previous years, although tufted duck was fairly well distributed throughout these reservoirs this year.

The numbers of tufted duck across the Lee Valley should be referenced using WeBS data to see whether the trend is mirrored across other sites in the Lee Valley.

3.4 Over–wintering Period (*October to March inclusive*)

3.4.1 Gadwall (Figure 7)

A peak count of 58 gadwall was recorded on 5th February 2019. Previous peak counts were as follows; 34 in 2018, 30 in 2017, and 52 in 2016.

Throughout the over-wintering period gadwall numbers were highest on High Maynard Reservoir with a count of 33 on 21st February 2019. Distribution across the Wetlands was as follows; Reservoir Five (peak of 27), East Warwick (peak of 19), Reservoir One (peak of 10), and Reservoir Four (peak of 10).

The distribution of gadwall is largely consistent with previous years' results. High Maynard, Number Five and East Warwick reservoirs were of importance in this over wintering period bearing similarities to all previous years. Birds were most frequently seen either within a 50m radius or on the banks of islands. The islands in East Warwick and High Maynard seemed to support higher distribution of numbers in this year than previous years.

3.4.2 Shoveler (Figure 8)

The peak count for shoveler was 141 on 12th November 2018. Previous year's peak counts were as follows; 15 in 2017, 92 in 2016, and 120 in 2015.

Shoveler aggregations were greatest on East Warwick (peak of 111) and Reservoir Five (peak of 71) showing a similar distribution to all previous year's results. There were smaller numbers on Reservoir One (24), West Warwick (10) and High Maynard (2). East Warwick has been and continues to be the most regularly used reservoir for over-wintering shoveler.

East Warwick supported a greater distribution than in previous years' surveys, as did Reservoir One, to some extent, where the shoveler favoured the area around the island.

3.4.3 Tufted duck (Figure 9)

The peak count for tufted duck present during the winter period was 1,141 on 23rd October 2018. Previous peak counts were 1,238 in 2017, 1,216 in 2016 and 1,610 in 2015.

Tufted duck were present and well distributed in all the reservoirs with a 540 peak present in Reservoir Five, 458 on Lockwood, 296 on Reservoir Four, 222 on High Maynard, with lower numbers of 105 on East Warwick, 81 on West Warwick, 62 on Low Maynard, 49 on Reservoir One and five on Reservoirs Two and Three. There are two minor distribution changes of note. Lockwood had a much higher percentage of the 2018 peak in comparison to all previous years' results, and East Warwick a lower percentage compared to previous years when it has had the highest densities.

Reservoir Four shows the distribution of birds to mainly be at the peripheries of the reservoir, with a lack of recording species in the middle of the reservoir. Whether this reflects survey effort or real changes requires further analysis.

3.4.4 Pochard (Figure 10)

A peak count of 68 pochard was recorded on 24th March 2019. Previous peak counts were 191 in 2018, 123 in 2017, and 240 in 2016.

During the over-wintering period a peak count of 42 pochard were recorded on Reservoir One on 12th November 2018. Lower numbers were recorded on High Maynard (peak of 27), Reservoir Four (peak of 22), Low Maynard (peak of 21), and East Warwick (peak of 19).

Pochard were recorded using all reservoirs during the over-wintering period except for Lockwood. As in all previous years High Maynard had a high count (relative to year peak) with most birds gathering around the northern arm and island.

The largest difference to previous years is the peak count of 42 on Reservoir One as in previous surveys this reservoir has been used by low numbers of birds.

Low Maynard had a more restricted distribution across the reservoir, with birds not being found in the central open water.

3.5 Other species

3.5.1 Breeding grey heron

Grey heron were recorded on all reservoirs except for Reservoir Four during the Year 4 monitoring. In line with all previous years, Reservoirs One, Two and Three had the greatest numbers as this is where the main breeding colonies are found. A peak of 13 was recorded on 18th April 2018, all of which were on Reservoir One. Peak counts for previous years were as follows: 41 in 2017, 48 in 2016, and 41 in 2015.

In addition, a heronry census was also taken following the BTO-recommended methodology and recorded through their website. Forty-three active nests were recorded on the islands on Reservoirs One, Two and Three.

3.5.2 Winter roosting cormorant

A peak of 90 over-wintering cormorant was recorded on 12th October 2018. The peaks for previous years were as follows; 196 in 2017, 322 in 2016, and 258 in 2015. The 2018 peak is considerably lower than all previous years by 100+ individuals (compared to 2017), however, this is thought to be due to a disparity in

methodologies. Birds roosting on islands have not been counted for 2018 as in all previous surveys.

Cormorants seen in the water were highest on Reservoir Five (peak of 90) and lowest (with less than 10 individuals) in Lockwood, Low Maynard, High Maynard, West Warwick, Reservoirs One, Two, Three and Four.

3.5.3 Over-wintering great crested grebe

The great crested grebe peak count was 63 on 23rd October 2018. Previous peaks were 40 in 2017, 70 in 2016, and 66 in 2015. Great crested grebes were evenly distributed across all the reservoirs in all years of survey.

3.5.4 Over-wintering coot

Coot were present on all reservoirs throughout the wintering period with a peak of 645 on 12th October 2018. Previous counts were as follows; 548 in 2017, 496 in 2016, and 1027 in 2015. It is one of the most numerous species on site.

Coot numbers were highest on East Warwick (peak of 165) and Reservoir Five (peak 148) in October 2018 but West Warwick and Reservoir One had low numbers of under 10 individuals throughout the over-wintering period.

3.6 Species impacted by disturbance

Figure 11 illustrates the disturbance events that occurred during the 2018-19 period across the Wetlands. During the monitoring period there were 294 recorded disturbance events caused by several stimuli including but not limited to; surveyor presence, visitor (excluding joggers), security staff, vehicle, cyclist or jogger. Surveyor presence accounted for 78% of the events and 13% attributed to visitors.

The disturbance that occurred along pathways open to the general public, including seasonal routes during their open period, accounted for 34% of disturbance events. Of the 34% three of the designated species (heron, tufted duck & pochard) were recorded responding negatively to disturbance stimuli, however these were recorded as all low-level events. While most of these disturbance incidents were recorded as surveyor disturbance, the location on main or open pathways is representative of the type of disturbance that any person may cause on those routes. The remaining 66% occurred on permanently closed pathways or on routes during their closed periods. While the percentage is high, the cause of the disturbance was through presence and/or movement of surveyors, staff and vehicles rather than members of the public. Disturbance is minimised on closed paths due to the limited access, with only permit holders and staff permitted. Although all disturbance events by members of the public were not captured through the survey, visitor surveys and reports from security show that members of the public do access these areas occasionally.

There is a noticeable increase in disturbance frequency and level around Low Maynard when compared to all previous years. Disturbance events were most frequently recorded along the main (north-south) access path for visitors with the main concentration of events occurring at the south west corner of Low Maynard which is close to the visitor entrance for the north side of the reserve. Disturbance events caused by the public occurred only the western side of Low Maynard on the path which is always open to the public. 53% of disturbance records affected SSSI and SPA species (heron, pochard and tufted duck) but all of these were recorded as low-level events.

The eastern edge of High Maynard, as in previous years, remains a high disturbance area as does the northern tip of the reservoir. Again, disturbance events recorded here were not caused by the general public, but by surveyor presence, other staff and vehicles. The northern part of the reservoir is relatively narrow, but disturbance seems to be mitigated by the proximity of the island in the northern part. Of the 37 high level records only 5 affected designated species, which were grey heron and tufted duck. Teal *Anas crecca* made up a large proportion of disturbance records, next was shelduck *Tadorna tadorna*, little egret *Egretta garzetta* and black headed gull *Larus ridibundus*.

