Appendix 7A

ORNITHOLOGICAL MONITORING RESULTS REPORT

Brittas Wind Farm, Co. Tipperary

Appendix 7A:

Ornithological monitoring - results report:

October 2021 to September 2023

Brittas Wind Farm Limited, Ørsted Onshore Ireland Midco Limited

Report prepared by APEM Group Woodrow

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Statement of Authority

This report was compiled by Adrian Walsh and Julieta Pedrana, where were assisted by Conn Barry and Bruno Mels. The report has been reviewed and approved by Mike Trewby. Ornithological surveys were carried out by experienced ornithological surveyors including Andre Robinson (AR), Seán Doyle (SD), Ken Westman (KW), Joe Kelly (JK), Ed Morris (EM), John Hehir (JH), Mike Trewby (MT), Patrick Devereaux (PDEV), Simon Mitchell (SM), Ciarán Smyth (CS), Tom Ryan (TR), Andrea Parisi (AP), Ajay Cheruthon (AC), Geoff Oliver (GO). Surveyor initials are used to indicate who was responsible for undertaking a given survey.

Adrian is an Ecologist with Woodrow Sustainable Solutions Ltd (APEM Group Woodrow). He has completed an honours BSc with a focus on Zoology and an MSc in Wildlife Conservation and Management at University College Dublin. He is a Qualifying Member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He has experience in bird surveys, bat surveys, terrestrial mammal surveys and regularly contributes to Appropriate Assessment and Ecological Impact Assessment reports. He volunteers as a surveyor for Birdwatch Ireland for the Irish Wetland Bird Survey (I-WeBS) and the Countryside Bird Survey (CBS).

Julieta is a Senior Ecologist with APEM Group Woodrow. She has completed a B.Sc. in Biological Science at University of Mar del Plata, Argentina and a Ph.D. in Conservation Biology at the University of Southern Patagonia, Argentina. From 2017 to 2023, Julieta worked as a Senior Scientist researcher of the National Council of Scientific Research from Argentina at the Department of Environmental Science, National Technological University, Argentina. The main themes of her research have been the application of GIS-based modelling in nature conservation focusing on the predictive models for species occurrence and habitat suitability. She regularly carries out ornithological surveys and compiles ornithological reports, including carrying out Collision Risk Modelling to inform wind farm planning.

Mike is an Assistant Director with APEM Group Woodrow and is the Division's lead ornithologist and field work manager. Mike worked for Birdwatch Ireland from 2003 to 2010 conducting research on red-billed chough, red grouse and breeding seabirds. Prior to joining Woodrow in 2016, Mike worked as an independent ornithological consultant, and he has over 20 years fieldwork and research experience in the field of ecology. Mike regularly undertakes impact assessments for large scale developments and is a full member of CIEEM (MCIEEM).

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7A.1. OVERVIEW

APEM Group Woodrow was commissioned by Brittas Wind Farm Limited, a subsidiary of Ørsted Onshore Ireland Midco Limited, to undertake ornithological survey work for the proposed Brittas Wind Farm in Co. Tipperary. As shown in Figure 7A.1, the Proposed Project includes a 10-turbine wind farm site, with associated access tracks, cabling and other infrastructure including an on-site 110kV electrical substation (hereafter referred to as the proposed Wind Farm Site), which is located within the townlands of Brittas, Rossestown, Clobanna, Brownstown, Kilkillahara and Killeenleigh, approximately 3 km north of Thurles town and centred on Irish National Grid Reference: S 13463 62522 (ITM: 613412, 662553).

The Proposed Project also includes a turbine delivery route (TDR) and a grid connection route (GCR). The TDR runs from the Port of Foynes in Co. Limerick to the proposed Wind Farm Site via the national, regional and local road network. The GCR exits the proposed Wind Farm Site from the on-site electrical substation in the northeast of the site and runs south for approximately 7 km, following the public road to the existing Thurles 110kV electrical substation, located in the townland of Ballygammane, Co. Tipperary. As the cabling for the grid connection will be laid underground, primarily within the public road, there will be no avian collision risk associated with the GCR and impacts will be limited to potential disturbance during construction. Similarly, the potential for ornithological impacts to arise due to the use of the proposed TDR is minimal and impacts due to vegetation clearance are restricted to two locations within the townlands of Brittas and Brittasroad, Co. Tipperary and these were included in the survey area for the proposed Wind Farm Site.

The ornithological study focused on the area of the proposed Wind Farm Site and a range of study areas were applied depending on the different aspects of avian ecology being investigated; with the aim of identifying the occurrence, status and distribution of any sensitive bird species potentially affected by collision risk, disturbance and displacement due to the proposed Wind Farm.

Avian collision risk for the 10 wind turbines proposed is assessed in Appendix 7H, which runs collision risk models that account for the range in turbine specifications proposed, including:

- Blade tip height up to 180 m;
- Hub height ranging from 102.5 m to 105.5 m; and,
- Rotor diameter ranging from 149 m to 155 m.

The River Suir flows in a southerly direction through the proposed Wind Farm Site and the associated floodplain, although relatively constrained by rising ground and only flooding periodically, does provide a range of wetland habitats, with some areas retaining natural and semi-natural vegetation types. The banks along this section of the River Suir have been modified, with much of the river's flood plain converted to improved agricultural grasslands that are heavily drained. Improved agricultural grassland is the dominant habitat within the proposed Wind Farm Site, which largely supports beef and some dairy production. The northwestern part of the proposed Wind Farm Site includes an area of particularly intensively managed grassland. Other activities occurring within the proposed Wind Farm Site include shooting of wildfowl along the banks of the River Suir and in the southern part of the site there is an archery club. In the southern part of the proposed Wind Farm Site, blocks of coniferous and broadleaf plantations, which support some veteran and specimen trees, are a more prominent feature adjacent to the agricultural grasslands. There is a network of treelines and hedgerows providing nesting and foraging opportunities, as well as connectivity through the area.

Ornithological surveys compliant with the 2017 SNH (NatureScot) guidelines for informing the impact assessment of onshore wind farms on avian populations were carried out for the proposed Wind Farm

Site. Surveying commenced in October 2021 and was completed in September 2023. SNH (2017) recommends that two years of bird data be collected. A third study year covering a slightly smaller study area was undertaken from October 2020 to August 2021, the results of which are presented Appendix 7I.

Survey requirements were informed by a desk study, investigating the occurrence of conservation sites designated for bird species (Special Protection Areas – SPAs), bird sensitivity mapping and records of birds historically occurring in the area.

Breeding season surveys undertaken included:

- Vantage point (VP) watches recording flight activity through the 500 m turbine buffer
- Breeding bird surveys covering the 500 m turbine buffer, including:
  - Territory mapping applying reduced effort common bird census (CBC) methodology to sample the range of different habitats occurring, as described in Gilbert *et al*. (1998)
  - Breeding waders, incorporating an adapted O'Brien & Smith (1992) methodology incorporating timings for optimal detection of breeding snipe
  - Dusk surveys for crepuscular/nocturnal species, in particular woodcock and long-eared owls
  - Riverine survey along the River Suir, including habitat suitability assessment for breeding kingfisher
- Wider area breeding raptor surveys covering the 2 km turbine buffer
- Wider area searches for barn owl sites covering the 1 km turbine buffer

Non-breeding season surveys undertaken included:

- Vantage point (VP) watches recording flight activity through the 500 m turbine buffer
- Winter site walkover surveys covering the 500 m turbine buffer
- Wider area wintering waterbird surveys
- Hen harrier roost searches

The range of ornithological study areas initially set up extend further than is required to assess the final proposed turbine layout, as the extent of the viable area constricted over time, as various constraints emerged and were avoided during the design phase. Maps used throughout this report illustrate the ornithological study areas in relation the final proposed turbine layout and where relevant are referred to as the 500 m, 2 km and 5-6 km turbine buffers. The 500 m turbine buffer encompasses the proposed Wind Farm Site. Appendix 7D provides a map showing the extent of the original study area in relation to the final buffers applied for the ornithological impact assessment.

This report documents the results from the desk study and surveys to provide the baseline ornithological information required to inform an ornithological impact assessment for the Proposed Project.

The use of species names within this report will be the generally accepted common names in English, following those in normal usage in Ireland. Where appropriate prefixes such as common, European, Eurasian or other geographic nomenclature are not used, e.g. golden plover as opposed to European golden plover, lapwing as opposed to northern lapwing, buzzard as opposed to common buzzard. Where species are listed, these are typically ordered by conservation status with species listed alphabetically, as opposed to taxonomically, unless tables or text have been reproduced from other sources. BTO species codes may be used on maps and Appendix 7B provides the list of BTO species codes and common names. Use of scientific names is kept to a minimum within the body of text and a list of both scientific and common names of birds covered in this report is provided in Table 7A.1.

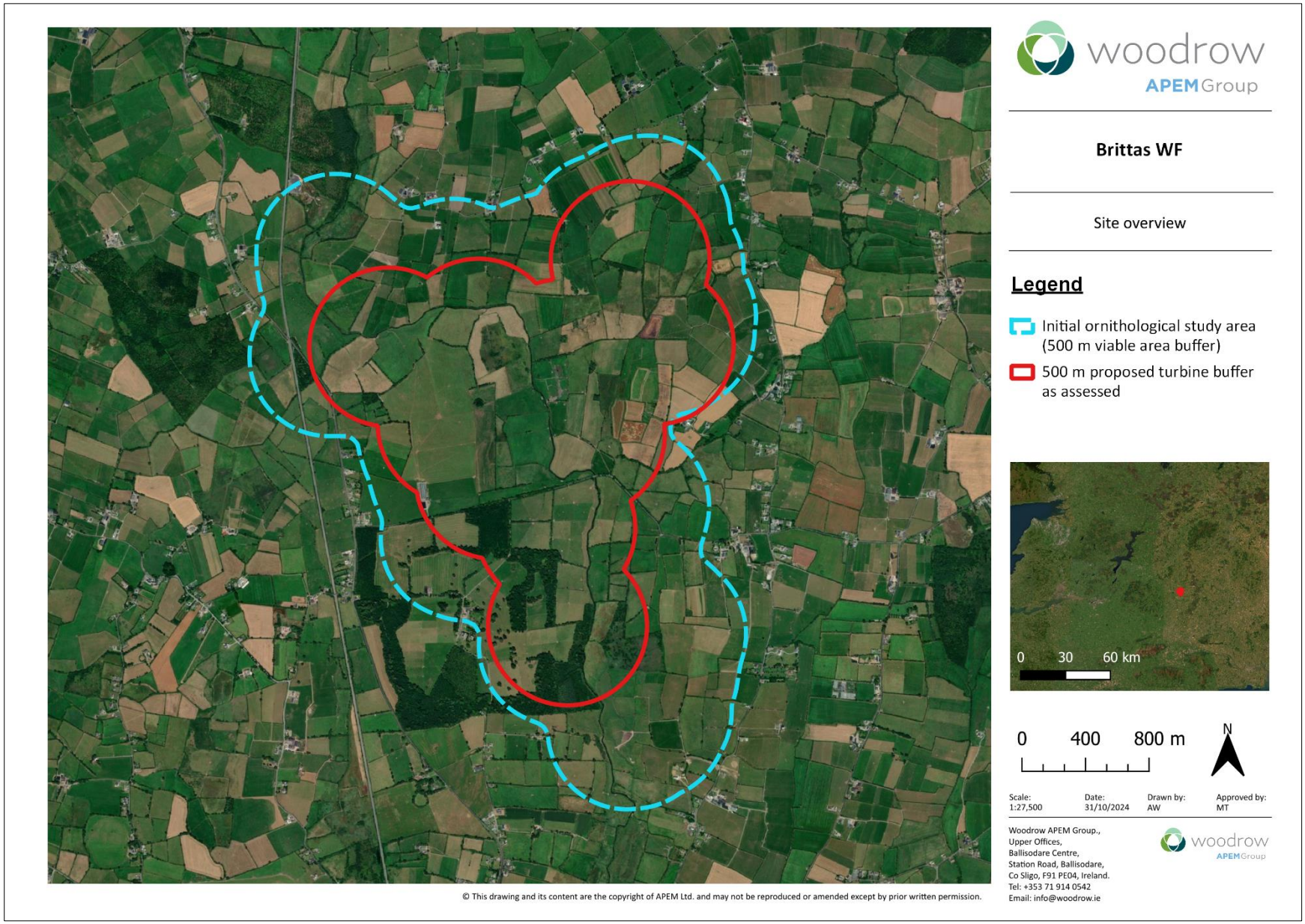

Figure 7A.1: Overview map showing ornithological study area – 500 m turbine buffer

7A.2. DESK STUDY

An initial desk-based review of the ornithological information available for the viable area identified for the potential installation of wind turbines and the surrounding wider area was undertaken. This review takes account of appropriate distances for potential species ranges and connectivity to designated areas, and the findings were compiled to identify target species and determine the appropriate surveys required to inform any potential for ornithological constraints and ornithological impact assessment.

7A.2.1. Scope and approach for ornithological desk study

A preliminary assessment of avian habitat suitability and availability was undertaken using ortho-imagery and 6-inch mapping, which was viewed using Bing Maps, Google EarthPro, Google Maps, and Ordnance Survey Ireland – GeoHive. This was further informed by scoping visits to the area. In addition, the results of previous surveys carried out for the proposed Wind Farm Site were consulted including one year of ornithological data collected between October 2020 and August 2021 in adherence with SNH (2017) guidelines – see Appendix 7I (Fehily Timoney, 2022).

The National Parks and Wildlife Services (NPWS) Designations Viewer was used to identify any nearby Special Protection Areas (SPAs), and respective species listed as Special Conservation Interest (SCI) for which these sites have been designated. The NPWS Designation Viewer was also used to identify nationally important sites for biodiversity, including Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) and to review these sites to determine whether they are recognised as supporting any features ornithological interest. Shapefiles and metadata for designated sites have been downloaded and are updated annually for use by APEM Group Woodrow ecologists on local Geographic Information Systems (GIS). The Environmental Protection Agency's (EPA) map viewer (EPA Maps) was used to investigate hydrological connectivity to SPAs using the "River Flow Direction" tool.

SNH (2016) guidelines on assessing SPA connectivity with proposed developments recommends that core ranges of species listed as Special Conservation Interests (SCIs) should be examined to assess connectivity between proposed developments and any surrounding SPAs. The largest core ranges presented in SNH (2016) are 15-20 km for certain geese species, including greylag geese and pink-footed geese. SNH (2023) provides similar screening distances for breeding seabirds, and while these were consulted, it is noted that the distances provides are for application in the marine environment for assessment potential connectivity between coastal seabird colonies and offshore wind farms.

Bird records were collated from the National Biodiversity Data Centre (NBDC) database, using the report function on Biodiversity Maps to generate a biological records data report. The search area selected was the 10 km Irish national grid square [S16], which encompassed the proposed Wind Farm Site – see Figure 7A.2. Most of the records generated by the report are based on the results of the Bird Atlas 2007-2011 (Balmer *et al*., 2013). In addition, a records request was made to the Centre for Environmental Data and Recording (CEDaR) for ecological records within the same 10 km Irish national grid square [S16]. These historical ornithological records are listed in Table 7A.1 and were reviewed to investigate the target species potentially occurring within the proposed Wind Farm Site and wider area to inform survey design and identify any potential ornithological constraints, at an early stage.

The BirdWatch Ireland Bird Sensitivity Mapping for Wind Energy Development (Mc Guinness *et al*., 2015), as presented on NBDC Biodiversity Maps was examined. For the 22 species assessed in Mc Guinness *et al.* (2015), the proposed Wind Farm Site was classified as having a low sensitivity – see Figure 7A.2. This was driven by proximity to areas identified as hotspots for breeding barn owl.

Based on SNH (2017) guidelines, migratory populations of wintering geese and swans are considered as species notably sensitive to wind farm developments. To characterise the distribution of these populations in relation to the proposed Wind Farm Site, data from recent population monitoring has been reviewed, including:

- Lewis *et al*. (2019b) for Irish Wetland Bird Survey (I-WeBS) counts and Kennedy *et al*. (2022) for I-WeBS site trends;
- Boland & Crowe (2008) and Burke *et al*. (2022) for greylag goose and pink-footed goose distribution;
- Burke *et al*. (2021) for whooper swan distribution; and,
- Fox *et al*. (2021) for Greenland white-fronted goose distribution.

A search for any Irish Wetland Bird Survey (I-WeBS) sites in the vicinity of the proposed Wind Farm Site was undertaken via the BirdWatch Ireland website I-WeBS page. This identified three I-WeBS site within 15 km of the proposed Wind Farm – see Figure 7A.5, including the River Suir Middle (0J301) *c*. 13.5 km to SSW, Cabragh Wetlands (0J307) *c*. 6.5 km to the south and River Suir Upper (0J302) encompassing an area of flood plain within the proposed Wind Farm Site. Annual peak count data for these I-WeBS sites was reviewed – see Table 7A.2, Table 7A.3, Table 7A.4 and Table 7A.5.