Although there was an increase in disturbance frequency and level recorded on Reservoir Four, the majority of these (78%) were captured during the pathways' closed period. Nine out of the ten disturbance events attributed to tufted duck were recorded during the post-breeding moult (pathways closed period), however these were low-level events and were all caused by the surveyors. Shoveler and pochard also had recorded disturbance on Reservoir Four, but these too, were low level.

Like the recorded events on Reservoir Four, birds on Reservoir Five experienced the most disturbance during the seasonal path closure. Only five events were attributed to tufted duck all of which were low-level and caused by operational vehicles, staff and surveyor presence.

Disturbance events on East Warwick were more evenly distributed than in all previous years of survey. Of the 34 events recorded in this monitoring period, 11 were listed as high level and the remaining 23 as low. The highest levels and frequency of disturbance were recorded in the north west corner of the reservoir, which is permanently closed off to the public, were all caused by the surveyor. All the events recorded on East Warwick were caused by people on foot. Four designated species experienced disturbance across the year; tufted duck at disturbance level 3 eight times, pochard at level 3 twice, shoveler at level 6 once, and a single grey heron at level 7. The main public pathway had 17 recorded incidents all of which were low-level with the remainder on the western edge, all caused by the surveyor.

When compared to previous years, disturbance on West Warwick Reservoir appears to have increased dramatically. However, all the 45 events recorded, excluding one caused by a vehicle, were caused by surveyors on the bank. West Warwick is not publicly accessible, and only open to anglers, security staff and bird watchers. Across the year West Warwick is subject to very low-level disturbance

There have been minor changes in the distribution of disturbance on Reservoirs One Two and Three, with the biggest differences apparent on the southern end of Reservoir One. Previously there were no events recorded in this area. There has also been a reduction in the quantity and level of disturbance seen in the north end of Reservoir Two when compared to previous years. Reservoir Three also had a reduction in quantity and level with no recorded incidences during this monitoring period.

Across the whole site, the highest recorded disturbance events were recorded as level 9 (birds flew off site) for black-headed gull and little egret, species that do not form part of the interest features of the SPA or SSSI. For key interest species, the highest recorded disturbance level was level 7 (birds flew a considerable distance away but resettled); for gadwall and grey heron, and the stimuli was the surveyor or vehicle movement.

At disturbance level 6 (birds flew some distance away and resettled) disturbance events occurred to coot, little egret, gadwall and tufted duck, as well as other non-key interest species. One disturbance event was caused by visitor movement, the others were caused by vehicle and surveyor movements.

4. Discussion

4.1 Responding to a year of change

There has been some understandable concern that the bird populations – and not those just relevant to Walthamstow Reservoirs' designated status – would be adversely affected by the establishment of the Wetlands as a public space. The site has a long-standing place in London ornithological circles that stretches back to the early 20th century, and is justifiably cherished by bird-watchers for the number of bird species seen there. There is a dedicated group – the Walthamstow Birders – that provide a detailed update of birds seen at Walthamstow Reservoirs and environs on their website, and a number of national survey schemes are undertaken on the site, reflecting its regional importance for bird-watching and recording. Over 245 species have been recorded at the Reservoirs, with 143 recorded in 2018 and 141 in 2017 (Walthamstow Birders, 2018).

That the site would be open to the public, with an anticipated number of annual visits reaching 250,000 five years after establishment, was a key consideration in the Wetlands' design and its on-going management. This report endeavours to analyse the numbers and distribution of key bird species as they respond to the first full year of the Wetlands as a public nature reserve (it opened less than six months earlier than the start of the survey period). Visitor numbers were far higher than projected (425,000, October 2017-September 2018), and the way the Wetlands was initially promoted led to some usage and behaviours by the public not anticipated during the design phase. This eventually resulted in changes to site management (including more staffing), more signage, and new barriers to some paths.

The critical issue for the survey and monitoring of key bird species over 2018-19 was whether public access would correspond to - and therefore be a likely causative factor of – adverse impacts to these bird populations at the Wetlands.

4.2 Numbers & distribution

The results from the 2018-19 survey show only to a limited extent how birds are responding to Walthamstow Wetlands now that it is a publicly accessible site.

Whilst the data is open to some interpretation, there so far appears to be no significant difference in the distribution of any of the key species in 2018-19 than in the previous three years that could be clearly attributed to the opening of the site to the general public. There are no significant changes to numbers or distribution records nor any that show a marked difference to any of the previous three years of surveys. There is no data to suggest a causal relationship one way or other (public use vs species numbers/distribution). However, a statistical analysis of this has yet to be explored.

There are minor variances, but a survey of one year is in itself unlikely to demonstrate whether these represent fundamental changes to bird populations on the site (as a result of its public access) or merely natural fluctuations. For example, there have been fluctuations of numbers of peak counts. However, these are difficult to attribute to the local circumstances and need to take account of other factors. Data needs to be looked at in comparison to the wider Lee Valley and at the South West London Water Bodies SPA, the nearest clusters of open water which attract these bird species in significant numbers. Nevertheless, peak count numbers provide relative context only, as is made clear in methodology and aim of this study.

It is the distribution of key species that is the best indicator of disturbance or direct evidence of disturbance resulting from recreational activity, and whether this leads to significant changes spatially, temporally and/or in terms of numbers. Therefore, this may be a better indicator that changes might need to be made to seasonal path access and route designs or if additional mitigation may be required. The most sensitive areas that are used by the SPA species are aimed to be protected from disturbance by the public through the design of the seasonal and permanent path closures. This was identified within the HRA as well as in previous BSG reports, and forms part of the Wetlands management.

There have been disturbance events recorded at higher levels during this survey compared to last year's survey. The highest levels occurred to species that do not form part of the interest features of the SPA or SSSI (although in itself important to note to inform management). For key interest species, the highest recorded disturbance event was level 7 (birds flew a considerable distance away but resettled) caused by general site operations or presence of a surveyor.

The data helps to further develop a picture of the key bird species' distribution and numbers, and to some extent, behaviour, at the Wetlands from the surveys to date (see *Walthamstow Wetlands Bird Monitoring Report*, BSG Ecology, 2015, 2016, 2017). Over time, and with further contextual analysis, this may – or may not – reveal changes as a result of the Wetlands being visited by hundreds of thousands of people each year.

4.3 Additions for 2019-20

There are some indications from the data that some birds seem to be moving away from banks adjacent to open paths and towards the islands and banks by seasonally closed paths. This trend should be monitored over the rest of the survey period, to assess whether this is likely to be a permanent and/or significant change, whether this may or may not affect the Wetlands' SPA and SSSI status, and/or whether further changes to the site's design or management is required. Areas which should require closer scrutiny include:

- Low Maynard - southern part
- East Warwick banks especially to the southern part of the reservoir.
- Reservoir Four - to track the behaviour of over-wintering tufted duck since they appeared to be recorded only on the peripheries of the reservoir.

4.4 Key messages

- The results from the monitoring of key species of birds – tufted duck, gadwall, pochard, shoveler - over April 2018 to March 2019 largely show no significant changes to numbers and distribution of these species that are of immediate concern and warranting the need for intervention.

- There have been minor positive and negative fluctuations in the numbers of these species, and these peaks and troughs are largely similar to the previous years of survey pre-dating the site opening to the public. They are likely to reflect natural variances influenced by a range of climatic, environmental and other factors within and without the Wetlands.

- Nevertheless, the distribution of some waterfowl species at certain times has shown some indication of change with what appears to be a visible bias towards reservoir islands away from banks and open pathways. Visitor access may have been a contributory factor to this change in distribution, along with other factors such as noise (negatively) or habitat enhancement (positively); if

a similar pattern is observed over 2019-20 then further specific surveys might be required to assess this in more detail.