Hen harrier breeding distribution in relation to the proposed Wind Farm Site was investigated using the results of national surveys, including surveys conducted between 1998-2000 and in 2005, 2010, 2015 and 2022; as reported in Norriss *et al*, 2002, Barton *et al*., 2006 Ruddock *et al*., 2012, Ruddock *et al*., 2016, Ruddock *et al*., 2024, respectively. The distribution of known hen harrier roosts was reviewed using maps available in NPWS (2022).

The review of breeding seabird numbers in Ireland in Cummin *et al*. (2019) was used to investigate the distribution of breeding seabird colonies and numbers of breeding seabirds. As the proposed Wind Farm Site is located more than 65 km from the closest coastline, the desk study focused on species that can breed at inland colonies and/or exhibit onshore foraging ranges, i.e. those seabird species with potential connectivity to the proposed Wind Farm Site, which includes cormorants, gulls and certain species of tern.

When required Sharrock (1976) was used to investigate historic bird records and changes in the breeding ranges of species. More recent historic data from Gibbons *et al*. (1993) was reviewed using NBDC Biodiversity Maps

7A.2.2. Desk study findings

7A.2.2.1. International and European sites with an ornithological interest

Ramsar sites and SPAs

Based on geographical separation and the core ranges of species listed in SNH (2016), there are no SPAs or Ramsar sites within the Zone of Influence of the proposed Wind Farm Site. There is also no downstream hydrological connectivity between the proposed Wind Farm Site and any SPA or Ramsar sites. Therefore, it can be conclusively determined that there is no potential for possible or likely significant effects on any SPAs. Likewise, there is no potential for negative effects to any Ramsar sites.

There are no Ramsar sites within 30 km of the proposed Wind Farm Site. As shown in Figure 7A.3, the closest SPA is Slievefelim to Silvermines Mountains SPA, which is designated for hen harrier and is located between 18 km and 21 km from the proposed Wind Farm Site. There are no other SPAs within 20 km of the proposed Wind Farm Site and notably no SPAs where geese species are listed as SCI.

As recommended by NatureScot guidelines (SNH, 2016), core foraging ranges of species listed as SCI for SPAs have been reviewed to assess connectivity between the proposed Wind Farm Site and any surrounding SPAs. Breeding hen harrier is the only SCI of the Slievefelim to Silvermines Mountains SPA, which based on SNH (2016) has a core breeding season foraging range of 6 km, with a maximum of 10 km. The proposed Wind Farm Site lies well beyond the reported core or maximum foraging ranges for hen harriers breeding within the SPA and therefore it can be conclusively determined that there is no potential for possible or likely significant effects.

The closest SPAs designated for wintering waterbirds are clustered along the River Shannon to the northwest of the proposed Wind Farm Site and include Lough Derg SPA (37 km), Dovegrove Callows SPA (44 km), River Little Brosna Callows SPA (46 km), Middle Shannon Callows SPA (47 km). The wintering SCI species for these SPA are listed below along with core/maximum wintering foraging ranges, if reported.

[A017]	Cormorant	*Phalacrocorax carbo*	no foraging range reported
[A395]	Greenland white-fronted goose	*Anser albifrons flavirostris*	5-8 km core foraging range (SNH, 2016)
[A038]	Whooper swan	*Cygnus cygnus*	< 5 km core foraging range SNH (2016)
[A050]	Wigeon	*Anas penelope*	no foraging range reported
[A052]	Teal	*Anas crecca*	no foraging range reported
[A054]	Pintail	*Anas acuta*	no foraging range reported
[A056]	Shoveler	*Anas clypeata*	no foraging range reported
[A061]	Tufted duck	*Aythya fuligula*	no foraging range reported
[A067]	Goldeneye	*Bucephala clangula*	no foraging range reported
[A140]	Golden plover	*Pluvialis apricaria*	no foraging range reported
[A142]	Lapwing	*Vanellus vanellus*	no foraging range reported
[A156]	Black-tailed godwit	*Limosa limosa*	no foraging range reported
[A179]	Black-headed gull	*Chroicocephalus ridibundus*	no foraging range reported

For breeding seabirds NatureScot (2023) provides recommended breeding season foraging ranges for use in determining potential connectivity between SPAs and proposed offshore wind farm developments, i.e. screening distances. These species specific foraging ranges along with distance to the closest SPAs are listed below for species that can breed at inland colonies and/or exhibit onshore foraging ranges, i.e. those seabird species with potential connectivity to the proposed Wind Farm Site, which is located more than 65 km from the coast.

It is important to note that these screening distances are provided here, in the absence of comparable data sets for inland breeding seabird colonies, as an indicative measure to screen for potential

connectivity between SPAs designated for breeding seabirds and the proposed Wind Farm Site. The values provided are based on foraging behaviour recorded at coastal seabird colonies, as the intended application is screening for potential connectivity in the coastal/marine environment and foraging ranges reported are representative of the maximum foraging distances, either as the mean maximum plus standard deviation (MM+SD) or maximum/mean maximum (Max/MM).

Cormorant	33.9 km foraging range	MM+SD	Closest SPA:	37 km	Lough Derg SPA
Black-headed gull	18.5 km foraging range	Max/MM	Closest SPA:	110 km	Lady's Island Lake SPA
Common gull	50.0 km foraging range	Max/MM	Closest SPA:	105 km	Lough Corrib SPA
Great black-backed gull	73.0 km foraging range	Max/MM	Closest SPA:	N/A	No designated sites
Herring gull	85.6 km foraging range	MM+SD	Closest SPA:	68 km	Mid-Waterford Coast SPA
Lesser black-backed gull	236.0 km foraging range	MM+SD	Closest SPA:	100 km	Saltee Islands SPA
Common tern	26.9 km foraging range	MM+SD	Closest SPA:	37 km	Lough Derg SPA
Arctic tern	40.5 km foraging range	MM+SD	Closest SPA:	110 km	Lady's Island Lake SPA

As listed above, SPAs designated for breeding cormorant, black-headed gull, common gull, common tern and Arctic tern are all beyond the screening distances; and therefore, there is no potential for significant effects anticipated for these SPA. Based on Cummins *et al*. (2019) any non-designated colonies for these species are also located beyond the screening distances, apart from one small black-headed gull colony (10 pairs or less), located near Lisheen Mine within 11 km of the proposed Wind Farm Site.

The NatureScot (2023) screening distance given for breeding herring gull is 85.6 km. Two SPAs where herring gulls are listed as SCIs fall within this zone, including the Mid-Waterford Coast SPA and Helvick Head to Ballyquinn SPA, which are located along the south coast, 68 km and 75 km away, respectively. Given the separation distance (> 50 km) between these coastal SPAs and the proposed Wind Farm Site it is anticipated that there will be no or very limited ecological connection and therefore no potential for significant effects. Ornithological surveys covering the proposed Wind Farm Site will determine the level of herring gull activity associated with area, in order to conclusively rule out potential for significant effects.

The NatureScot (2023) screening distance given for breeding lesser black-backed gull is 236 km. For the onshore environment this zone is extensive and would encompass almost all the SPAs designated for the species in the Republic of Ireland[1]. In reality the breeding season foraging range is likely to be considerably lower, with the review by Thaxter *et al*. (2012) giving a mean foraging range of 71.9 km, a mean maximum of 141 km and a maximum of 181 km for lesser black-backed gull, and if more recent studies using GPS trackers were included, e.g. Green *et al*. (2023) Thaxter *et al*. (2015), mean and mean maximum distances would be revised downwards.

The closest SPA with lesser black-backed gull listed as a SCI is the Saltee Islands SPA, where the Great Saltee, approximately 100 km to the southeast of the proposed Wind Farm Site, supports *c*. 250 pairs (Cummins *et al*., 2019). Distances to the next closest designated lesser black-backed colonies within the Lough Mask SPA and the Lambay Island SPA are just beyond the mean maximum foraging ranging (141 km), as reviewed in Thaxter *et al*. (2012). There are non-designated colonies which are closer including low densities (10 pairs or less) at Lough Derg, 37 km to the west, and significantly larger numbers at Lough Ree, 90 km to the north, which has held over > 1000 pairs in recent years and is considered to be the second largest colony in the country (Cummins *et al*., 2019).

[1] The exception being the Inishboffin, Inishdooey and Inishbeg SPA in Co. Donegal, approximately 275 km to the north

Overall, it is anticipated that separation distances of 90 km or more between lesser black-backed breeding colonies and the proposed Wind Farm Site, puts the development beyond the core foraging range for this species and there will be no potential for likely significant effects to any designated sites. Ornithological surveys covering the proposed Wind Farm Site will determine the level of lesser black-backed gull activity associated with area, in order to conclusively rule out potential for significant effects.

The only other SPA in the area surrounding the proposed Wind Farm Site is the River Nore SPA, which is 25 km away at its closest point and there is no direct hydrologically connection. The River Nore is designated for kingfisher. The closest reported territory to the proposed Wind Farm Site was 26 km north-east, at Borris-in-Ossory and based on this separation distance, the proposed Wind Farm Site is well beyond the reported core and maximum breeding season foraging range reported for kingfisher (Cummins *et al*. 2010). Therefore, there is no potential for any likely significant effects to occur.

7A.2.2.2. Nationally recognised sites with an ornithological interest

Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs)

The only nationally important site in the vicinity of the proposed Wind Farm Site with an ornithological interest is the Cabragh Wetlands pNHA [Site Code: 001934]. As shown in Figure 7A.4, this pNHA is split between two subsites that are approximately 5 km apart. The closest part of the pNHA to the proposed Wind Farm Site is between 0.9 km and 4 km away and is located north of Thurles, between the Racecourse Road and the Dublin–Cork Main line railway. This northern area, referred to as the Tank wetland, is historically prone to flooding and also encompasses a small reservoir. The main ecological features of interest pertain to the florist communities associated with wetland habitats fed by springs releasing lime-rich groundwater. This catchment is not hydrologically linked to the proposed Wind Farm Site. This part of the pNHA is not monitored for wintering waterbirds through I-WeBS and the desk-based information available suggested that the Tank wetland is unlikely to support any significant wintering waterbird populations that have the potential to be affected by the proposed Wind Farm Site. However, given the close proximity and the occurrence of wetland habitats, the area was covered as part of the wider area wintering waterbird surveys conducted.

The other section of the Cabragh Wetlands pNHA, often referred to as the Cabragh Marshes, is located to the south of Thurles, and is between 6.5 km and 9.3 km from the proposed Wind Farm Site. Wintering waterbird populations within this part of the pNHA are monitored through counts of the I-WeBS Site 0J307 (Cabragh Wetlands). At this location the pNHA is encompassed entirely within the Lower River Suir SAC and supports a range of semi-natural floodplain habitats. Historically the area had several discharge lagoons utilised by the Thurles Sugar Factory up until the 1980s, when refining of sugar ceased and the plant closed, the lagoons were subsequently removed. Since the early 1990s a significant proportion of land within the pNHA has been bought or is leased by the Cabragh Wetlands Trust (*c*. 24 ha) and is actively managed for wetland habitats, as well as the birds and other wildlife that they support (Muyllaert, 2006 and Collins, 2017). In terms of birds, the wintering waterbird assemblage is reported as regularly exceeding 1,000, supports a number of red listed species, and therefore, was assessed as regionally important (Collins, 2017 and Lauder, 2020). Mirroring national declines in waterbird populations, peak annual counts in recent years have rarely surpassed 1,000 birds (2014-2021 I-WeBS data) – see Table 7A.3 and Table 7A.4.

The Cabragh Marshes are noted as particularly suitable for surface feeding ducks and these contribute to core numbers of birds, including (with peak count recorded between 1994-95 to 2020-21 in parenthesis) gadwall (17), mallard (160), pintail (24), shoveler (78), teal (670) and wigeon (590). Sizeable flocks of several wader species are noted as periodically occurring at Cabragh Marshes

including curlew (310), golden plover (2,000) and lapwing (2,100). Lauder (2020) suggests that as these wader flocks tend to range widely over farmland habitats, they utilise the Cabragh Marshes part of the pNHA as a safe daytime loafing site and that utilisation especially for lapwing and golden plover is dependent on water levels and surrounding land use. Given the ranging tendencies of these species it is possible that golden plover and lapwing utilising the pNHA could also utilise suitable habitat within or adjacent to the proposed Wind Farm Site. Regularly occurring flocks of migratory geese and swan are an important ornithological constraints to consider for wind farm developments. As shown in Table 7A.3 and Table 7A.4 whooper swans (85) and greylag geese (25) are only periodically recorded at Cabragh Marsh, with Greenland white-fronted geese (45) recorded much less frequently.

In terms of breeding birds, Cabragh Marsh has historically supported breeding lapwing and also of local significance a pair of barn owls regularly breeds in a nest box installed on the site (Lauder, 2020).

7A.2.2.3. Wintering waterbirds

A review of wetlands monitored as part I-WeBS identified three I-WeBS sites within 15 km of the proposed Wind Farm Site – see Figure 7A.5, and included:

- River Suir Upper (0J302) within the proposed Wind Farm Site
- Cabragh Wetlands (0J307) – Cabragh Marshes (part of the Cabragh Wetlands pNHA), *c*. 6.5 km to the south
- River Suir Middle (0J301), *c*. 13.5 km to the SSW

Additional wetland habitats in the wider area previously identified and monitored over winter 2020/21 included the following areas – see Appendix 7I (Fehily Timoney, 2022):

- The Tank wetland (part of the Cabragh Wetlands pNHA), *c*. 1 km to SSW
- River Suir at Clonamuckoge Beg/Kilkillahara, adjacent to northwestern boundary
- Lisheen Bog, cut-away raised bog between the Lisheen wind farms and M8, *c*. 8 km to east
- Ballydavid, Littleton, *c*. 8 km to SSE
- Littleton Bog, c. 10 km to SSE
- Liathmore, *c*. 10 km to southeast

7A.2.2.3.1. I-WeBS sites

For the three I-WeBS sites the River Suir Upper (0J302) – Brittas (0J397), Cabragh Wetlands (0J307) and the River Suir Middle (0J301) peak count data is provided in Table 7A.2, Table 7A.3, Table 7A.4 and Table 7A.5. Note: The count data for River Suir Middle includes data for the more southerly subsite Newcastle – Caher (0J301), not just the subsite located closer to Thurles Ballycamasc Bridge - Camus Bridge (0J399)

The wintering waterbird populations associated with the Cabragh Wetlands were discussed in Section 7A.2.2.2 in relation to the pNHA of the same name, which highlighted the regional importance of this wetland in regularly supporting over 1,000 wintering waterbirds. The Cabragh Wetlands or Marshes are primarily noted for usage by surface feeding ducks (Lauder, 2020). With regards to migratory swans, a relatively small numbers of whooper swan (mean peak 23 birds) were recorded in most winters from 1994/95 up until 2011/12, however only a single bird was reported over the following eight seasons, and it appears that the site is no longer regularly utilised by this species. In terms of migratory geese, there is a relatively small flock of greylag geese recorded at Cabragh Marshes in some winters (mean peak 14 birds), with numbers recorded always remaining below thresholds for national importance. Greenland white-fronted geese do not regularly occur and were only recorded in two winters between 1994/95 and 2020/21. Flocks of golden plover and lapwing are periodically recorded

in nationally important numbers, along with small numbers of curlew (Lauder, 2020). It is possible that the wader flocks associated with the Cabragh Wetlands pNHA also utilise suitable habitat within or adjacent to the proposed Wind Farm Site, notably the River Suir Upper I-WeBS site.

The River Suir Upper I-WeBS site (0J397) - Brittas covers a section of the River Suir flood plain within the proposed Wind Farm Site and based on I-WeBS data this area supports variable numbers of wintering waterbirds – see Table 7A.2; however has rarely been reported as supporting more than 500 birds. Notable species recorded include regular flocks of lapwing (12-300 birds), with only small numbers of golden plover (1-4 birds) and curlew (1-30 birds) occasionally recorded over winters 2011/12 to 2020/21. Over this period greylag geese were only recorded once. Similar to the trend for the Cabragh Marshes, a small whooper swan flock (10-28 birds) were historically reported in the area with utilisation appearing to cease after winter 2016/17. Numbers of ducks recorded, specifically mallard, teal and wigeon, also appear to have tailed off in recent winters (Kennedy *et al*., 2022). Utilisation of the River Suir Upper is likely to be linked to seasonal flooding, which many explain the sporadic usage of the area.

The Upper River Suir - Brittas and Middle River Suir sites are approximately *c* 15 km apart. Interestingly, while whooper swan usage totally dropped off at the River Suir Upper I-WeBS site, there was marked increased at the River Suir Middle I-WeBS site over the same period – see Table 7A.5. Apart from the whooper swan flock (28-120 birds), other core species associated with the River Suir Middle I-WeBS sites include mallard (2-84 birds), teal (25-150 birds) and wigeon (8-191 birds), with flocks of lapwing (4-90 birds) and curlew (59-112 birds). There are no flocks of golden plover recorded and greylag geese occur periodically and in small numbers.