- The Trust will continue to monitor in the same manner over 2019-20, with some additional areas for scrutiny, to determine whether this pattern grows spatially or temporally and/or represents a significant response to disturbance (or other factors).

- This data and report is only based on the four key species for which the Wetlands' Special Protection Area and Site of Special Scientific Interest is designated. However, the Trust is mindful of other bird species for which Walthamstow Wetlands is important, and will monitor the site and liaise with key experts, to help ensure management of the site takes due account their requirements.

5. References

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Waltham Forest Council (2014). *Bird Impact Monitoring Programme*.

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6. Figures (overleaf)

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

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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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T: 01865 883833

JOB REF: 7718,01

PROJECT TITLE
WALTHAMSTOW RESERVOIRS MONITORING YEAR 2

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

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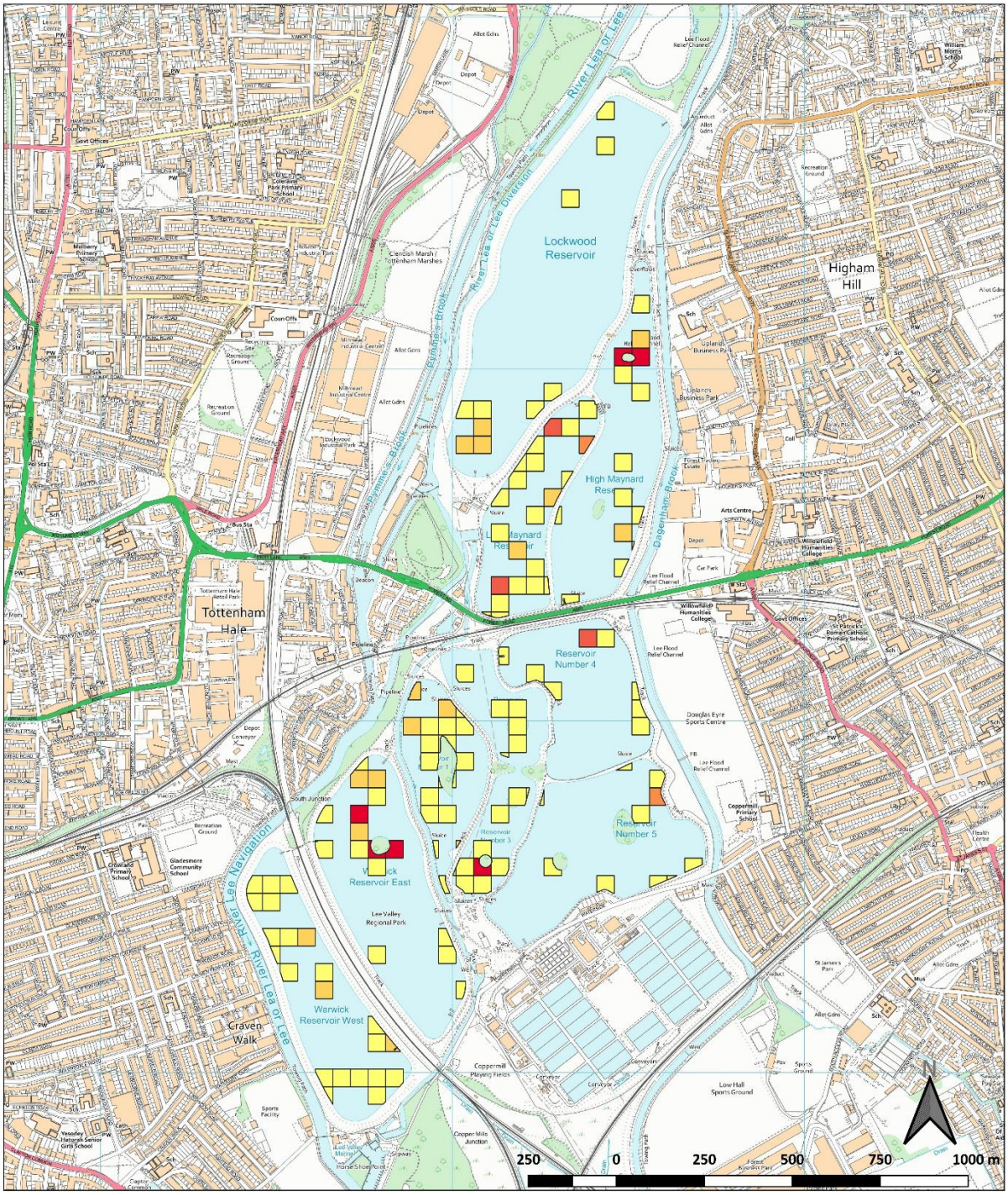
DRAWN: COH APPROVED: OG STATUS: FINAL

LEGEND

50 x 50 m study grid



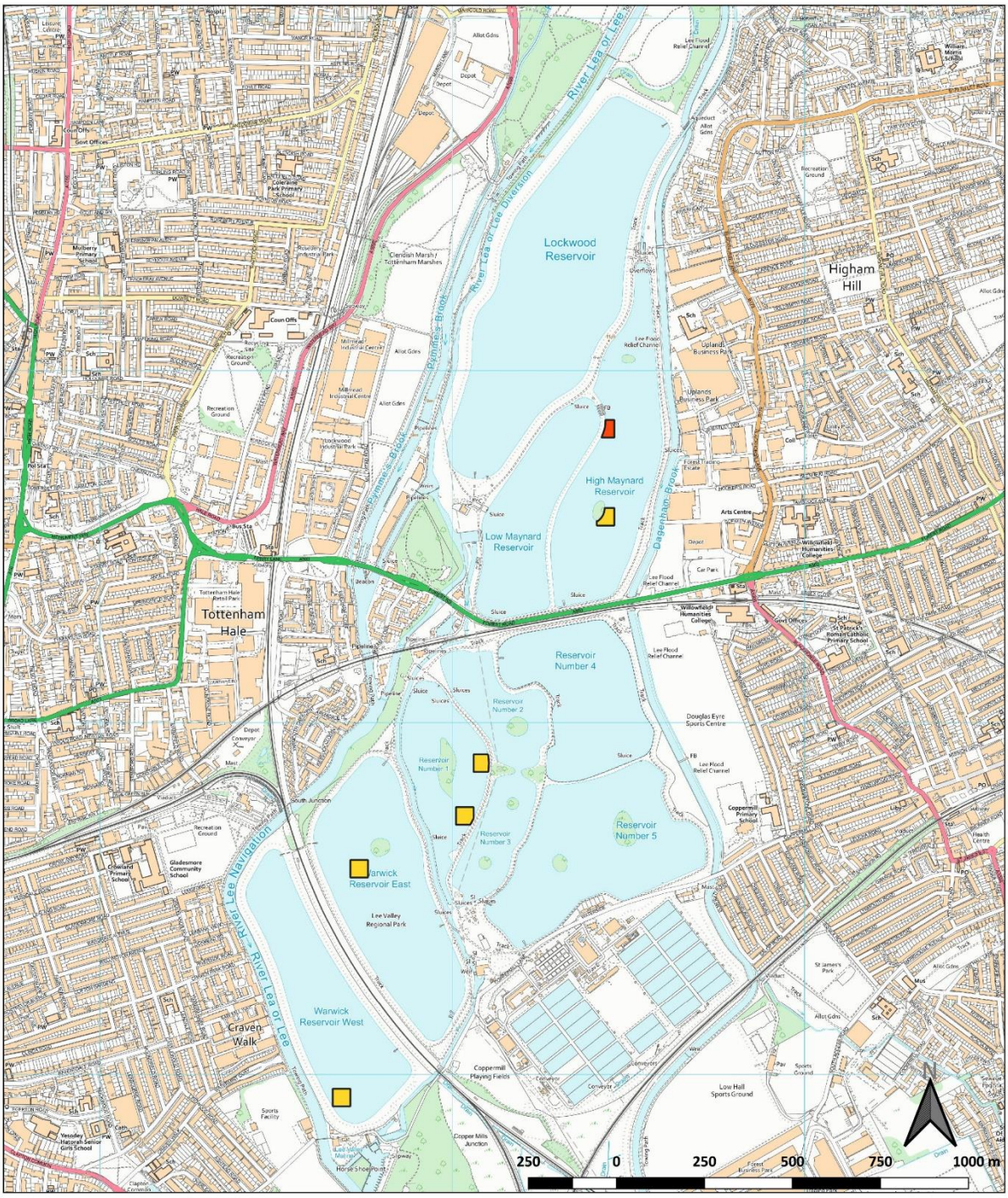
KEY

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 60

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 2: Distribution of tufted duck present during breeding season April to June inclusive