7A.2.2.3.2. Other wetland sites

As part of wintering waterbirds survey conducted over winter 2020/21 - see Appendix 7I (Fehily Timoney, 2022), another part of the floodplain at Clonamuckoge Beg/Kilkillahara, approximately 500 m upstream of the River Suir Upper - Brittas I-WeBS site and adjacent to the proposed Wind Farm Site, was regularly monitored, along with the other wetland in close proximity, the Tank wetland (northern section of the Cabragh Wetalnds pNHA). The Tank wetland was surveyed five times over winter2020/21 and was found to regularly support wintering snipe (5-15 birds) and grey heron (1-5 birds), with mute swan (2 birds) recorded once. The Clonamuckoge Beg/Kilkillahara area was monitored on six occasions over winter 2020/21. A small numbers of whooper swans (3 to 5 birds) were recorded on three visits, with an additional observation of a flock of 12 birds recorded foraging in the area during VP watches. On four of the visits, flocks of golden plover (150-700 birds) and lapwing (26-300 birds) were recorded. Other species recorded included mute swan (4-6 birds), mallard (2 birds), teal (14 birds) and moorhen (2 birds).

In terms of wetlands further away from the proposed Wind Farm Site (> 8 km) that were monitored over winter 2020/21 - see Appendix 7I (Fehily Timoney, 2022), including Lisheen Bog, Ballydavid, (Littleton), Littleton Bog and Liathmore, there were no significant numbers of wintering water birds recorded. The only noteworthy numbers occurred at Liathmore, which consistently supported a flock of whooper swans (22-95 birds) and Ballydavid (Littleton), where flocks of lapwing (40-75 birds) were regularly recorded.

7A.2.2.3.3. Regional occurrence of migratory swan and geese

Based on 2020 swan census (Burke *et al*., 2021), the Liathmore whooper swan flock and smaller flocks (< 50 birds) associated with the Middle River Suir, south of Thurles were the only areas supporting flocks of whooper swans in this region of Co. Tipperary. Lough Derg, approximately 36 km northwest of the proposed Wind Farm Site is the closest location identified as supporting internationally number

of whooper swans, with the River Suir valley in Co. Waterford to the south supporting several nationally important flocks.

Likewise, a review of Burke *et al*. (2022) and Fox *et al*. (2021) found that Co. Tipperary, aside from Lough Derg and Little Brosna Callows, does not regularly support any significant populations of migratory grey geese, including Icelandic greylag geese, pink-footed geese and Greenland white-fronted geese. Pink footed geese are not regularly recorded in Co. Tipperary and the small flocks of greylag geese associated with the Middle River Suir and occasionally at the Cabragh Wetlands are reported as feral flocks or flocks of unknown origin (Burke *et al*. 2021). The closest traditional Greenland white-fronted goose sites are the River Nore, in Co. Kilkenny and Little Brosna Callows both located over 30 km from the proposed Wind Farm Site.

7A.2.2.3.4. Regional occurrence of wintering waders

Overall, the proposed Wind Farm Site and environs are considered to provide a mosaic of suitable habitats for wintering waders, especially the large areas of grassland and wetland habitat along the River Suir. In terms of wintering waders, several species can often be found inland away from coastal hotspots, in particular snipe, golden plover and lapwing, as well as curlew, black-tailed godwit, redshank and ringed plover. The presence of forestry in the proposed Wind Farm Site has the potential to support wintering woodcock.

A review of wintering wader distribution, based on I-WeBS data presented in Crowe (2005), Boland & Crowe (2012), Burke *et al*. (2018) and Lewis *et al*. (2019), shows that the middle region of Co. Tipperary where the proposed Wind Farm Site is located does not regularly support any internationally or nationally important wintering wader populations. The northern part of the county including Lough Derg and the River Shannon valley, located > 30 km to the north and north-west of the proposed Wind Farm Site, are the closest areas supporting internationally or nationally important numbers of wintering waders.

Based on I-WeBS count data for the Cabragh Wetlands and the Upper River Suir , covering the northern part of the proposed Wind Farm Site, the wader species regularly occurring the area include (with highest peak count since winter 2011/12 in parentheses) lapwing (1,100 birds), golden plover (250 birds), curlew (154 birds) and snipe (under recorded) - see Table 7A.2 and Table 7A.4. While lapwing are recorded in most winters, albeit in variable numbers and occasionally counts exceed thresholds for national importance (1% threshold: 850 birds), golden plover and curlew are not always observed. Cabragh Wetlands appears to be the more regularly utilised site compared to the Upper River Suir and overall the wader flocks occurring in this region are reported as being relatively mobile (Lauder 2020) and moving over a wider area to capitalise on a range of resource, some of which like flooding are only periodically available.

7A.2.2.3.5. Regional occurrence of wintering gulls

In terms of overall numbers of wintering waterbirds, gull species often contribute significantly to counts for I-WeBS sites. On reviewing count data from I-WeBS sites, including the the River Suir Upper (0J302) and Cabragh Wetland (0J307), as well as counts undertaken over winter 2020/21 (Fehily Timoney, 2022), black-head gulls and lesser black-backed gulls were the only regularly occurring species, with herring gulls only very occasionally observed and typically only single birds recorded. The maximum counts for black headed gull was 200 birds and for lesser black-backed gull was 310 birds, however smaller numbers were more typically encountered and, in some winters, no or very few gulls were counted. While it is noted that under I-WeBS methodology counting of gulls is optional and may not have been undertaken in some years, the count data is suggestive of a relatively mobile and sporadically occurring populations of wintering gulls in the region.

7A.2.2.4. Breeding waders

Areas of wet grassland, fen type habitat and marsh associated with River Suir floodplain provide habitat potentially suitable for breeding lowland waders in particular snipe, lapwing and possibly curlew and redshank. Balmer *et al*. (2013) recorded snipe as possibly breeding within the proposed Wind Farm Site and more recently during the 2021 breeding season six territories were identified in the northern part (Fehily Timoney, 2022). Lapwing and curlew have historically bred within the 10 km square covering the proposed Wind Farm Site (Sharrock, 1976 and Gibbons *et al*., 1993). Based on Colhoun *et al*. (2022) and Balmer *et al*. (2013), curlew are no longer recorded as breeding in any of the 10 km Irish national grid square encompassing the proposed Wind Farm Site [S16] or closely bordering squares [S05], [S06] and [S15]. The closest known breeding sites are > 10 km away to the southeast [S25] and > 20 km away to the west [R86] (O'Donoghue *et al*, 2019, Colhoun *et al*., 2022).

Lapwing were recorded within the proposed Wind Farm Site during the 2021 breeding season (Fehily Timoney, 2022), with a maximum of 8 birds recorded; however it is unknown if successful breeding occurred. Aerial and topographic imagery indicates that habitat suitability for upland breeding waders is non-existent in this part of Co. Tipperary, and therefore, species like golden plover and dunlin (also a machair/coastal breeder in Ireland) are highly unlikely to breed in the area. This assertion is supported by breeding distribution maps for these species presented in Sharrock (1976), Gibbons *et al*. (1993), and Balmer *et al*. (2013)

The section of the River Suir passing through the proposed Wind Farm site does not provide the sand/shingle banks that would be suitable for common sandpiper. Likewise, suitable habitat for breeding ring plover was lacking. In this region ring plover have been recorded in small numbers, utilising areas of exposed peat on cut-away bogs and in June 2021 pairs were recorded > 7 km from the proposed Wind Farm Site at Lisheen Bog and Littleton Bog (Fehily Timoney, 2022). These two locations in the wider area, along with Cabragh Marsh were also found to hold small numbers of other breeding waders, including lapwing, curlew and redshank (Fehily Timoney, 2022).

Woodcock nest in woodland and scrub, and parts of the proposed Wind Farm Site providing suitable cover, especially in the south. There is only historic data of woodcock probably breeding in the 10 km square encompassing the proposed Wind Farm Site (Sharrock, 1976). A recent reduction in the breeding range of woodcock in Ireland means that the breeding population is red listed, although the winter component, which sees an influx of continental birds, remains green-listed (Gilbert *et al*., 2021). Breeding woodcock are now largely confined to the midlands and east of Ireland (Balmer *et al*., 2013) and are therefore potentially present within the proposed Wind Farm Site; however they were not detected during the 2021 breeding season (Fehily Timoney, 2022).

7A.2.2.5. Other breeding waterbirds

Based on analysis reported in Lauder & Lauder (2020), which identifies breeding waterbird hotspots using species distribution data combined with scoring criteria based on aspects of each species' ecology, conservation status and social value, the closest hotspots are over 30 km away to the west and northwest and are associated withLough Derg and the River Shannon. The 10 km Irish grid square encompassing the proposed Wind Farm Site [S16] and closely neighbouring squares [S05], [S06], [S15] scored at the lower end of the scale in this analysis. While this desk-based finding does not preclude potential impacts on specific wetland species that may breeding in the environs of the proposed Wind Farm Site, it can be concluded that important wetland areas supporting high species diversity or abundance will not affect by virtue of separation distances.

7A.2.2.5.1. Kingfisher

Kingfisher are likely to forage along the River Suir and its tributaries within the proposed Winds Farm Site. Assessment of the River Suir during the 2021 breeding season for breeding kingfisher (Fehily Timoney, 2022) noted some potential old nesting holes along the banks within the proposed Wind Farm Site and therefore the species may be breeding on this stretch of the river. This assertion is supported by historic breeding records (Gibbons *et al*. 1993). The River Suir flows in a southerly direction through the proposed Wind Farm Site and approximately 6.8 km downstream, south of Thurles, the river is designated within the Lower River Suir SAC. Whilst there are no kingfisher breeding territories reported within the Site Synopsis for this SAC (NPWS, 2023), this species is noted as regularly occurring within the catchment, including Cabragh Wetalnd (Lauder, 2000). Riverine bird surveys, incorporating kingfisher habitat suitability assessments, were employed in subsequent breeding seasons (2022 and 2023) to investigate the potential for this species to breed within the proposed Wind Farm Site.

As kingfisher are listed on Annex I of the EU Birds Directive, the distances from the proposed Wind Farm Site to SPAs designated for this species was reviewed – see Section 7A.2.2.1. The closest kingfisher SPA is the River Nore SPA, which is approximately 25 km east of the proposed Wind Farm Site at its closest point. This SPA supported 16 probable kingfisher territories according to Cummins *et al*. (2010) and the closest reported territory to the proposed Wind Farm Site was 26 km north-east, at Borris-in-Ossory. Based on this separation distance, the proposed Wind Farm Site is well beyond the reported core and maximum breeding season foraging range reported for kingfisher (Cummins *et al*. 2010), and therefore, there is no potential for any likely significant effects to occur. Furthermore, given the low flight trajectory of kingfishers, collision risk for this species is considered to be very low.

7A.2.2.5.2. Grey heron

Grey heron is a common and widespread species in Ireland, with a population that is assessed as relatively stable and therefore is green listed (Gilbert *et al*. 2021). Given the affinity of grey herons to wetland habitats and the occurrence of the River Suir, activity for this species is anticipated to be elevated within the proposed Wind Farm Site. In addition surveys in 2020-2021 (Fehily Timoney, 2022) identified a heronry in the woodland just south of the proposed Wind Farm Site. This introduces a potential localised sensitivity for this species, which requires further monitoring.

7A.2.2.5.3. Breeding gulls

A review of breeding gull colonies based on Cummins *et al*., (2019) found that the closest breeding sites supporting nationally/internationally important numbers were either located some distance away on the south coast or at Lough Derg. These locations are > 30 km from the proposed Wind Farm Site. There is a small black head gull colony (10 pairs or less) within 11 km of the proposed Wind Farm Site, located to the east, near Lisheen Mine. Section 7A.2.2.1 provides a review of breeding gull colonies in relation to potential connectivity to Natura 2000 sites (SPAs).

7A.2.2.6. Birds of prey

Buzzard, sparrowhawk and kestrel are widespread resident species in Ireland and, based on habitat availability, are likely to be breeding within the 2 km proposed turbine buffer. During the preliminary study year (2020-2021) – see Appendix 7I (Fehily Timoney, 2022), buzzard and kestrel were the most commonly recorded raptor species. Sparrowhawk and peregrine were also regularly recoded; however significantly less frequently than buzzards or kestrels, and this would be expected for more secretive species like sparrowhawk and given the flight behaviour of peregrine. Surveys over the 2021 breeding season found peregrine, kestrel and buzzard breeding adjacent to the proposed Wind Farm Site. The peregrines were nesting on Brittas Castle, approximately 350 m from the proposed Wind Farm site. The kestrel breeding site was located just beyond the eastern boundary and fledged three

young in 2021. Buzzards were recorded nesting approximately 1 km to the west of the proposed Wind Farm Site. No breeding behaviour for sparrowhawk was observed, however were considered likely to be breeding in the area.

The only other raptors species recorded over the 2020-2021 study year were sporadic observations of hen harrier and merlin (Fehily Timoney, 2022). Based on the lowland nature of the area (< 100 m) and dominance of improved agricultural grassland and cultivated land, there is very limited potential for upland breeding species to occur, including hen harrier, merlin and the rare breeding species - short-eared owl.

Wooded areas, particularly in the south of the proposed Wind Farm Site, have the potential to support long-eared owls. Barn owls are known to occur in the area, with a breeding site identified in a building approximately 1.1 km to the northwest of the proposed Wind Farm Site (Fehily Timoney, 2022).

Release sites for the red kite *Milvus milvus* re-introductions in Ireland have been in Co. Wicklow and Co. Down, and while the dispersal has been relatively protracted, it is possible that the breeding population has started to expand into Co. Tipperary, where there is potentially suitable habitat for this species. Habitat suitability for the two species of eagle re-introduced back into Ireland, golden eagle *Aquila chrysaetos* and white-tailed eagle *Haliaeetus albicilla* is limited in this part of Co. Tipperary and these species are considered as unlikely to regularly occur in the area.

Other rarer species of raptor occurring in Ireland including goshawk *Accipiter gentilis*, osprey *Pandion haliaetus*, marsh harrier *Circus aeruginosus* and hobby *Falco subbuteo*, are highly unlikely to have any meaningful association with the proposed Wind Farm Site, based on habitat availability in the general area, geographic location and reported occurrences of these rarer species.

As important Annex I species in Ireland with potential population sensitivities to wind farm development, further desk-based assessment is provided for hen harrier and merlin in the following sections. This done to highlight that the proposed Wind Farm Site is emerging as not being important for these species. Additional information is also provided for peregrine, kestrel and barn owl, as other bird of prey historical noted as breeding in the area and being of conservation concern

7A.2.2.6.1. Hen harrier

The 10 km grid square [S16] encompassing the study area is not covered by the National Hen Harrier Surveys, due to limited habitat suitability and lack of historical records (Ruddock *et al*., 2024). Based on Ruddock *et al*. (2024) the closest 10 km grid squares where hen harriers have been recorded breeding since monitoring began in the lates 1990s is [R95] and [R96], which are located more than 10 km west of the proposed Wind Farm Site. As discussed in Section 7A.2.2.1, these breeding territories are associated with the Slievefelim to Silvermines Mountains SPA, which is located between 18 km and 21 km from the proposed Wind Farm Site.

Irish hen harriers have traditionally favoured nesting within dense heather, though following the decline of this habitat in Ireland, pairs are being increasingly recorded utilising young conifer plantations (Wilson *et al.,* 2006). Afforestation, including felling and re-planting cycles, is now a major factor in determining the current distribution of breeding hen harrier in Ireland. While there is forestry within the proposed Wind Farm Site and surrounding wider area that has the potential to provide cover for nesting; a significant limiting factor is the lack of extensive open areas of less improved, and typically upland habitats supporting high density of ground nesting prey species, like meadow pipits and skylark. Therefore, the proposed Wind Farm Site and surrounding hinterland (out to 2 km) is assessed as not being suitable for breeding hen harrier.

NPWS (2022) provides a map showing the winter distribution and known hen harrier roosts within 10 km Irish national grid squares, based on Balmer *et al*. (2013) and roost monitoring undertaken by the Irish Winter Hen Harrier Survey. This map indicates that there are no known hen harrier roosts within the 10 km grid square [S16] encompassing the proposed Wind Farm Site. Roosting has been recorded to the south in the 10 km grid square [S15], however this falls just beyond the 2 km turbine buffer for the proposed Wind Farm Site. Hen harriers roost in a range of habitats (Clarke & Watson, 1990, O'Donoghue, 2012, 2019 and Hardey *et al*., 2013) and there are patches of woodland edge, scrub and wetlands within the proposed Wind Farm Site and out to 2 km that have the potential to support a hen harrier roost. Based on surveys conducted over 2020 and 2021 (Feehily Timony, 2022), there was a very low incidence of hen harrier activity detected and records were limited to a single male flying approximately 2 km west of the proposed Wind Farm Site.

Based on the desk-based review of existing information, it is anticipated that ongoing surveys will conclude that the proposed Wind Farm Site and associated wider area (2 km proposed turbine buffer) is not important for breeding or wintering hen harrier populations.