London Wildlife Trust



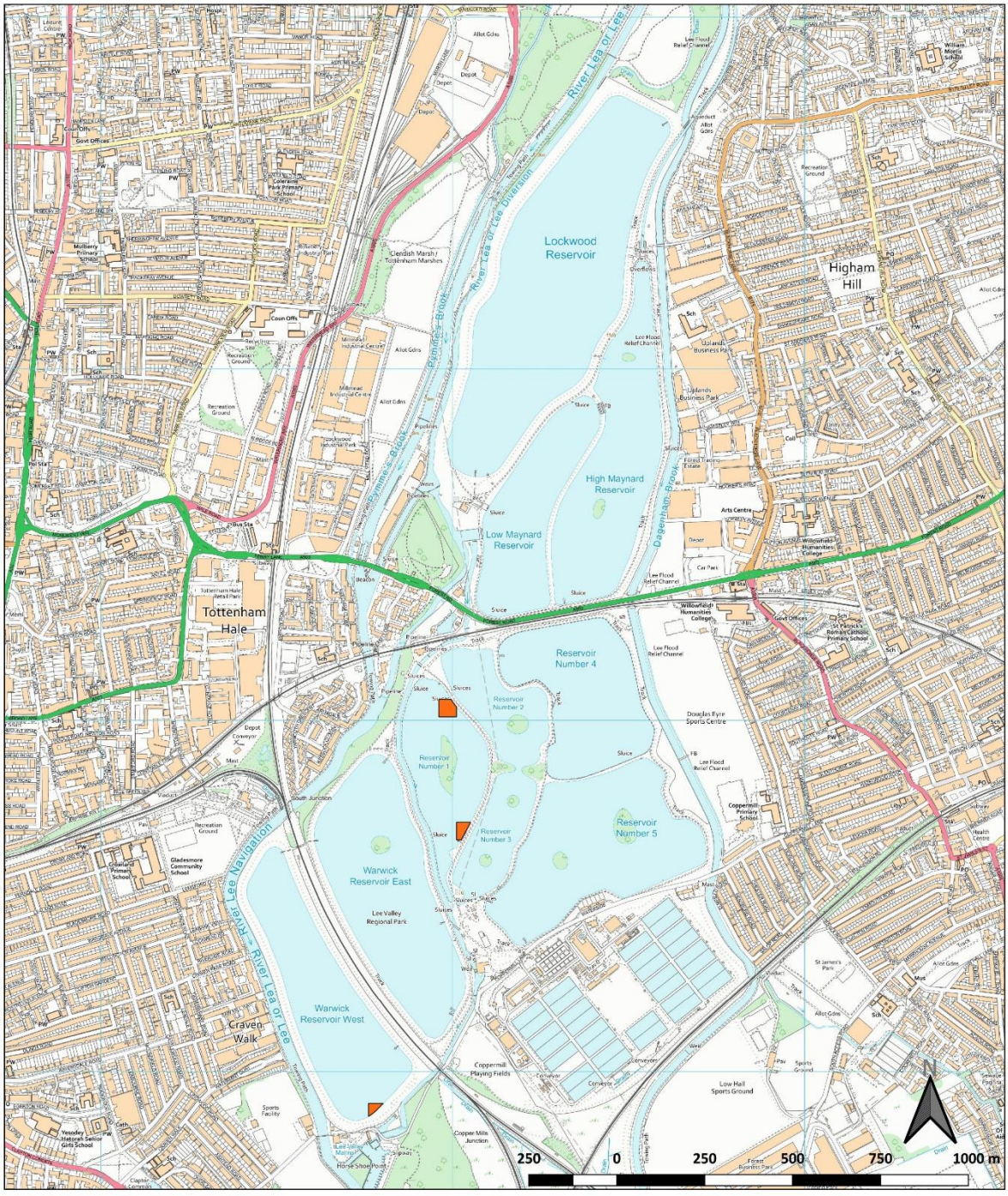
KEY

- 1
- 2
- 3
- 4

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 3: Distribution of gadwall present during breeding season
(April to June inclusive

London Wildlife Trust



WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 4: Distribution of shoveler present during breeding season April to June inclusive

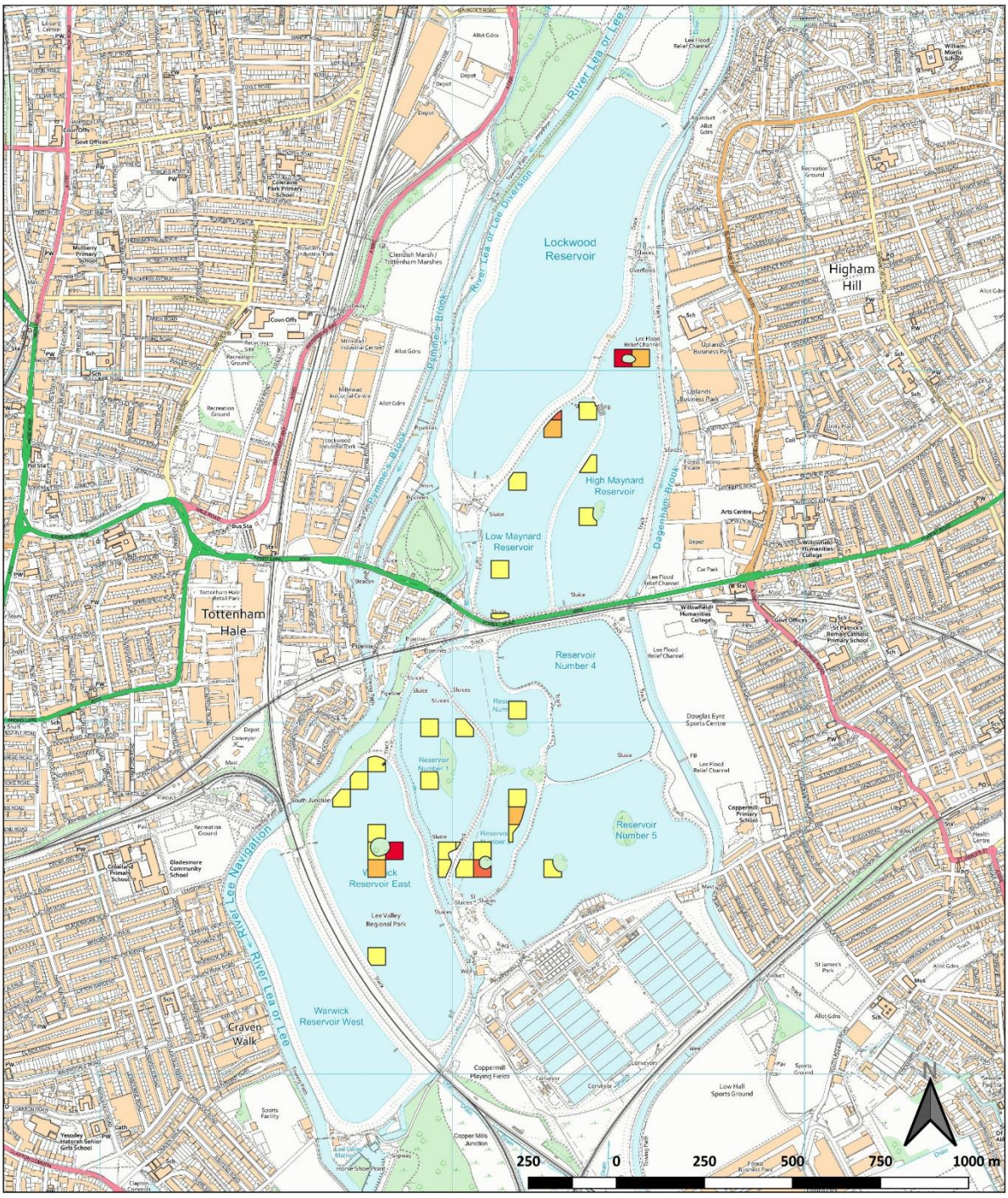
KEY

1
2
3

Produced by the London Wildlife Trust
Based upon the Ordnance Survey 1: 10 000 map with the permission of The Controller of Her Majesty's Stationery Office.

Licence No. AL100023493

London Wildlife Trust



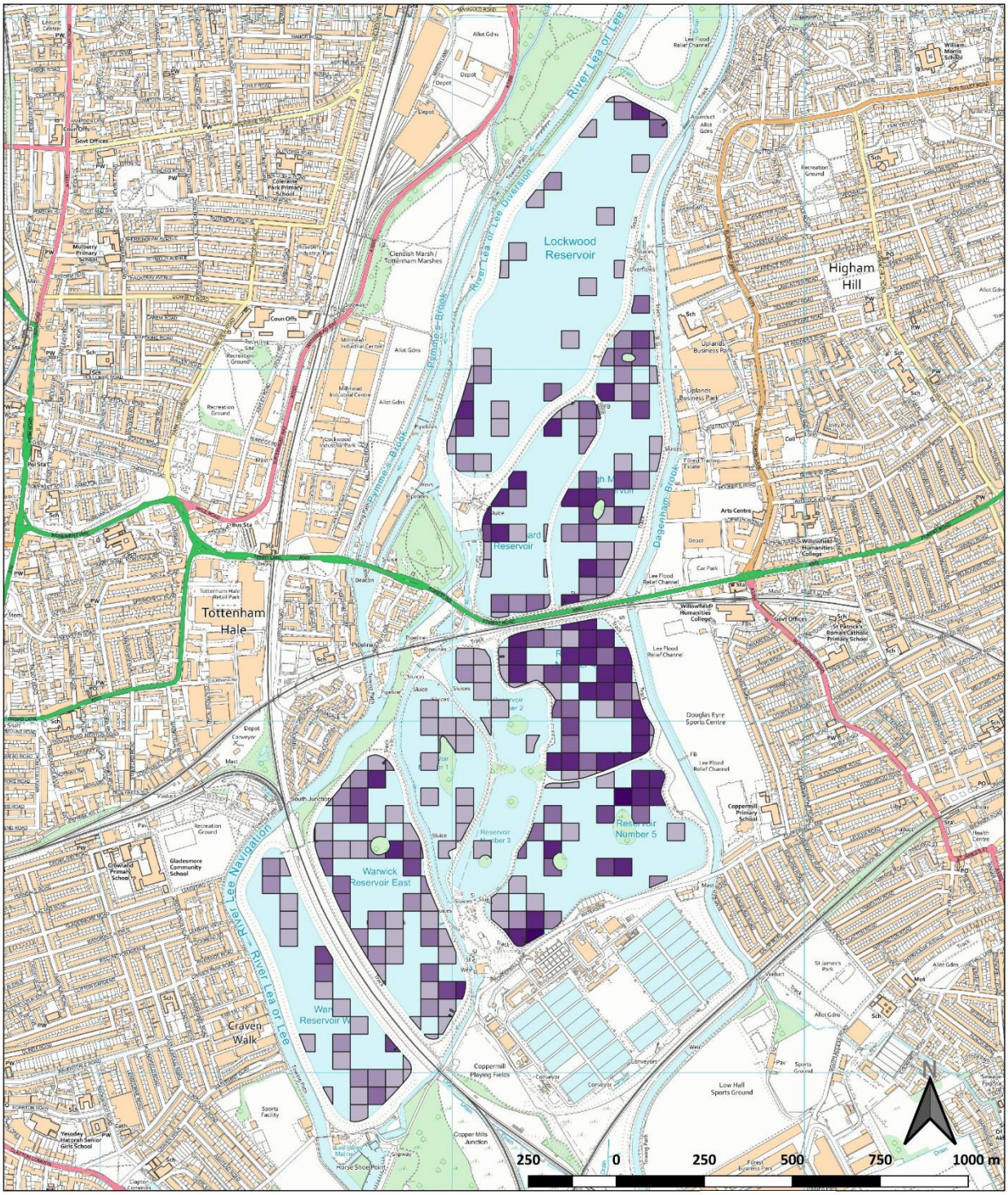
KEY

- 1 - 5
- 6 - 10
- 11 - 15
- 16 +

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 5: Distribution of pochard present during breeding season
April to June inclusive