7A.2.2.6.2. Merlin

Merlin is a species that breeds in a range of different upland habitats and typically occurs at higher altitudes (Ewing & Rebecca, 2011), although lowland regions in Ireland with substantial areas of raised bog can support breeding territories, particularly where woodland/scrub occurs adjacent to open bog or heathland, which provides access to ground nesting prey species, such as meadow pipits. Like hen harrier, merlin is traditionally a ground-nesting species. However, due to there being limited suitable ground cover in Irish upland habitats, this species is now more regularly recorded nesting in trees, where they utilise the nests of other species, in particular those of corvids, (Lusby *et al*., 2017).

There is a historic record of probable breeding merlin (Bird Atlas 2007-2011) within the 10 km Irish national grid square [S16] that encompasses the proposed Wind Farm Site (Balmer *et al*., 2013). This record was found to be associated with the forestry and raised bog approximately 6 km to the northwest, in the vicinity of wind farms around the Lisheen Mine where there is some semblance of suitable breeding habitat. Aside from the area in and around Lisheen Bog there is no suitable breeding habitat within or in the wider area surrounding the proposed Wind Farm Site.

In Ireland, merlin typically leave upland breeding sites over the winter following prey species to areas where they congregate, such as estuaries and areas of cereal productions. Numbers are swelled by an influxes of breeding birds from Iceland. As the River Suir floodplain periodically attracts waterbirds over the winter, it is possible that merlin utilise the proposed Wind Farm Site out of the breeding season. This is supported by the preliminary year of baseline surveys conducted over 2020 and 2021 (Feehily Timony, 2022) when merlin were observed seven times over winter 2020/21 and there were no merlin sightings during the breeding season; however the majority of the observations were recorded beyond the 500 m proposed turbine buffer – see Appendix 7I.

As merlin are listed on Annex I of the EU Birds Directive, the distances from the proposed Wind Farm Site to SPAs designated for this species was reviewed. The closest merlin SPA is the Slieve Aughty Mountains SPA, which is over 40 km north-west from the proposed Wind Farm Site. Based on this separation distance, the proposed Wind Farm Site is well beyond the reported core and maximum breeding season foraging range reported for merlin (SNH, 2016, Lusby *et al*. 2017), and therefore, there is no potential for any likely significant effects to occur.

7A.2.2.6.3. Peregrine

In Ireland, away from the coast, cliffs quarries can provide suitable nesting ledges for breeding peregrines (Moore *et al.,* 1997), along with ruined buildings, churches and other man-made structures that offer relatively high (> 10 m), inaccessible locations. A single historic (Bird Atlas 2007-2011) peregrine breeding sites was confirmed within the 10 km Irish national grid square [S16] that encompasses the proposed Wind Farm Site (Balmer *et al*., 2013). This site is a castle situated approximately 3.7 km north of the proposed Wind Farm Site. There are a number of other ruined castles that have the potential to support peregrine, however most of these are more than 2 km from the proposed Wind Farm Site, including one 2.7 km to east, one 3.5 km to the west, one 4.1 km to the northeast and one 5.0 km to the west.

In 2021 peregrine were recorded nesting in Brittas Castle (Fehily Timoney, 2022), which is located approximately 350 m from the proposed borrow pit and within 600 m of the closest turbine (T10). The core foraging range for breeding peregrines is 2 km, with a maximum of 18 km reported (SNH, 2016) and the proposed Wind Farm Site is likely to form part of the home range for this pair. Availability of nesting locations in this region will be a factor limited peregrine breeding densities and it is likely that the some of the other castle sites listed above support neighbouring pairs.

7A.2.2.6.4. Kestrel

While buzzard and sparrowhawk are both green listed, the BoCCI conservation status for kestrel was upgraded over the course of the baseline study from amber to red (Colhoun & Cummins, 2013; Gilbert *et al.*, 2021). Both breeding numbers and distribution of kestrels have declined significantly, which is thought to have been driven by changes in prey availability due to agricultural intensification (Wilson-Parr & O'Brien, 2019), as well as secondary rodenticide poisoning. Flight behaviour means kestrels are also a species emerging as notably susceptible to collision with turbines and this is acknowledged within the Collision Risk Model (CRM) for this species, which SNH (2018a) recommend running with a lowered avoidance rate for kestrels (95% avoidance). If flight activity for kestrels within the 500 m turbine buffer is high, this will result in a level of collision risk for this species, and it is important to assess what magnitude of population level effects could result based on predicted collision risk.

7A.2.2.6.5. Barn owls

The habitats within 2 km of the proposed Wind Farm Site, including the patchwork of woodland, rough/unimproved areas, treelines and hedges, along with derelict buildings provide suitable nesting and foraging habitat for barn owls; and bird sensitivity mapping (Mc Guinness *et al*., 2015) ranks the regions sensitivity to wind farm development as low, due to the proximity (within 2 km) of barn owl breeding hotspots – see Figure 7A.2. There are contemporary records for the species in the wider area (Balmer *et al.*, 2013), and in 2021 a breeding site was identified in an abandoned building approximately 1.1 km to the northwest of the proposed Wind Farm Site (Fehily Timoney, 2022). There is also another traditional barn owl site at the Cabragh Wetlands, within 7 km (Lauder, 2020).

In Ireland, foraging distances from nest sites can extend up to 6 km and even as far as 9 km; however, the core breeding home range is documented to be 4 to 5 km from the nest (Lusby & Cleary, 2014, TII 2021, Lusby *et al*. 2021). This is further than the 1 km search area recommended by the SNH (2017) survey guidelines for breeding barn owls (owls other than short-eared owls). In terms of sensitivity to wind farm developments, barn owls are reported as successfully breeding at a large wind farm in Scotland, with the number of pairs increasing after the provision of nest boxes, e.g., Crystal Rig Wind

Farm[2]. It is generally considered that low level flight behaviour of barn owls (typically < 3-4 m) limits collision risk with larger turbines in the UK (and Ireland) where lattice towers are not commonly employed (Barn Owl Trust, 2015). As such, impacts are more likely to be associated with any land use change and loss of breeding territories due to the proposed development.

7A.2.2.7. Other species of conservation concern

7A.2.2.7.1. Swift

The conservation status of swift was upgraded from amber to red in Ireland, due to recent severe declines in breeding populations (Colhoun & Cummins, 2013; Gilbert *et al.*, 2021). Swifts show strong fidelity to their nest sites, and it is possible that the continuous decline in numbers is related to the loss of traditional nest cavities in buildings which have been renovated or demolished (Whelan *et al*. 2018). There is potential for swifts to forage through the proposed Wind Farm Site over the summer months while nesting in the buildings of nearby towns and villages. The closest reported swift nests are at Thurles town approximately 2 km south of the proposed Wind Farm Site (Birdwatch Ireland, 2023)[3].

Depending on weather conditions, swifts often forage at heights of 50 to 100 m placing them within the collision risk zone of wind turbines. As swifts are habituated to manmade structures, it is considered unlikely that foraging birds will be displaced by operational turbines. Conversely, this species (along with swallows and other hirundines) may be actively drawn towards turbines to glean insects that are attracted to/more active around turbine towers and hardstands (Rydell *et al.*, 2012). While the mechanism and potential effects are poorly understood at this stage, it is considered likely that this behaviour leads to heightened collision risk for this species (Rydell *et al.*, 2012).

7A.2.2.7.2. Rare passerines

As detailed in SNH (2017), it is considered that most passerines are at low risk of collision with wind turbines due to flight behaviour. Population dynamics (e.g. high fecundity and rapidly attaining sexual maturity) also make passerines less vulnerable to displacement effects. This means that the proposed Wind Farm development is unlikely to impact passerine communities at the population level. The exception may be rarer breeding passerines, which in an Irish context would include whinchat *Saxicola rubetra*, ring ouzel *Turdus torquatus*, tree sparrow and yellowhammer.

The combination of pastural agriculture, with some cultivated fields, which is typical of the region, as well as the occurrence of wet grasslands and marshy habitats along the floodplain provides suitable habitat for whinchat, tree sparrow and yellowhammer, with the latter two species recorded within the 10 km Irish national grid square [S16] encompassing the proposed Wind Farm Site - see Table 7A.1. Other red listed species likely to occur within the proposed Wind Farm Site are meadow pipit and grey wagtail. Despite declines in grey wagtail and meadow pipit, thought to be related to harsh winters following the 2009 and 2010 breeding seasons, both species have remained relatively common and widespread. Based on Lewis *et al*. (2020), grey wagtail numbers have not recovered and continue to decline, whereas meadow pipit numbers are reported to have stabilised.

Based on habitat availability, some less regularly occurring non-passerine species like stock dove and quail could also breed in the area and are both red listed species.

[2] As reported at: http://www.pes.eu.com/wind/ornithological-plan-leads-to-barn-owl-success/

[3] As reported by BirdWatch Ireland online Swift Survey – Nest Records (2012-2022). Accessed via: https://bwi.maps.arcgis.com/apps/MapJournal/index.html?appid=81ddc38cfcde40ffab699be638ee5b20

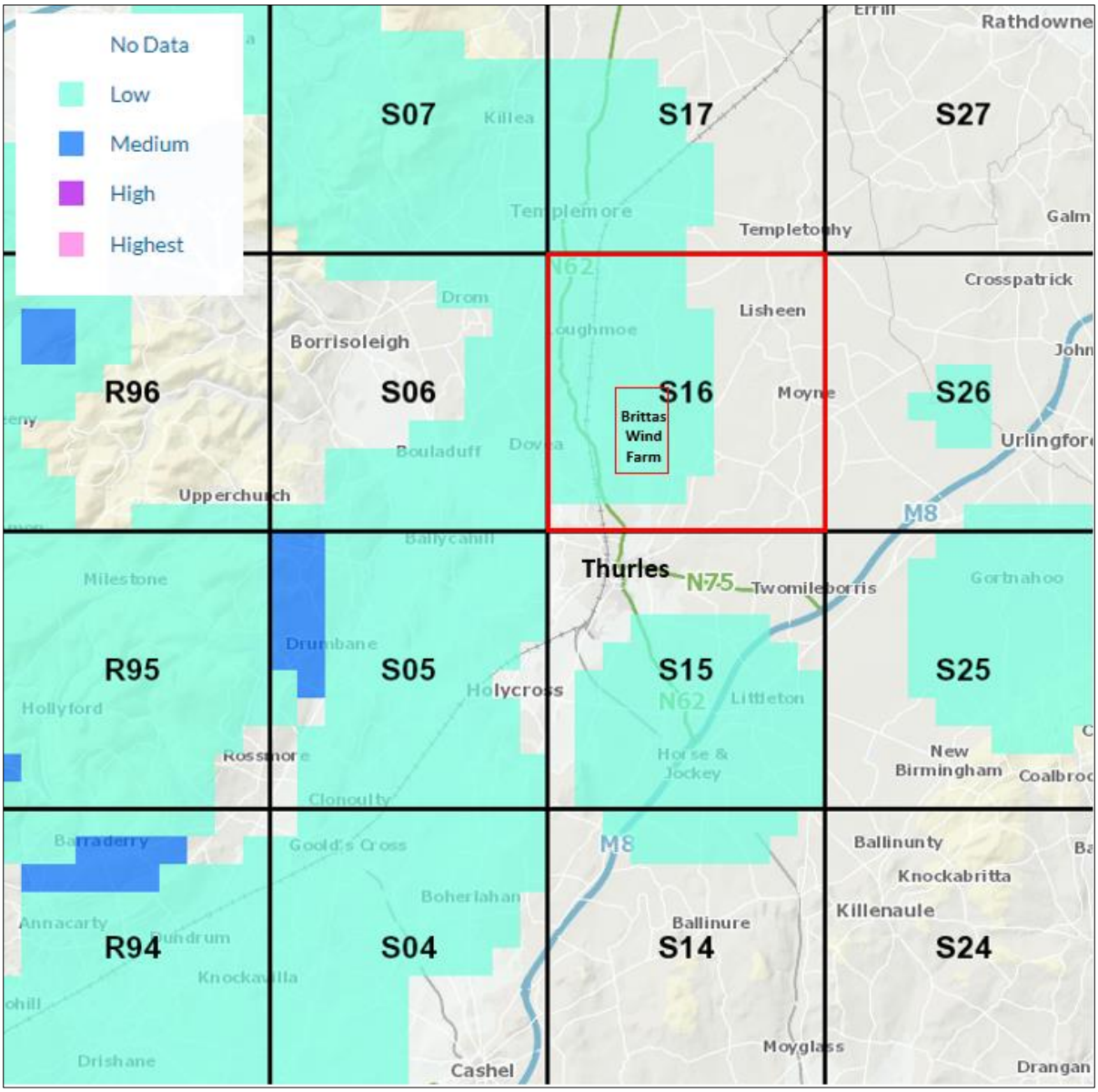

Figure 7A.2: Bird sensitivity to wind energy

Source: Mc Guinness *et al*. (2015), as displayed on Biodiversity Maps: https://maps.biodiversityireland.ie/Map

Table 7A.1: Bird records within the 10 km national grid square S16

Source: NBDC Biodiversity Maps, with additional species included if recorded in 2020/21 (FTC - Fehily Timoney, 2022)
Species are listed aphetically by conservation status, with the BoCCI4 column referring to whether conservation concern status applies to wintering (Win) or breeding (Br) populations.

Common Name	Scientific Name	Annex I species	BoCCI4 status	Most recent	Data source
Barn owl	*Tyto alba*		Red Br	2009	CeDAR
Bewick's swan	*Cygnus columbianus*	✓	Red Br&Win	2001	NBDC
Corncrake	*Crex crex*	✓	Red Br	1972	NBDC
Curlew	*Numenius arquata*		Red Br&Win	2020	I-WeBS
Dunlin	*Calidris alpina*	✓	Red Br&Win	2018	I-WeBS
Grey partridge	*Perdix perdix*		Red B	1972	NBDC
Grey wagtail	*Motacilla cinerea*		Red Br	2011	NBDC
Golden plover	*Pluvialis apricaria*	✓	Red Br&Win	2021	I-WeBS
Kestrel	*Falco tinnunculus*		Red Br	2023	NBDC
Lapwing	*Vanellus vanellus*		Red Br&Win	2020	I-WeBS
Meadow pipit	*Anthus pratensis*		Red Br	1991	NBDC
Redshank	*Tringa totanus*		Red Br&Win	2001	NBDC
Redwing	*Turdus iliacus*		Red Win	2011	NBDC
Shoveler	*Anas clypeata*		Red Br&Win	2020	I-WeBS
Snipe	*Gallinago gallinago*		Red Br&Win	2020	I-WeBS
Stock dove	*Columba oenas*		Red Br	2011	NBDC
Swift	*Apus apus*		Red Br	1991	NBDC
Woodcock	*Scolopax rusticola*		Red Br	1972	NBDC
Yellowhammer	*Emberiza citrinella*		Red Br	2020	NBDC
Barn swallow	*Hirundo rustica*		Amber Br	1991	NBDC
Black-headed gull	*Larus ridibundus*		Amber Br&Win	2021	I-WeBS
Coot	*Fulica atra*		Amber Br&Win	2021	I-WeBS
Cormorant	*Phalacrocorax carbo*		Amber Br&Win	2021	I-WeBS
Gadwall	*Anas strepera*		Amber Br&Win	2021	I-WeBS
Goldcrest	*Regulus regulus*		Amber Br	1991	NBDC
Greenfinch	*Carduelis chloris*		Amber Br	1991	NBDC
Greylag goose	*Anser anser*		Amber Win	2021	I-WeBS
Hen harrier	*Circus cyaneus*		Amber Br	1972	NBDC
Herring gull	*Larus argentatus*		Amber Br&Win	2021	FTC
House sparrow	*Passer domesticus*		Amber Br	2011	NBDC
House martin	*Delichon urbicum*		Amber Br	2021	FTC
Kingfisher	*Alcedo atthis*	✓	Amber Br	2015	I-WeBS
Lesser black-backed gull	*Larus fuscus*		Amber Br&Win	2021	I-WeBS
Linnet	*Carduelis cannabina*		Amber Br	1991	NBDC
Mallard	*Anas platyrhynchos*		Amber Br&Win	2020	I-WeBS
Merlin	*Falco columbarius*	✓	Amber Br	2011	NBDC
Mute swan	*Cygnus olor*		Amber Br&Win	2021	I-WeBS
Pintail	*Anas acuta*		Amber Win	2021	I-WeBS
Ringed plover	*Charadrius hiaticula*		Amber Br&Win	2021	FTC
Skylark	*Alauda arvensis*		Amber Br	1991	NBDC
Spotted flycatcher	*Muscicapa striata*		Amber Br	2011	NBDC
Starling	*Sturnus vulgaris*		Amber Br	2011	NBDC
Sand martin	*Riparia riparia*		Amber Br	2011	NBDC
Teal	*Anas crecca*		Amber Br&Win	2020	I-WeBS
Tree sparrow	*Passer montanus*		Amber Br	2021	FTC
Tufted duck	*Aythya fuligula*		Amber Br&Win	2021	I-WeBS
Whooper swan	*Cygnus cygnus*	✓	Amber Br&Win	2017	I-WeBS
Wigeon	*Anas penelope*		Amber Br&Win	2020	I-WeBS
Willow warbler	*Phylloscopus trochilus*		Amber Br	1991	NBDC
Blackbird	*Turdus merula*		Green	1991	NBDC
Blackcap	*Sylvia atricapilla*		Green	2011	NBDC
Blue tit	*Cyanistes caeruleus*		Green	1991	NBDC