London Wildlife Trust



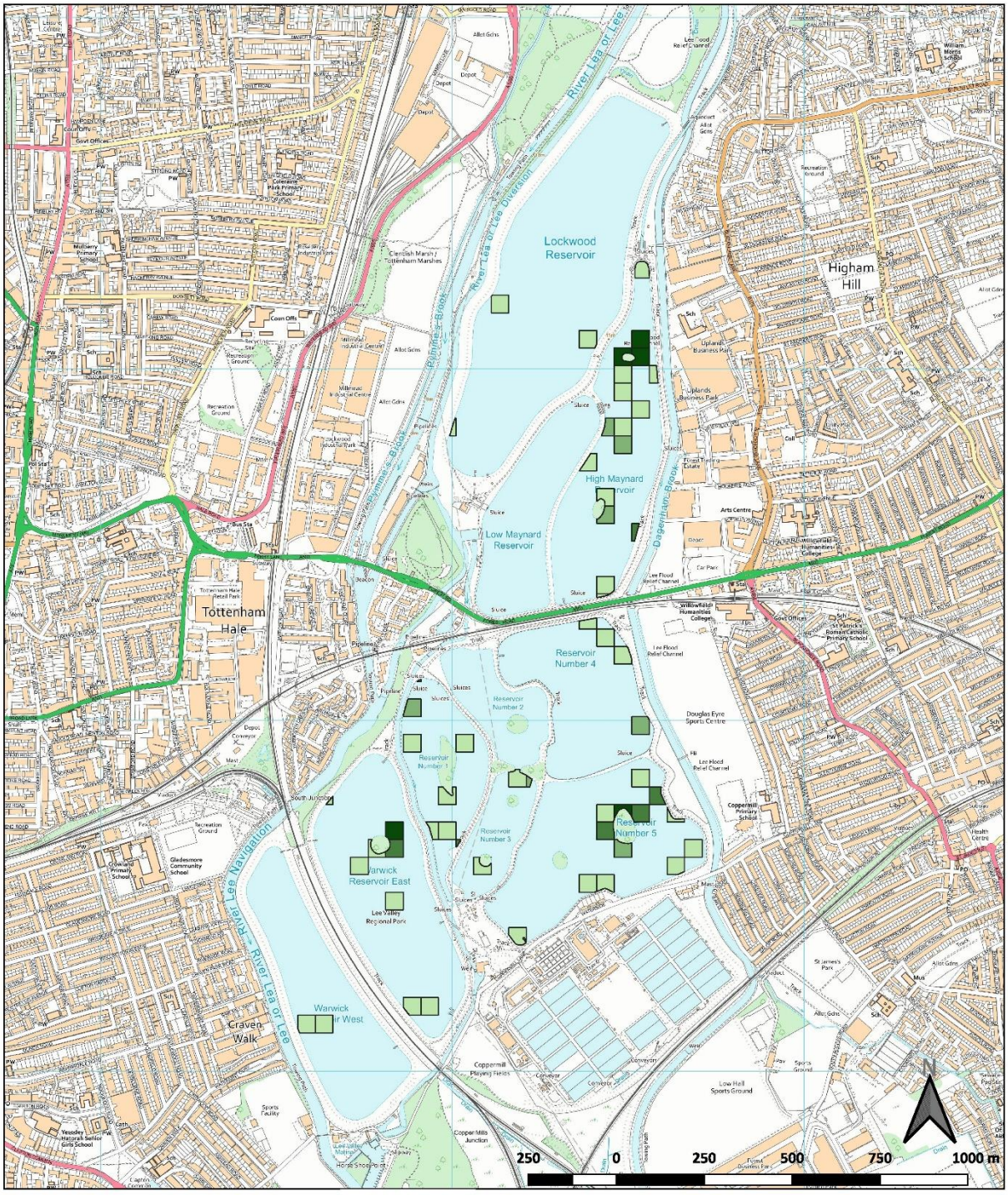
KEY

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 125
- 126 - 274

WALTHAMSTOW WETLANDS
MONITORING YEAR 4

Figure 6: Distribution of post-breeding tufted duck August to September inclusive

London Wildlife Trust



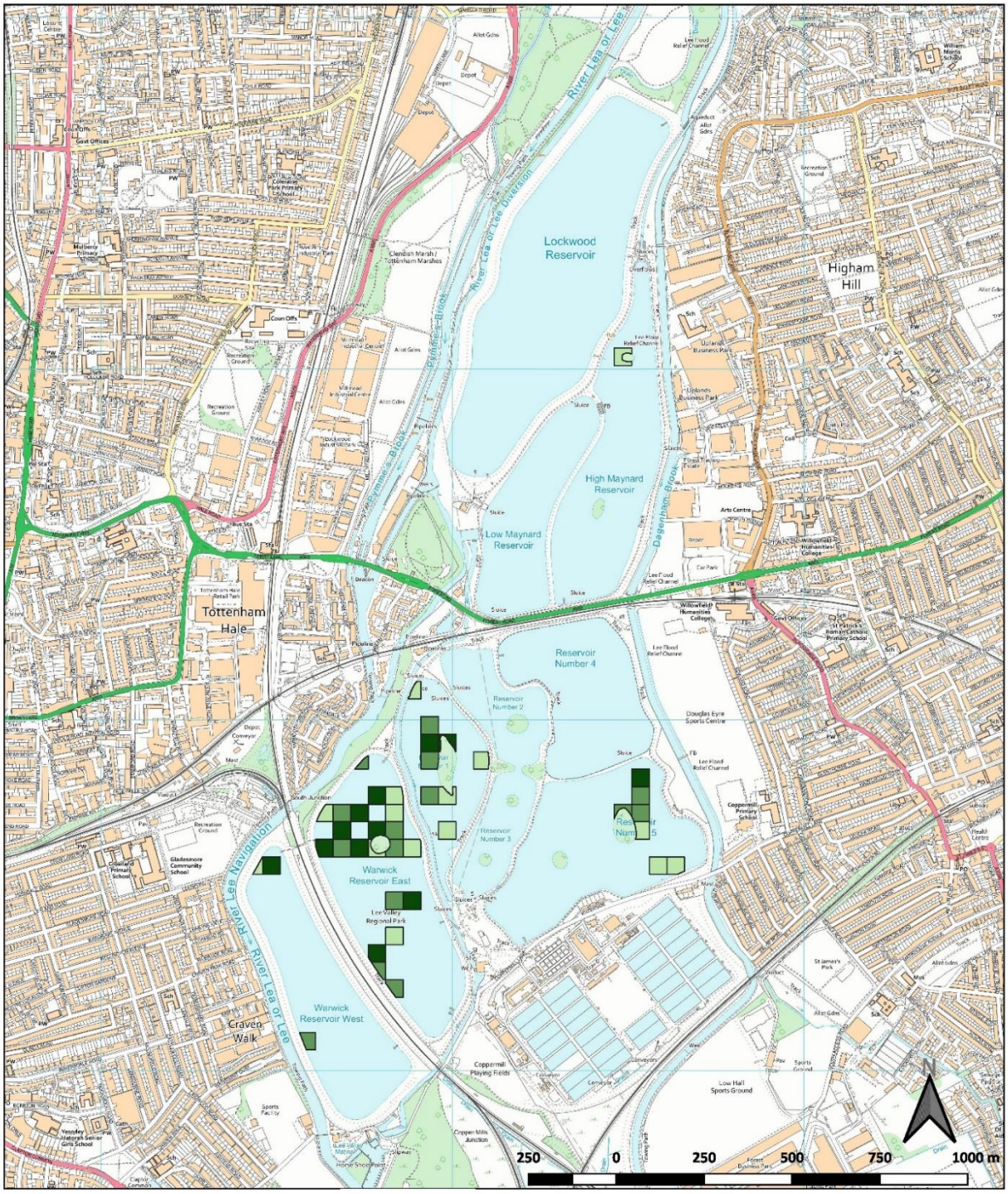
KEY

- 1 - 4
- 5 - 8
- 9 - 11
- 12 - 57

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 7: Distribution of over-wintering gadwall October to March inclusive

London Wildlife Trust



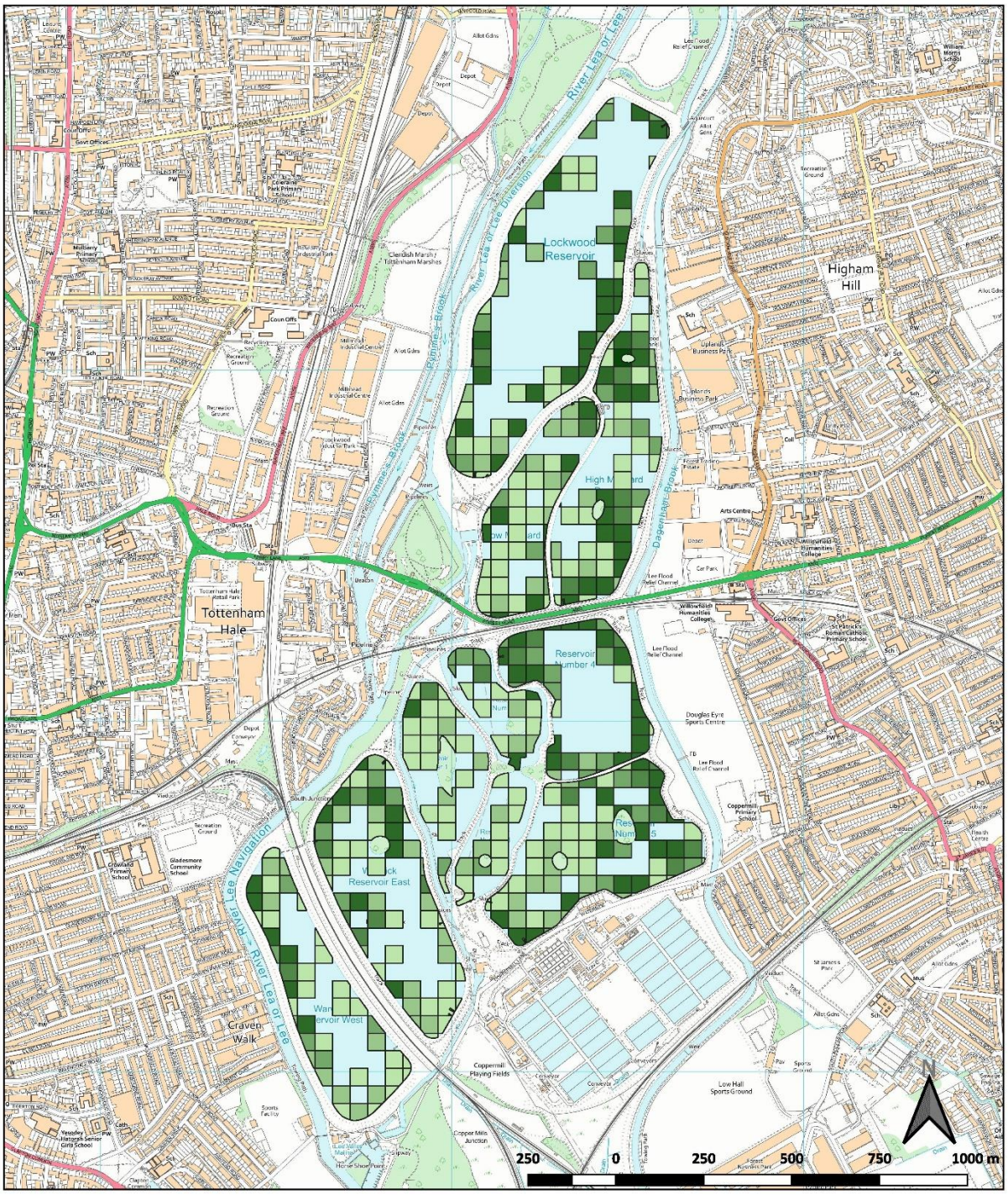
KEY

- 1 - 4
- 4 - 12
- 12 - 96

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 8: Distribution of over-wintering shoveler October - March inclusive

London Wildlife Trust



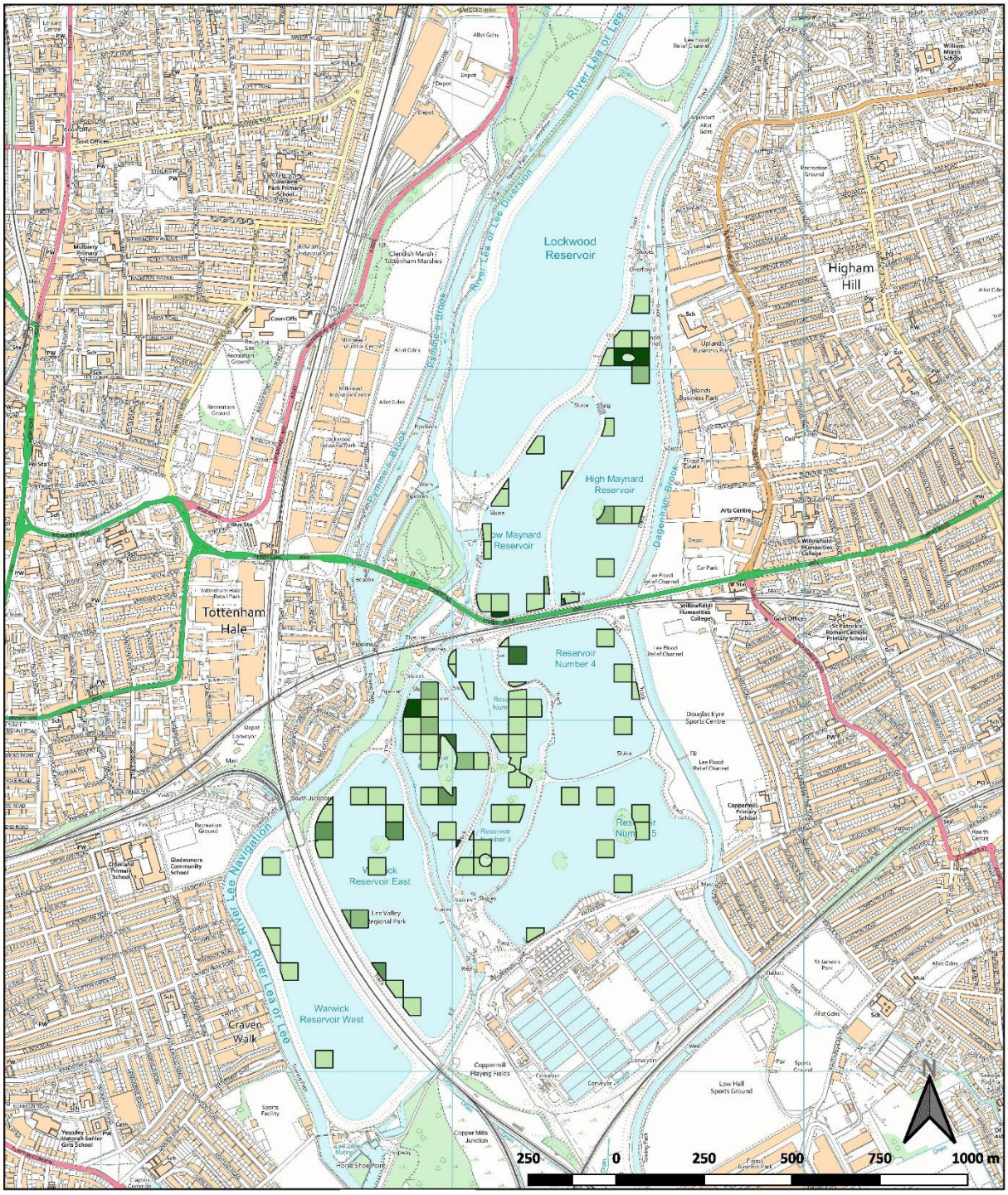
WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 9: Distribution of over-wintering tufted duck October to March inclusive