Common Name	Scientific Name	Annex I species	BoCCI4 status	Most recent	Data source
Bullfinch	*Pyrrhula pyrrhula*		Green	2011	NBDC
Buzzard	*Buteo buteo*		Green	2019	NBDC
Chaffinch	*Fringilla coelebs*		Green	1991	NBDC
Chiffchaff	*Phylloscopus collybita*		Green	1991	NBDC
Collard dove	*Streptopelia decaocto*		Green	2011	NBDC
Cuckoo	*Cuculus canorus*		Green	1991	NBDC
Dipper	*Cinclus cinclus*		Green	1972	NBDC
Dunnock	*Prunella modularis*		Green	1991	NBDC
Fieldfare	*Turdus pilaris*		Green	2011	NBDC
Goldfinch	*Carduelis carduelis*		Green	2011	NBDC
Grasshopper warbler	*Locustella naevia*		Green	1991	NBDC
Grey heron	*Ardea cinerea*		Green	2021	I-WeBS
Great tit	*Parus major*		Green	2011	NBDC
Hooded crow	*Corvus cornix*		Green	2018	NBDC
Jay	*Garrulus glandarius*		Green	2011	NBDC
Lesser redpoll	*Carduelis flammea cabaret*		Green	1991	NBDC
Little egret	*Egretta garzetta*		Green	2021	I-WeBS
Little grebe	*Tachybaptus ruficollis*		Green	2021	I-WeBS
Long-eared owl	*Asio otus*		Green	2011	NBDC
Long-tailed tit	*Aegithalos caudatus*		Green	2011	NBDC
Magpie	*Pica pica*		Green	1991	NBDC
Mistle thrush	*Turdus viscivorus*		Green	2011	NBDC
Moorhen	*Gallinula chloropus*		Green	2021	I-WeBS
Peregrine	*Falco peregrinus*		Green	2016	NBDC
Pheasant	*Phasianus colchicus*		Green	1991	NBDC
Pied wagtail	*Motacilla alba yarrellii*		Green	1991	NBDC
Raven	*Corvus corax*		Green	2011	NBDC
Reed bunting	*Emberiza schoeniclus*		Green	1991	NBDC
Reed warbler	*Acrocephalus scirpaceus*		Green	2021	FTC
Rock dove (feral pigeon)	*Columba livia*		Green	1991	NBDC
Robin	*Erithacus rubecula*		Green	1991	NBDC
Rook	*Corvus frugilegus*		Green	1991	NBDC
Sedge warbler	*Acrocephalus schoenobaenus*		Green	1991	NBDC
Siskin	*Carduelis spinus*		Green	2011	NBDC
Song thrush	*Turdus philomelos*		Green	1991	NBDC
Sparrowhawk	*Accipiter nisus*		Green	2011	NBDC
Stonechat	*Saxicola torquata*		Green	2011	NBDC
Treecreeper	*Certhia familiaris*		Green	1991	NBDC
Water rail	*Rallus aquaticus*		Green	2021	I-WeBS
Whitethroat	*Sylvia communis*		Green	1991	NBDC
Woodpigeon	*Columba palumbus*		Green	1991	NBDC
Wren	*Troglodytes troglodytes*		Green	1991	NBDC
Vagrant species					
American golden plover	*Pluvialis dominica*		n/a	2010	NBDC
American wigeon	*Anas americana*		n/a	2009	NBDC

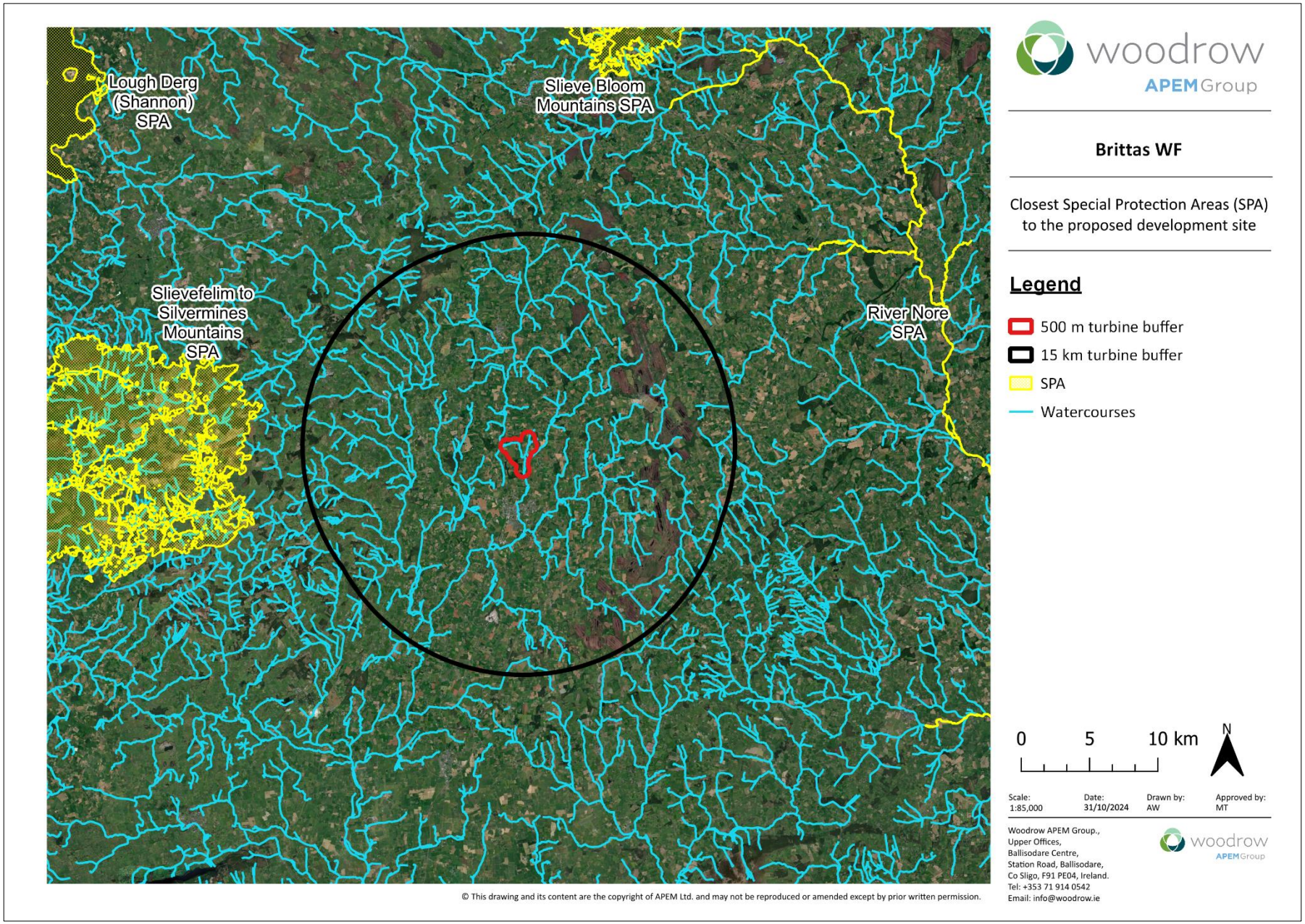

Figure 7A.3: Location of SPAs in relation the proposed Wind Farm Site

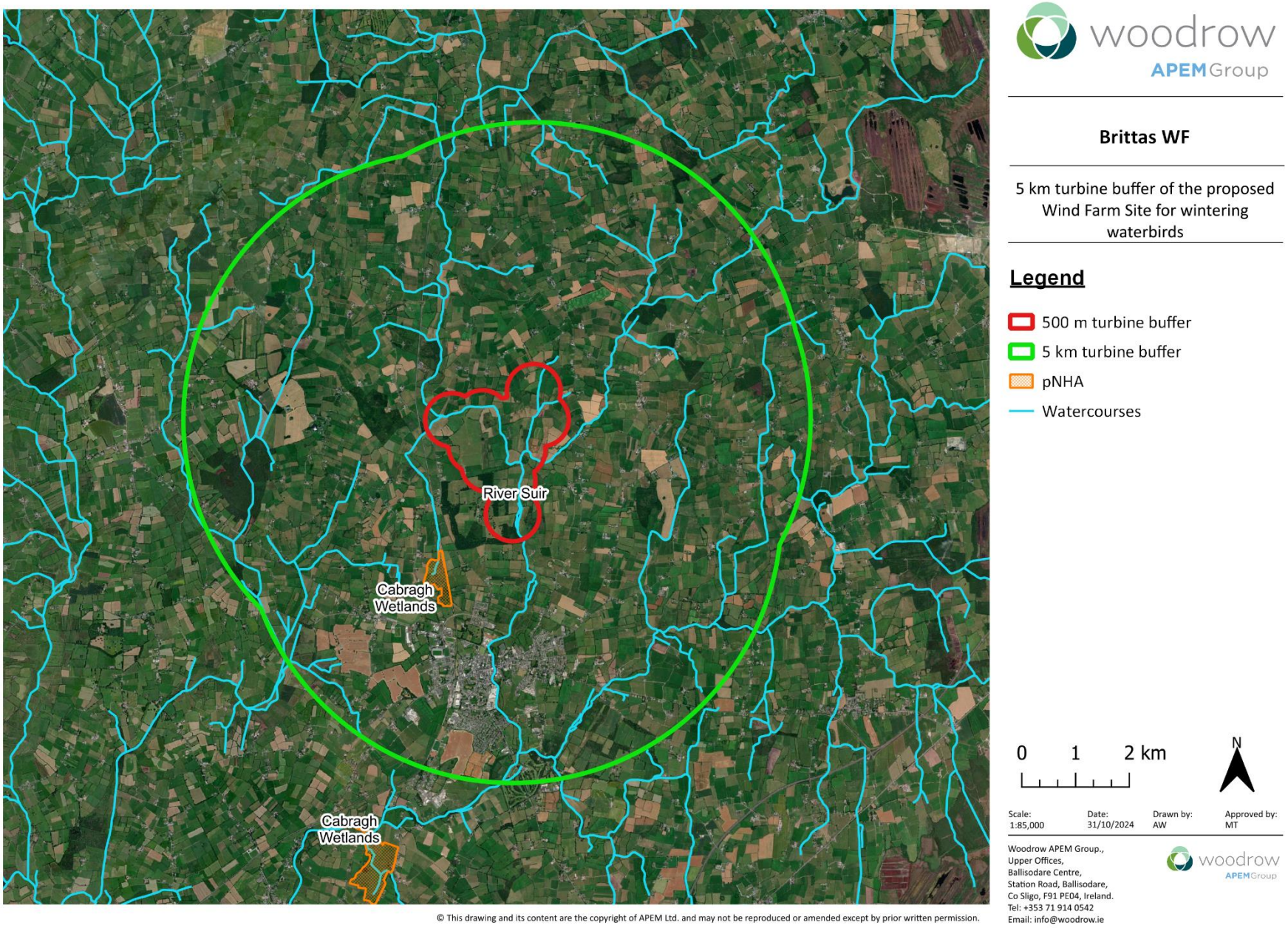

Figure 7A.4: Location of pNHAs with an ornithological interest in the vicinity of the proposed Wind Farm Site

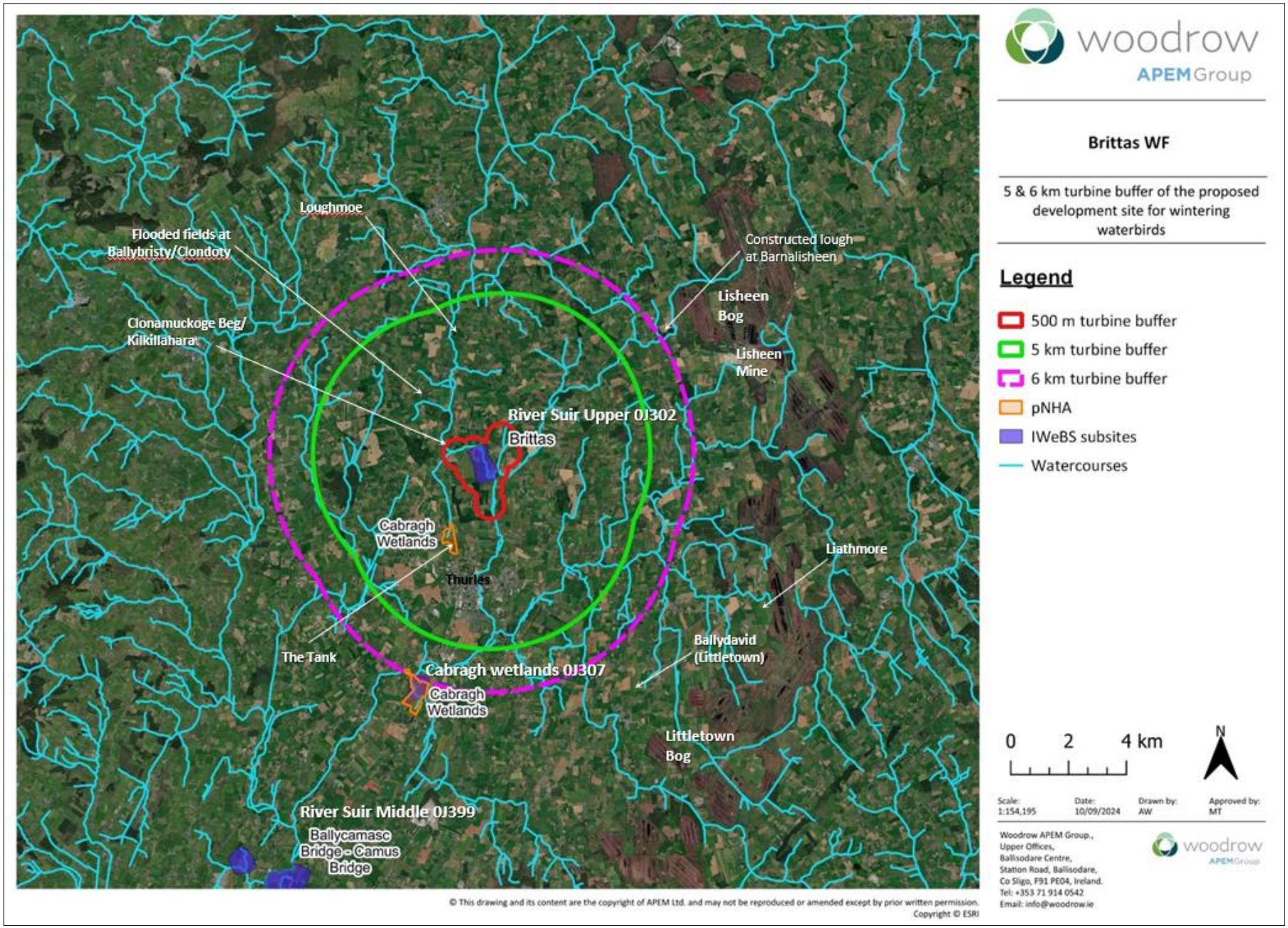

Figure 7A.5: I-WeBS count sections and other wetlands identified for monitoring

Table 7A.2: I-WeBS peak counts for River Suir Upper (0J302) – winter 2011/12 to 2020/21

Source: Irish Wetland Bird Survey, BirdWatch Ireland accessed via: https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/

Species	1% National	1% International	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21
Mute swan	90	100	3	6	5	6	2	5	2	No count	3	5
Whooper swan	150	340	28	16	17	24	10	21				
Greylag goose	35	980	2									
Wigeon	560	14,000	6		10		2					
Teal	360	5,000	50		27	50	1					25
Mallard	280	53,000	7	2								
Cormorant	110	1,200							1			
Little egret	20	1,100	1	2			2		1		1	3
Grey heron	25	5,000	1			1		1	1			4
Moorhen					2							
Golden plover	920	9,300			4							1
Lapwing	850	72,300	200		300	90	220		12		65	170
Dunlin	460	13,300							3			
Snipe					1							
Curlew	350	7,600	12			30	1		5			
Black-headed gull			21			4					7	1
Lesser black-backed gull					200	4	5		200			

Table 7A.3: I-WeBS peak counts for Cabragh Wetlands (0J307) – winters 1994/95 to 2010/11

Source: Irish Wetland Bird Survey, BirdWatch Ireland accessed via: https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/

Species	1% National	1% International	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Mute swan	90	100	7	8	6	8	6	5	16	4	3	9	5	4	7	2	11	3	6
Bewick's swan	20	220			P														
Whooper swan	150	340		6	12	21	13		9		5	12		24	5		64	85	
Eur white-fronted goose					2														
Gr white-fronted goose	100	190			10												45		
Greylag goose	35	980			17	25	16	13	10		6	16	1	9	10	8	19	22	25
Canada goose	Non-native				1														
Wigeon	560	14,000	83	200	400	590	425	350	300	350	180	320	420	400	305	240	120	180	120
Gadwall	20	1,200	9	2	1	2	2	6	4	2	3	3	7	14	4	16	17	10	4
Teal	360	5,000	250	100	200	670	560	420	570	400	310	450	370	350	600	250	520	500	500
Mallard	280	53,000	80	50	100	140	160	125	125	68	150	130	160	120	140	100	60	80	120
Pintail	20	600	17	4	20	14	6	6	24	4	9	12	3	1	2	4	16	3	9
Shoveler	20	650	14	40	20	58	78	50	12	32	36	28	36	21	38	22	11	30	12
Pochard	110	2,000			P	2	4				1	1							
Tufted Duck	270	8,900			P						1		1	1					
Little Grebe	20	4,700			2	7	2	1	1	1	2	1	4	1	1	1			
Great crest grebe	30	6,300			P														
Cormorant	110	1,200		3		1		13			3		12		2				3
Bittern					1														
Little egret	20	1,100											1	1	3	4	6	3	1
Grey heron	25	5,000	3	6	4	7	2	4	5	2	1	1	2	3	2	1	3	1	1
Water rail			2	2	4	4	4	3	7	4	5	5	4	3	2	5	2	4	1
Moorhen			10	6	6	8	6	6	5	6	5	4	4	3	3	2	3	3	2
Coot	190	15,500	30	5	12	17	16	2	1	2	2			2	1		5		
Golden plover	920	9,300		50	200	900	200	400	200	400	100	400	1,300	2,000	120		700		
Lapwing	850	72,300	450	120	400	700	500	480	475	420	700	800	2,100	1,500	250	750	750	50	400
Dunlin	460	13,300				1											1		
Ruff					1														
Snipe			10	10	39	36	25	55	5	8	6	39	168	20	15	7	20	60	10
Woodcock					P														
Black-tailed godwit	200	1,100											1			1		1	
Curlew	350	7,600		30	30	151	112	58	140	210	195	170	310	102	165	50	200	200	55
Redshank	240	2,400													1		1		
Kingfisher					P	1	1						1						1
Black-headed gull			3		200	200	8	12		15	50	80	30	26	52	130	50	10	20
Lesser black-backed gull						310							50	4		10			
Herring gull					P														

Table 7A.4: I-WeBS peak counts for Cabragh Wetlands (0J307) - winters 2011/12 to 2020/21

Source: Irish Wetland Bird Survey, BirdWatch Ireland accessed via: https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/

Species	1% National	1% International	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21
Mute swan	90	100	6	6	3	5	2	5	8	nc	2	4
Bewick's swan	20	220								nc		
Whooper swan	150	340	22					1		nc		
Eur white-fronted goose										nc		
Gr white-fronted goose	100	190								nc		
Greylag goose	35	980	15	11	18		6			nc	20	9
Canada goose	Non-native									nc		
Wigeon	560	14,000	270	101	170	150	15	150	250	nc	130	185
Gadwall	20	1,200	4	16	17	10	4	8	3	nc		8
Teal	360	5,000	410	600	350	450	250	200	300	nc	150	280
Mallard	280	53,000	70	44	100	90	40	50	46	nc	2	45
Pintail	20	600	9			1				nc		8
Shoveler	20	650	7	7	12	7	4	6	20	nc		8
Pochard	110	2,000								nc		
Tufted Duck	270	8,900			1					nc		2
Little Grebe	20	4,700	1	1						nc		1
Great crest grebe	30	6,300								nc		
Cormorant	110	1,200	1					1		nc		2
Bittern										nc		
Little egret	20	1,100	1	6	1	5	8	3	2	nc	2	2
Grey heron	25	5,000	1	1	1	1	1	1	2	nc	2	13
Water rail			1	2	2	4	2	2	2	nc	1	3
Moorhen			1	3	5	1	2	2		nc		3
Coot	190	15,500	2	1						nc		2
Golden plover	920	9,300	250	80		50	10	15	40	nc		13
Lapwing	850	72,300	1,100	370	4	90	320	17	200	nc	400	150
Dunlin	460	13,300								nc		
Ruff										nc		
Snipe			5	6	4	1	25	2	12	nc		8
Woodcock										nc		
Black-tailed godwit	200	1,100								nc		
Curlew	350	7,600	120	70	7	110	145	65	154	nc	130	80
Redshank	240	2,400								nc		
Kingfisher						1				nc		
Black-headed gull			80	20	70	4	30	50	20	nc	6	12
Lesser black-backed gull					3	25	10			nc		30
Herring gull										nc		

Table 7A.5: I-WeBS peak counts for River Suir Middle (0J301) – winter 2011/12 to 2020/21

Source: Irish Wetland Bird Survey, BirdWatch Ireland accessed via: https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/

Note: Site has two separate sections along River Suir including, Subsite: 0J399 - Ballycamasc Bridge - Camus Bridge (closest to Thurles) & Subsite: 0J396 – Newcastle -Caher (further south)

Species	1% National	1% International	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21
Mute Swan	90	100		9	9	31	22	41	45	40	52	34
Whooper swan	150	340		42	70	38	50	102	120	103	107	66
Greylag goose	35	980					2	2	4			
Shelduck	100	25,00					1					
Wigeon	560	14,000		20		40	135	29	130	12	191	8
Teal	360	5,000				120	60	47	150	73	25	42
Mallard	280	53,000	2	13	20	84	48	34	48	42	23	26
Shoveler	20	650						1		4	3	4
Little grebe	20	4,700				1		3				
Cormorant	110	1,200	6	15	3	2	37	12	27	17	24	7
Little egret	20	1,100			1		11	1	7	6	13	14
Grey heron	25	5,000	1		1	1	2	4	3	7	13	8
Moorhen					3	6	1	2	5	5	4	1
Grey plover	30	2,000										50
Lapwing	850	72,300		50	70	25	6	4	90	70	62	75
Snipe					3	8	12	9	11	18	6	16
Black-tailed godwit	200	1,100									2	
Curlew	350	7,600		70	76	60	112	66	110	66	59	2
Green sandpiper										1	2	1
Common sandpiper							1					
Kingfisher			1				1			1	1	
Black-headed gull					48	62	2	50		40	3	50
Common gull								100	47	9	5	1
Lesser Black-backed gull					15	45	4		16	45	5	25

7A.3. METHODOLOGY AND SURVEY EFFORT

SNH (2017) guidelines provide recommended survey methodologies for the assessment of avian populations within and adjacent to onshore wind farms. Methodologies utilised for ornithological surveys are outlined in the following sections and adhere to the relevant SNH guidance.

Two years of ornithological surveys are recommended by the SNH guidelines unless it can be demonstrated that a single year of data is sufficiently robust and appropriate for assessing the potential impacts of the proposed Wind Farm Site. In this case, four full seasons of data were collected, spanning from October 2021 to September 2023.

A preliminary year of surveying was undertaken between October 2020 and August 2021. Methodology, survey effort and results for this study year are present in Appendix 7I (Fehily Timoney, 2022).

7A.3.1. Vantage Point (VP) watches

VP watches record flight-line activity in relation to the 500 m turbine buffer (proposed Wind Farm Site) to provide data on selected target species for assessing avian collision risk. Target species are those identified as being at risk from displacement effects caused by wind farm developments or from collision with turbines. Target species for which flight-line data was captured included the following species groups:

- All waterbird species, with particular attention to species listed as Special Conservation Interests (SCIs) of any SPAs considered to be within the potential zone of influence of proposed turbine locations
- All birds of prey
- Any species listed on Annex I of the Birds Directive
- Any species listed as Red or Amber on the BoCCI 2020-26 (Gilbert *et al.*, 2021), where collision risk presents potential for population level effects. During Year 2 of the study, swifts were upgraded to red listed and, consequently, over the breeding season 2021 swifts were included as target species during VP surveys.

Four VPs were used to cover the 500 m turbine buffer, the locations of which are shown in Figure 7A.3. Based on viewshed analysis conducted for a 15 m elevation above ground level, these four VPs provide sufficient coverage (100%) of the 500 m buffer around proposed wind turbine locations. The output maps from viewshed analysis are provided in Appendix 7D and it is worth noting that VPs were set up to cover a larger area, which reduced in size as the number of proposed turbines was reduced. The VPs selected to cover the proposed Wind Farm are compliant with the SNH (2017) guidelines, which stipulate that viewsheds from VPs should not extend more than 2 km and that the angle of view should also not be extended beyond an arc of 180 degrees.

Based on viewsheds extending 2 km, some of the viewsheds of the VPs overlap – see viewshed maps provided in Appendix 7D. Therefore, it is acknowledged that as a function of coverage (survey effort), the flight seconds reported cumulatively for all the VP watches will provide an overestimate for flight times. To avoid any duplication of flight records, an effort was made to limit conducting VP surveys simultaneously by two or more surveyors from VPs with overlapping viewsheds. To limit observer fatigue, surveyors did not typically undertake VP watches of more than 3 hours in duration without a

break unless inclement periods of weather meant watches were paused for short durations until conditions improved.

VP watches involve the surveyor observing birds from a stationary position using binoculars and a telescope. In accordance with SNH (2017), the viewshed of the VP is scanned continuously. When a target species is seen, the surveyor estimates the height of the bird and its usage of the area by drawing its flight path on a map and noting its behaviour. Flight heights are estimated visually using known heights of features within the viewsheds, such as telegraph poles, plantations and contours as a reference. Other data collected includes the number of birds, time of detection and duration of flight, as well as sex and age class if relevant. A list of all non-target species encountered within the environs of the proposed Wind Farm Site is also compiled during VP watches, though priority is given to recording target species when busier periods of flight activity occur.

The aim for a given season, i.e. breeding season (typically mid-March/April to August/September) and non-breeding season (typically September/October to mid-March), is to conduct a minimum of 36 hours of watches per VP per season, ensuring that watches are spread relatively evenly over the study period. This target was reached for each of the vantage point locations for the duration of the four seasons of monitoring, with some VPs receiving an excess of 36 hours. Therefore, the flightline data collected is considered sufficient to identify any potential ornithological constraints arising from potential collision risk.

A summary of dates that VP watches were undertaken, and the duration of watches completed at each VP location us given in Table 7A.6. Further details on survey effort for VP watches and weather conditions are provided in Appendix 7C.

7A.3.2. Collision Risk Modelling

Appendix 7H provides a detailed method statement for the collision risk modelling applied along with results.

VP watches are conducted to collect flight line data which can then be used to model collision risk. The flight risk volume applied in this analysis is derived from a buffer extending 500 m from the proposed turbine locations, which for the proposed Wind Farm Site equates to an area of 490.53 ha. Flights occurring within the 500 m turbine buffer and at heights of between 25 m and 180 m above ground level were defined as being within the collision risk zone (CRZ). A height band of 25-180 m was selected as it this represents the minimum and maximum rotor swept heights of all turbine types being assessed, as derived from blade length and hub height. Three sets of turbine specifications were assessed, hereafter referred to as Turbine Type A, Turbine Type B and Turbine Type C, and the following specifications:

- Turbine Type A - rotor swept dimensions: 30 m to 180 m (rotor diameter 150 m)
- Turbine Type B - rotor swept dimensions: 25 m to 180 m (rotor diameter 155 m)
- Turbine Type C - rotor swept dimensions: 31 m to 180 m (rotor diameter 149 m)

For target species generating sufficient levels of flight time within the CRZ, data sets were run through a collision risk model (CRM), as detailed in Scottish Natural Heritage (SNH, 2000) and Band *et al*. (2007), employing avoidance rates as given in SNH (2018a). This provides estimates of the number of collisions per annum and for the lifetime of the proposed Wind Farm (35 years).

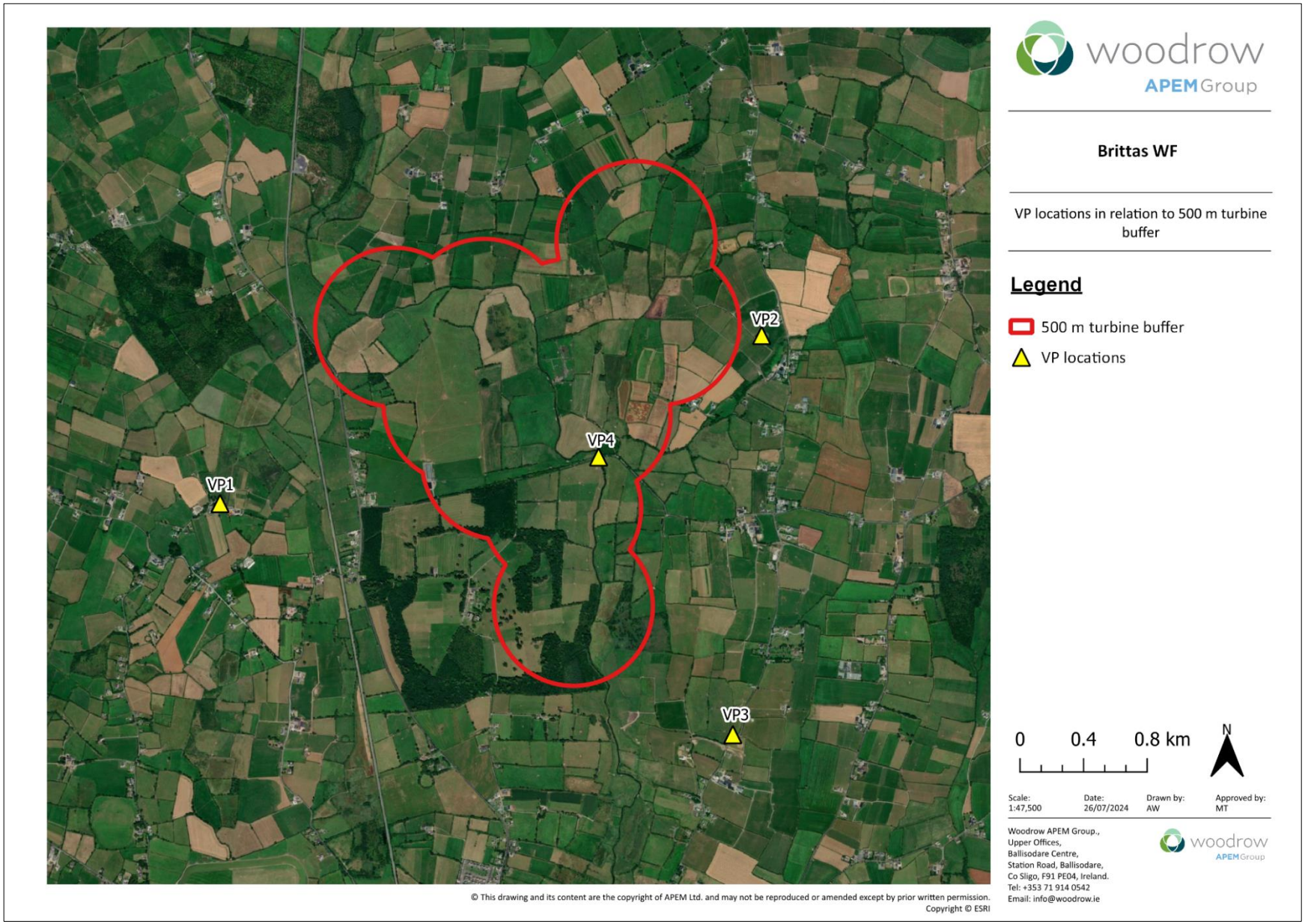

Figure 7A.6: Vantage point (VP) locations showing extent of 500 m turbine buffer

Table 7A.6: Dates and duration for VP watches

Non-breeding season 2021-2022				
Date	**VP1**	**VP2**	**VP3**	**VP4**
23/10/2021		6		
24/10/2021	6			3
25/10/2021				3
26/10/2021			6	
11/11/2021	6			
12/11/2021		3		3
13/11/2021	3			3
22/11/2021		6		
23/11/2021			3	
24/11/2021			3	
01/12/2021	3	3		
02/12/2021			3	3
16/12/2021	3		3	
17/12/2021				3
20/12/2021		3		3
21/12/2021			3	
09/01/2022				3
18/01/2022	3	3		
19/01/2022			3	3
20/01/2022	3			
22/01/2022		3		
23/01/2022			3	
08/02/2022	3	3		
24/02/2022	3		3	3
26/02/2022		3	3	3
07/03/2022	3		3	3
13/03/2022		3		
Total	**36**	**36**	**36**	**36**

Breeding season 2022				
Date	**VP1**	**VP2**	**VP3**	**VP4**
11/04/2022	6			
12/04/2022				6
13/04/2022	6			
18/04/2022			6	
05/05/2022	6			
06/05/2022				6
12/05/2022			6	
13/05/2022		6		
02/06/2022	3			
03/06/2022	3			
20/06/2022		3	3	
24/06/2022		3	3	
25/06/2022			3	
02/07/2022				3
04/07/2022	3			3
06/07/2022		6		
16/07/2022	3			3
24/07/2022			9	
05/08/2022	3	3		
08/08/2022		3	3	
22/08/2022				6
25/08/2022	6			
28/08/2022		6		
30/08/2022	3		3	
31/08/2022				3
Total	**36**	**36**	**36**	**36**