KEY

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 125
- 125 - 135

London Wildlife Trust



KEY

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 58

WALTHAMSTOW WETLANDS MONITORING YEAR 4

Figure 10: Distribution of over-wintering pochard October to March inclusive

London Wildlife Trust

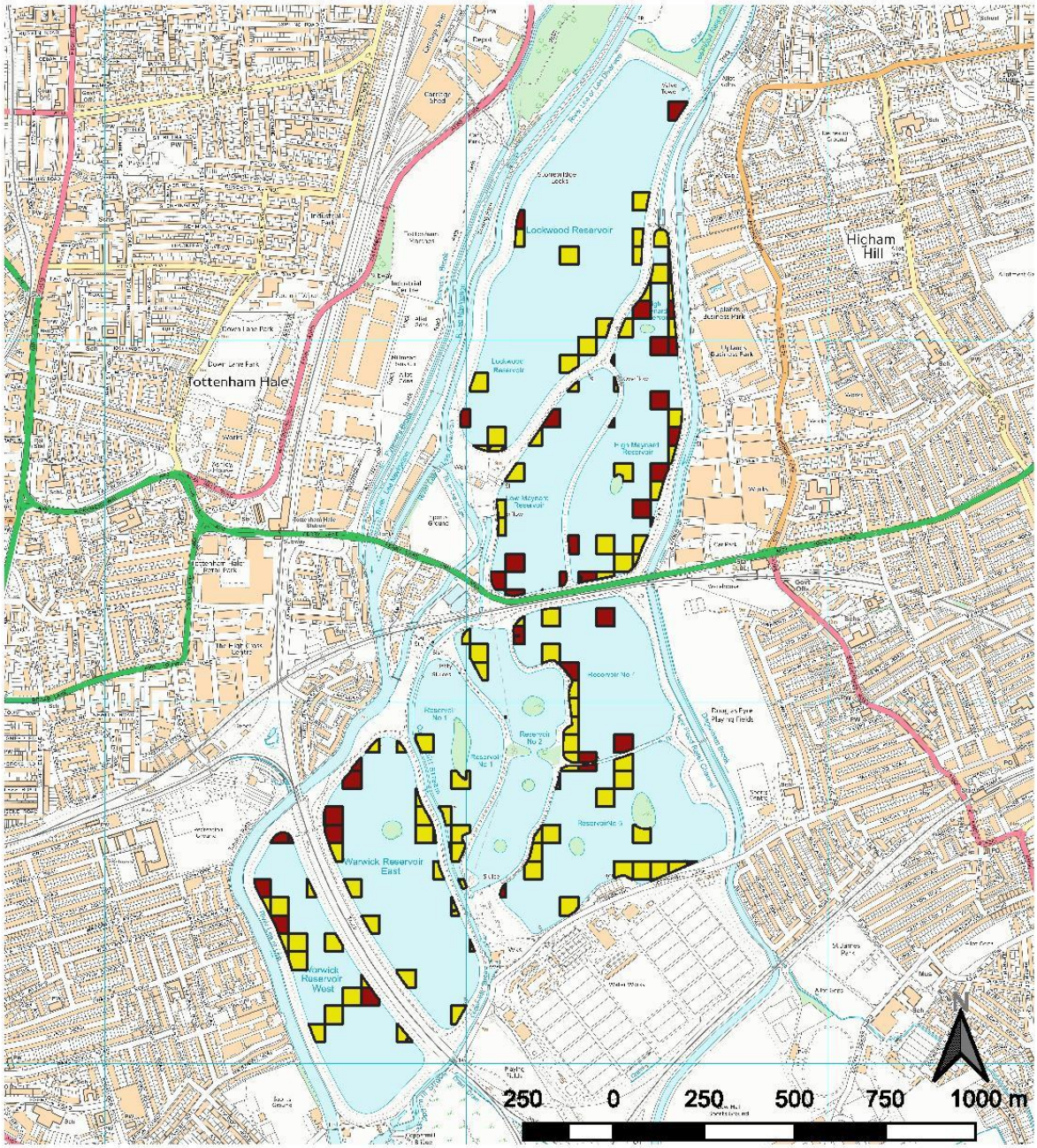


Figure 11: Distrubance events recorded during Year 4

London Wildlife Trust

7. Appendices

Appendix 1: Example recording forms
Appendix 2. Seasonal access map

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	

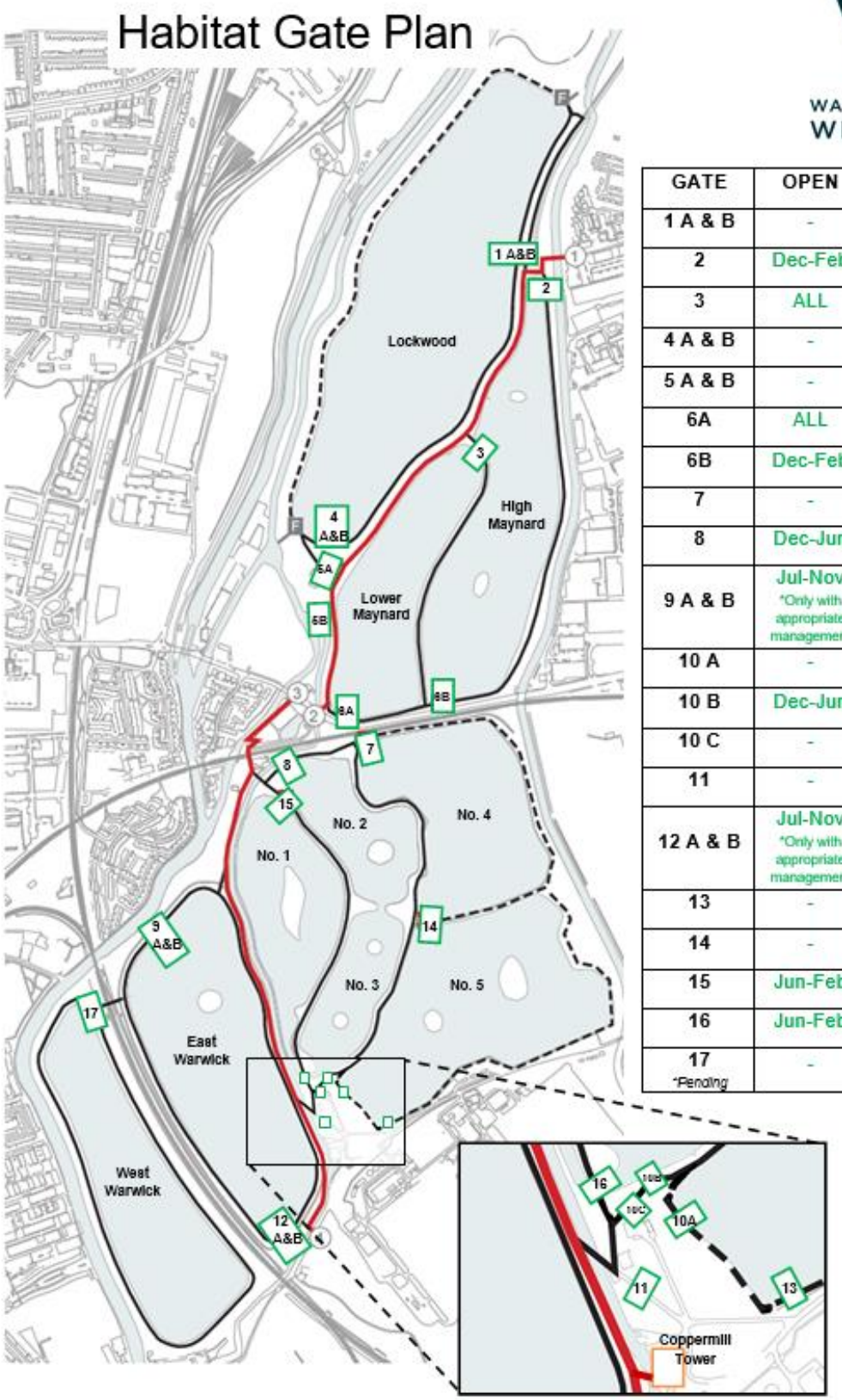
Disturbance recording form

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 paced, 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



GATE	OPEN	CLOSED
1 A & B	-	ALL
2	Dec-Feb	Mar-Nov
3	ALL	-
4 A & B	-	ALL
5 A & B	-	ALL
6A	ALL	-
6B	Dec-Feb	Mar-Nov
7	-	ALL
8	Dec-Jun	Jun-Nov
9 A & B	Jul-Nov *Only with appropriate management	Dec-Jun
10 A	-	ALL
10 B	Dec-Jun	Jun-Nov
10 C	-	ALL
11	-	ALL
12 A & B	Jul-Nov *Only with appropriate management	Dec-Jun
13	-	ALL
14	-	ALL
15	Jun-Feb	Mar-Jun
16	Jun-Feb	Mar-Jun
17 *Pending	-	ALL