Non-breeding season 2022-2023				
Date	**VP1**	**VP2**	**VP3**	**VP4**
24/10/2022	1.5			
27/10/2022	2			3
29/10/2022		3	3	
31/10/2022		3	3	
27/11/2022	6			
28/11/2022		6		
29/11/2022			6	
30/11/2022				6
09/12/2022	3			3
12/12/2022	3	3		
27/12/2022		3	3	
29/12/2022			3	3
15/01/2023		6		
21/01/2023	6			
22/01/2023				6
25/01/2023	3	3		
29/01/2023			6	
05/02/2023	6			
06/02/2023		6		
18/02/2023			6	
19/02/2023				6
01/03/2023			3	3
04/03/2023	6			
05/03/2023			6	
06/03/2023		3		3
24/03/2023				2.5
26/03/2023				1
Total	**36**	**36**	**39**	**36.5**

Breeding season 2023				
Date	**VP1**	**VP2**	**VP3**	**VP4**
06/03/2023		3	3	
25/03/2023	3	3	3	
26/03/2023				3
22/04/2023			6	
23/04/2023	6			
29/04/2023		6		3
30/04/2023				3
14/05/2023	6			
01/06/2023		3	3	
09/06/2023	3			
12/06/2023	3			
16/06/2023				3
19/06/2023		3	3	
26/06/2023				3
27/06/2023		6		3
28/06/2023			6	3
05/07/2023	3			
06/07/2023	3			
18/07/2023			6	
19/07/2023				6
31/07/2023		6		
03/08/2023	3			
09/08/2023		6		
10/08/2023				6
16/08/2023			6	
21/08/2023	3			
27/08/2023			3	
28/08/2023		3		3
19/09/2023	3			
20/09/2023				3
Total	**36**	**39**	**39**	**39**

7A.3.3. Breeding bird surveys

The purpose of the site walkovers or point counts, according to SNH (2017) guidelines, is to give a broad overview of bird activity within the 500 m turbine buffer using a route which is representative of the important ornithological features/habitats present. Breeding bird surveys aim to provide information on the distribution of breeding birds throughout the 500 m turbine buffer, highlighting the locations of potentially sensitive species to be flagged as ecological constraints, e.g. breeding waders or raptors. Various methods are employed depending on the habitat type and the expected species, information which is highlighted in the desk study. As such, the survey methodology employed a range of survey techniques determined by desk study such as proximity to designated sites, habitat availability and associated avian assemblages. The study area for breeding bird walkovers encompasses the 500 m buffer of the turbine locations within the proposed Wind Farm Site.

Based on topography and habitat availability, the desk study determined that the proposed Wind Farm Site had the potential to support a range of target species, including raptors (e.g. peregrine, kestrel, buzzard and sparrowhawk), lowland breeding waders (e.g. snipe, lapwing, redshank, curlew), riverine species (e.g. kingfisher) and crepuscular/nocturnal woodland species (e.g. woodcock and long-eared owls).

Two seasons (2022 and 2023) of breeding bird walkover surveys were carried out, with survey visits taking place at least seven days apart. The dates of these surveys are shown in Table 7A.7, further details such as weather conditions available in Appendix 7C. Additional visits were undertaken in 2024 to cover the proposed location for the onsite electrical substation, and the area was surveyed on 31 May and 05 June 2024, with the main focus being coverage for breeding snipe and potential usage by other waders. Appendix 7I provides details for breeding bird surveys undertaken over the 2020 breeding season (Fehily Timoney, 2022).

7A.3.3.1. Adapted common bird census (CBC) methodology

Breeding bird surveys were undertaken following common bird census (CBC) methodology, as described in Gilbert *et al*. (1998) - summarising Marchant (1983) and Marchant *et al*. (1990). This approach, which employs territory mapping, is typically used where there is a requirement to map the distribution of breeding birds across an entire site. Strict application of CBC methodology, which is undertaken for long-term population monitoring and high levels of accuracy in mapping breeding distribution, requires a minimum of 10 visits between March and July, conducted at intervals of at least 10 days apart. As outline in SNH (2017), this level of detail is not required for proposed wind farm developments; and the purpose of the walkovers is to identify and then survey habitats potentially supporting target species and also to sample the range of different habitat types present within the proposed Wind Farm site to generate a general description of avian assemblages occurring that is used inform the ornithological baseline. Survey dates are provided in Table 7A.7 and for this lowland site the minimum number of site visits undertaken was three.

CBC surveys can commence from sunrise and are undertaken over the early morning period for a duration of up to four hours. While it is advised that surveyors avoid the hour before sunrise (i.e. the dawn to sunrise period), this time period was incorporated into surveys for snipe, as detailed in O'Brien & Smith (1992) that also allows for lowland wader surveys to be conducted through the day on some visits. For CBC methodology it is also suggested that incorporating evening visits can be useful for more accurately mapping the occurrence of certain species, e.g. woodcock that display around dusk or grasshopper warblers that tend to be more vocal at dusk.

The survey area is covered at a slow pace and the routes selected cover all suitable breeding wader habitat within the 500 m turbine buffer including the River Suir and associated wetland habitats on the floodplain, with consideration given to any suitable habitat for curlew out to 800 m. The route adopted also allowed for sampling of all the other distinct habitat types occurring within the proposed Wind Farm Site, including the woodland and pastural grassland with treelines/hedgerows. Systematic point counts were not employed to cover the blocks of woodland/forestry plantations, as these were relatively small and could be adequately covered by walking slowly through them or around the periphery.

Appendix 7C provides details on weather conditions encountered during walkover surveys and ideally, to ensure bird activity is not suppressed and to facilitate optimal detection, surveys should not be undertaken in unfavourable weather conditions, specifically moderate to strong winds (greater than Beaufort Force 5), persistent rain and/or in poor visibility.

While walkover surveys covered habitats within the proposed Wind Farm Site that were suitable for breeding raptors, including: buzzard, sparrowhawk, kestrel, and peregrine, the time required to detect breeding sites for these species, as outlined in Hardey *et al*. (2013), is not facilitated during walkovers. As such, any raptor observations recorded during walkovers were examined together with observations from VP watches and breeding raptor surveys covering a search area out to 2 km to identify breeding territories.

7A.3.3.2. Breeding snipe surveys

Suitably wet areas within the 500 m turbine buffer were covered for breeding snipe, including wetlands associated with the River Suir floodplain. Additional breeding snipe surveys were conducted in 2024 to cover a small area of fen/wet grassland at the proposed location for the onsite electrical substation.

As detailed in Gilbert *et al*. (1998), summarising O'Brien & Smith (1992), surveys running from dawn to three hours after, or late afternoon to dusk, were employed to increase the chances of detecting breeding behaviour, including chipping, or drumming snipe. These surveys would also detect the occurrence of other lowland breeding waders, including lapwing, redshank and curlew, all other bird species encountered were also noted, along with an indication of behaviour so that breeding status could be determined.

Suitable areas of habitat were covered three times over the breeding season between mid-April and early June, with visits at least seven days apart. To maximum detection of displaying birds surveying on cold, very wet and windy (> Beaufort Force 3) was avoided.

Discretion is required on interpretation of early spring breed behaviour in snipe, as sometimes these can be birds on passage, simply gearing for the breeding season and will move on set up territories elsewhere. Likewise, lapwing and often start displaying early in the season and then move on.

7A.3.3.3. Dusk surveys

Dusk surveys targeting woodland areas within the 500 m turbine buffer were carried out on calm, dry nights specifically to identify any roding woodcock (territorial males) and long-eared owls, as detailed in Gilbert *et al.* (1998) and Hardey *et al*. (2013). Survey would also detect other crepuscular/nocturnal species if occurring, such as nightjar. Dates for dusk surveys are listed in Table 7A.9. Further details on weather and survey efforts are provided in Appendix 7C.

For woodcock surveys commenced roughly 15 minutes before sunset and continued up until 60 minutes after sunset between May and June, as recommended by UCC Irish Woodcock Project (UCC

Ornithology Group, 2021). Surveyors targeted relatively short sections of woodland edge with associated scrub/forestry rides during each survey.

Dusk/dawn surveys for long-eared owl were carried out during targeted periods, when this species is most vocal, specifically early in the season (late March to May) when males and females tend to be most actively calling and late in the season (late June and into August) when young can be detected begging loudly. One survey was undertaken before dawn and incorporated with a short walkover at a wetland to check for breeding snipe. During dusk/dawn surveys, surveyors also listened for other crepuscular/nocturnal species, such as barn owls and possibly nightjars, as well as species that are known to be more active over this period, like snipe, water rail and grasshopper warblers.

Dusk/dawn surveys would detect barn owl activity, however surveying for this species involves assessing any buildings and veteran trees within 1 km of proposed turbines for potential to support barn owls. Any incidental records of crepuscular/nocturnal bird species were noted during bat surveys that were undertaken by APEM Group Woodrow; this included internal inspection of buildings and veteran trees within the proposed Wind Farm Site.

7A.3.3.4. Kingfisher surveys

Due to the presence of kingfisher along the River Suir, riverine bird surveys incorporating kingfisher habitat suitability assessments for kingfisher were undertaken as part of site walkover surveys. Kingfisher habitat suitability assessments were carried out to determine the quality of the foraging habitat and the extent riverbank with the material, structure and form favoured by this species for excavating nest holes – essentially taller, vertical banks with friable materials that are not susceptible to flooding during the summer months.

The methodology employed to assess kingfisher habitat suitability followed criteria outline in Cummins *et al*. (2010) and used in other baseline kingfisher surveys conducted in Ireland (Crowe *et al*., 2008 & Thomas *et al*. 2007). The survey area, defined as the River Suir flowing through the 500 m turbine buffer was divided into sections, each *c*. 600 m. The following characteristics of the sections were noted to provide an assessment of potential for breeding and foraging kingfisher:

- Nesting habitat - bank profile, height and material (typically kingfisher require tall vertical banks with soft material for excavating nest burrows, although existing holes e.g. amongst tree roots, in solid structures and in dead sections of trees are occasionally utilised). The extent of suitable nesting banks was defined for each section as:
    1. less than 10 m of suitable bank;
    2. 10-100 m of suitable bank; or
    3. more than 100 m of suitable bank
- Foraging habitat - water quality and flow, occurrence of fishing perches (e.g. overhanging trees)
- Potential disturbance factors

Kingfisher habitat assessments were conducted on 12 May 2022 (River Suir south of Rossestown Bridge) and on 06 June 2022 (River Suir north of Rossestown Bridge).

7A.3.3.5. Data capture for walkover surveys

During site walkovers georeferenced data was collected using Survey123 and routes/coverage were tracked using the Outdoor Active application (previously ViewRanger). In addition to target species, point data on the occurrence of non-target species was recorded to provide an indication of the bird assemblages occurring within the proposed Wind Farm Site. Surveyors identify and record the activity of birds and at the end of the season the maps for the series of visits are analysed together. This

highlights concentrations or clusters in breeding activity for species and a picture emerges showing the location of breeding territories across the site. If required, the number of territories for each species can be reported.

Table 7A.7: Survey effort for breeding bird walkover surveys covering proposed Wind Farm Site

Breeding season 2022		
Date	**Survey type**	**Surveyor**
28/04/2022	Walkover	SM
29/04/2022	Walkover	SM
11/05/2022	Walkover	MT
12/05/2022	Walkover (O'B&S)	MT
16/06/2022	Walkover	MT
26/06/2022	Walkover (O'B & S)	SM
27/06/2022	Walkover	SM
26/07/2022	Walkover	SM

Breeding season 2023		
Date	**Survey type**	**Surveyor**
13/04/2023	Walkover	EM
26/04/2023	Walkover (O'B & S)	EM
09/05/2023	Walkover	PDEV
22/05/2023	Walkover	PDEV
28/06/2023	Walkover (O'B & S)	EM
29/06/2023	Walkover	EM
24/07/2023	Walkover	JH

Table 7A.8: Survey effort for dusk/dawn surveys for owl and woodcock (WK)

Breeding season 2022		
Date	**Survey type**	**Surveyor**
11/05/2022	Dusk survey (WK/Owl)	SM
11/05/2022	Dusk survey (WK/Owl)	MT
12/05/2022	Dawn survey (Owl/SN)	MT
22/05/2022	Dusk survey (WK/Owl)	SM
23/06/2022	Dusk survey (WK/Owl)	SM

Breeding season 2023		
Date	**Survey type**	**Surveyor**
23/03/2023	Dusk survey (Owl)	JH
09/05/2023	Dusk survey (WK/Owl)	PDEV
22/05/2023	Dusk survey (WK/Owl)	PDEV
09/06/2023	Dusk survey (WK/Owl)	EM
28/06/2023	Dusk survey (WK/Owl)	EM
25/07/2023	Dusk survey (Owl)	EM
16/08/2023	Dusk survey (Owl)	KW

7A.3.4. Wider area breeding raptor surveys

SNH (2017) recommends surveying the wider area (hinterland) for up to 2 km from a proposed wind farm development for most breeding raptor species, including hen harrier and merlin. Surveys for breeding eagle require a larger search area (6 km buffer); however based on the desk study, this region is beyond the current Irish breeding range for white-tailed eagle and golden eagle. The search area can also be extended, if the site lies within the potential zone of influence to any SPAs (SNH, 2016). The proposed Wind Farm Site was considered to be too distant to be associated with any SPAs designated for raptors and therefore, using a 2 km buffer on the proposed turbine as the breeding season search area was deemed appropriate and is shown in Figure 7A.7. For barn owl a search area covering the 1 km turbine buffer was established, based on SNH (2017) guidelines, and searches targeted old buildings and veteran trees for potential usage by breeding barn owls.

A combination of 'mini-VPs', as well as driven and walked transects were used to search potential nesting habitats within the hinterland over the 2022 and 2023 breeding seasons. Survey methods for breeding raptors follow those outlined in Hardey *et al.* (2013). The dates of the wider area raptor surveys are shown in Table 7A.9. Further details on weather and survey efforts are provided in Appendix 7C.

Raptor observations recorded during VP watches and site walkovers were examined together with observations from wider area breeding raptor surveys to identify breeding territories.

Table 7A.9: Survey effort for wider area breeding raptors

Breeding season 2022		
Date	**Survey**	**Surveyor**
28/04/2022	Breeding raptor	SM
29/04/2022	Breeding raptor	SM
11/05/2022	Breeding raptor	SM
24/06/2022	Breeding raptor	SM
26/07/2022	Breeding raptor	SM
25/08/2022	Breeding raptor	SM
28/08/2022	Breeding raptor	SM

Breeding season 2023		
Date	**Survey**	**Surveyor**
21/03/2023	Breeding raptor	JH
22/03/2023	Breeding raptor	JH
23/03/2023	Breeding raptor	JH
11/04/2023	Breeding raptor	JH
20/04/2023	Breeding raptor	JH
26/05/2023	Breeding raptor	PDEV
27/06/2023	Breeding raptor	EM
25/07/2023	Breeding raptor	EM
28/07/2023	Breeding raptor	EM

7A.3.5. Winter walkovers of proposed Wind Farm Site

Winter walkovers of the proposed Wind Farm Site were undertaken during winter 2021-22 and 2022-23, during which surveyors walked the proposed Wind Farm Site noting down all species encountered and ensuring that coverage sampled of all important habitat types present. As such, winter walkovers provide useful contextual information on the distribution of winter bird species occurring within the site, how habitats are being utilised and can provide additional information on numbers of birds, especially for flocking species like golden plover and lapwing. As mentioned in Section 2, walkovers are also a more suitable survey method for species which are difficult to detect during VP watches, such as wintering woodcock and snipe.

During winter site walkovers georeferenced data was collected using Survey123 and routes/coverage were tracked using the Outdoor Active application (previously ViewRanger). Point data on the occurrence and behaviour of target and non-target species was recorded.

The dates of the winter site walkovers carried out during winter 2021-22 and winter 2022-23 are listed in Table 7A.10, with further detail on weather and survey effort provided in Appendix 7C.

Table 7A.10: Survey effort for non-breeding season site walkover surveys

Non-breeding season 2021-22		
Date	**Survey type**	**Surveyor**
18/12/2021	Winter walkover	AR
19/12/2021	Winter walkover	AR
21/01/2022	Winter walkover	AR
22/01/2022	Winter walkover	AR
30/01/2022	Winter walkover	AR
27/02/2022	Winter walkover	AR
28/02/2023	Winter walkover	AR

Non-breeding season 2022-23		
Date	**Survey type**	**Surveyor**
23/01/2023	Winter walkover	JH
24/01/2023	Winter walkover	JH
16/03/2023	Winter walkover	JH

7A.3.6. Winter hen harrier roost searches

During the initial desk-based review it was noted that there were no known hen harrier roost within the 10 km Irish nation grid square [S16] encompassing the proposed Wind Farm Site (NPWS, 2022). However, scrub often associated with wetland areas had some limited cover that may superficially appear to be capable of supporting a hen harrier winter roost. SNH (2017) guidance stipulates in relation to surveying for communal raptor roosts, including those of hen harriers, that roost sites within 2 km of a proposed Wind Farm Site should be identified. The dates of winter hen harrier roost

searches are shown in Table 7A.11, with further detail on weather and survey effort provided in Appendix 7C.

The approach to surveying for hen harrier roosts was determined by two factors:

- Availability of potentially suitable roosting habitat in the vicinity of the proposed Wind Farm Site, as described by Clarke & Watson (1990) and in the Irish national hen harrier winter roost survey guidelines (O'Donoghue, 2019); and
- Hen harrier activity was observed during VP watches, site walkovers and wider area surveys.

SNH (2017) defers to Hardey *et al*. (2013) for specific roost survey methodology requiring surveyors to employ professional judgement in identifying and targeting potential roosts based on observed flight activity within or adjacent to the proposed development. Hardey *et al*. (2013) recommend locating birds in the late afternoon and then attempting to track them back to roosts. O'Donoghue (2019) notes that the best time to conduct a roost watch is at least 40 minutes before sunset until dark or 30 minutes before sunrise until at least 30 minutes after sunrise.

If a roost is identified, then further monitoring is required to describe roost attendance and to track flight lines to and from the roost in relation to the proposed Wind Farm Site. Further monitoring is typically undertaken on a monthly basis or twice a month, depending on the frequency of occupancy and how affiliated roosting birds are to the proposed Wind Farm Site.

Table 7A.11: Survey effort for hen harrier roost watch surveys

Non-breeding season 2021-22		
Date	**Survey**	**Surveyor**
25/10/2021	HH roost search	AR
12/11/2021	HH roost search	AR
16/12/2021	HH roost search	AR
19/01/2022	HH roost search	AR
25/02/2022	HH roost search	AR
13/03/2022	HH roost search	AR

Non-breeding season 2022-23		
Date	**Survey**	**Surveyor**
14/09/2022	HH roost search	TR
17/10/2022	HH roost search	TR
21/01/2023	HH roost search	GO
14/02/2023	HH roost search	GO
23/03/2023	HH roost search	JH
23/03/2023	HH roost search	JH

7A.3.7. Wider area wintering waterbird surveys

In assessing the impact of the proposed development, it can be important to provide contextual data on the numbers of wintering waterbirds in the wider area relative to the usage of the proposed Wind Farm Site by these species. SNH (2017) survey guidelines require monitoring of swan and geese foraging and roosting locations when occurring in the environs of the proposed Wind Farm Site, and specifically where SPAs are designated for these species. Study areas of up to 500 m from the proposed Wind Farm Site for foraging locations and up to 1 km from the site for roost locations are recommended, although this may be extended where high levels of activity are anticipated and if investigating connectivity with designated sites.

In Ireland, swan and goose distribution is not well documented beyond designated sites and many wintering waterbirds occur outside of SPAs, with distribution often changing over time in response to changes in land use and other pressures such as hunting. Seasonal availability of resources also affects distribution, such as availability of stubbles in the autumn, as do more stochastic events such as flooding. The results of the desk study (see Section 7A.1) highlighted the availability of wetland habitat along the floodplain of the River Suir, including the River Suir Upper, a count area monitored by I-WeBS which is within the proposed Wind Farm Site. Consequently, two seasons of wider area wintering waterbird surveys were carried out in winter 2021-22 and winter 2022-23.

Survey methodology was based on the approach employed by I-WeBS, with modifications for recording locations and behaviours of birds based on Lewis & Tierney (2014), involving monthly survey visits to cover the survey area, which was extended up to 5-6 km beyond the proposed Wind Farm Site (see Figure 7A.8). As outlined in the desk study (Section 7A.1), the initial wider area wintering waterbirds surveys conducted over winter 2020/21 (Fehily Timoney, 2022) surveyed wetlands further afield, such as Littleton Bog and Liathmore, which are > 9 km away from the proposed Wind Farm Site – see Figure 7A.5. The relatively low numbers of winter waterbirds recorded at these locations and the separation distance meant that further surveying of these more distance wetlands over winters 2021/22 and 2022/23 was not warranted.

The aim was to cover any suitable wetland or other habitat in the wider area that was considered suitable for foraging and/or roosting wintering waterbirds. Surveyors recorded the location of waterbirds and associated behaviour using Surevy123, with survey routes/coverage tracked using the Outdoor Active application (previously ViewRanger). While waterbirds are the focus of this survey, other species are recorded, in particular birds of prey which often start displaying over the late winter/early spring. It should be noted that waterbird activity along the course of the River Suir, as it flows through the proposed Wind Farm Site, was also viewable from all of the VPs used during the study period.

The dates of the surveys are shown in Table 7A.12, with further detail on weather and survey effort provided in Appendix 7C.

Table 7A.12: Survey effort for wider area wintering waterbird surveys

Non-breeding 2021-22			
Visit no.	**Date**	**Survey**	**Surveyor**
1	25/10/2021	I-WeBS	AR
2	23/11/2021	I-WeBS	AR
3	17/12/2021	I-WeBS	AR
4	20/01/2022	I-WeBS	AR
5	25/02/2022	I-WeBS	AR
6	13/03/2022	I-WeBS	AR

Non-breeding 2022-23			
Visit no.	**Date**	**Survey**	**Surveyor**
1	18/10/2022	I-WeBS	CS
2	28/11/2022	I-WeBS	SM
2	30/11/2022	I-WeBS	SM
2	02/12/2022	I-WeBS	SM
3	18/12/2022	I-WeBS	GO
3	31/12/2022	I-WeBS	GO
4	21/01/2023	I-WeBS	GO
4	22/01/2023	I-WeBS	GO
5	14/02/2023	I-WeBS	GO
6	06/03/2023	I-WeBS	GO
6	07/03/2023	I-WeBS	GO
6	13/03/2023	I-WeBS	GO

7A.3.8. Statement on survey limitations

Given that there are three years of survey data are available to inform the ornithological baseline and impact assessment, any gaps in survey effort for site walkover surveys or wider area surveys are compensated for and importantly, it is considered that overall the surveys completed allows for all sensitive ornithological receptors to be identified and potential for likely significant effects to be robustly assessed.

In relation to walkover surveys, it is considered that the most important habitats occurring within the 500 m turbine buffer, namely wetlands potentially utilised by breeding and wintering waterbirds were adequately covered. Likewise, coverage of the wider area for wintering waterbirds was comprehensive. For VP watches no limitations are identified in terms of coverage the site and as

shown by viewshed maps in Appendix 7D, the VPs covered 100% of the 500 m turbine buffer and in fact the use of VP4 results in considerable overlap in viewsheds.

The main survey limitation pertains to flight line data for swifts which was not recorded systematically by all surveyors. Survey approaches differed for recording swift flight times because swift were considered a secondary target species by most surveyors, as prior to Gilbert et al. (2021) swift were amber listed. To account for this limitation a precautionary approach to assessing swift collision risk is required.

Inclement weather conditions, especially during the winter can result in limitations for the ornithological data collected by limiting detectability of birds or supressing bird activity. This is avoided in the first instance, by attempting to undertake surveys within the permitted weather parameters as specified by survey guidelines and as such surveys are scheduled around poor weather conditions. Secondly, weather conditions are monitored throughout surveys to ensure that when poor weather conditions are unexpectedly encountered, these do not dominate the data set, in particular for VP watch data. One of the main weather limitations for VP watch data is reduced visibility across the viewshed. Over the two year study visibility during VP watches was categorised as good 80% of the time, changeable good-moderate 8% of the time, moderate 12% of the time and changeable good-poor only 1% of the time. In addition, wind speeds in excess of Beaufort Force 5 were only encountered on 4% of the VP watches and the majority, 71%, were conducted in Beaufort Force 3 or less. In terms of precipitation, 58% of the VP watches were noted as dry, with periodic rainfall ranging from drizzle to heavy passing showers recorded on the remaining watches and only two VP watches recorded prolonged rainfall. Only one VP watch encountered snow at times. Therefore, there are no significant weather related limitations, and the surveys conditions are considered representative a range of weather parameters.

Overall, despite the minor limitations identified, it is concluded that sufficient data was collected over the study period to identify any ornithological constraints that may arise for the proposed Wind Farm and inform the ornithological impact assessment.

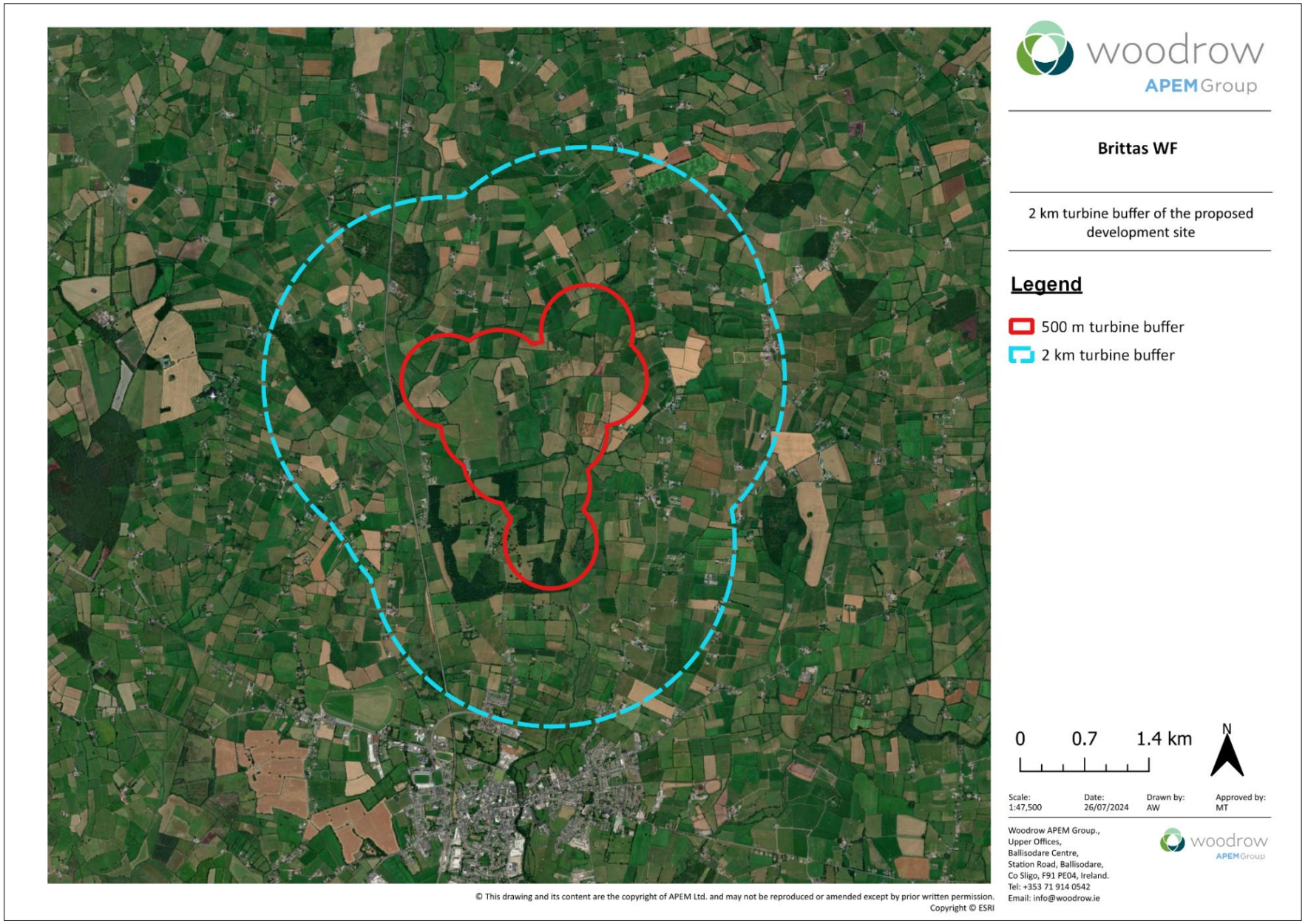

Figure 7A.7: Extent of 2 km turbine buffer monitored for breeding raptors and hen harrier roosts

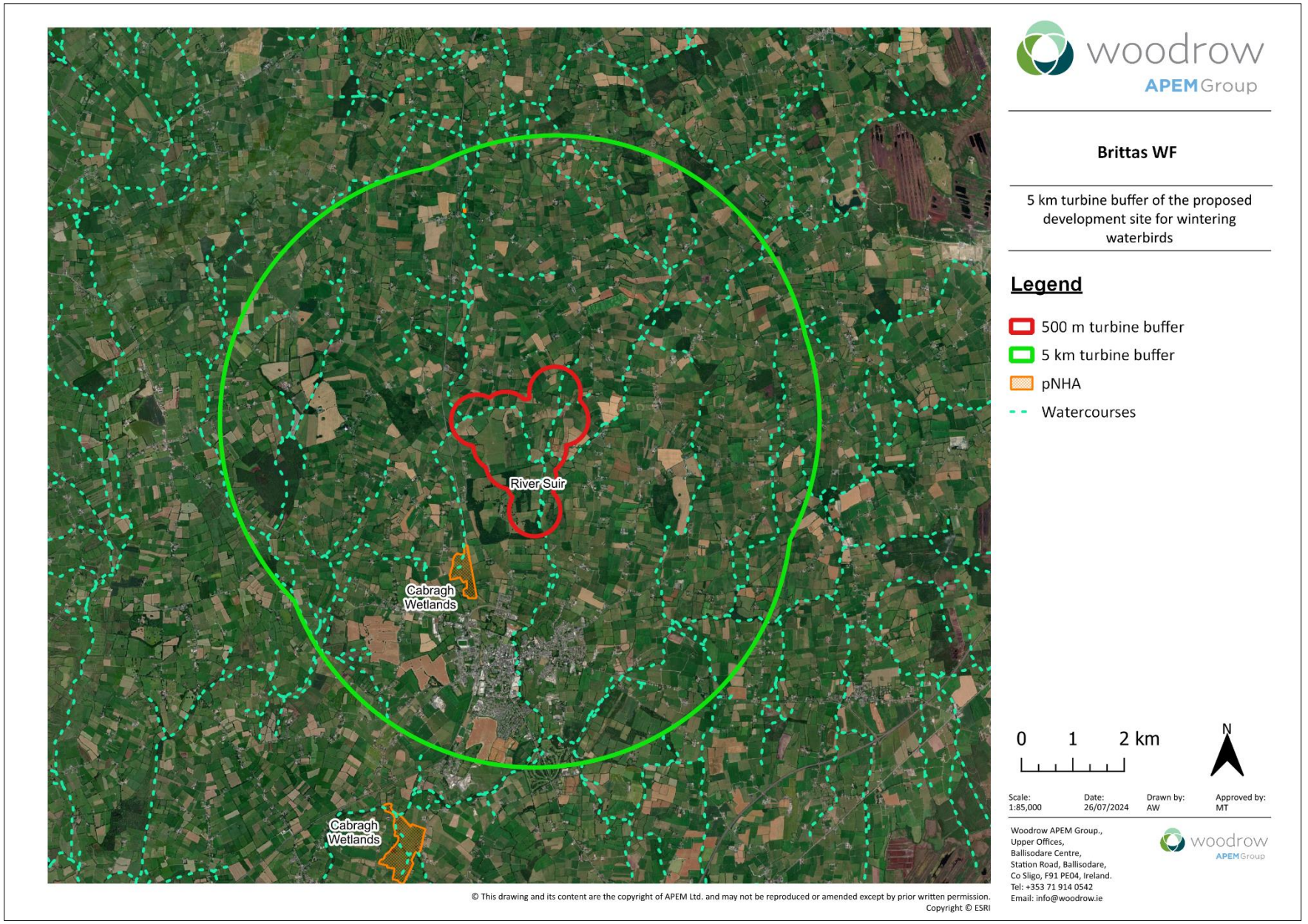

Figure 7A.8: Extent of 5-6 km turbine buffer monitored for wintering waterbird surveys

7A.4. SURVEY RESULTS

7A.4.1. Results – Vantage Point (VP) watches

A total of 23 target species were recorded during VP watches over two years of surveys between October 2021 and September 2023. Flight times for target species recorded within the 500 m turbine buffer over the two year study are provided in Table 7A.13. Flightline maps are provided in Appendix 7E, where individual flightlines shown on the maps can be cross-referenced via identification numbers to additional data on flight behaviour within attribute tables. Table 7A.14 shows seasonal variation in the occurrence of target species and flight activity data.

Flight time is split into different altitudinal levels in order to better understand the extent to which target species fly within the Collision Risk Zone (CRZ). The flight height range of the CRZ was defined as 25 m to 180 m, which was a rotor swept range representative of the lowest minimum rotor swept height and highest tip height for the turbine specifications being assessed, and for two of the turbine types being assessed, with slightly smaller rotor swept ranges, 30 m to 180 m, this was precautionary.

The flight times provided in Table 7A.13 and Table 7A.14 should be viewed as raw flight data that has been clipped to include only flight time within the 500 m turbine buffer. This treatment of the data does not control for overlapping survey effort, as occurs extensively across the viewsheds for VP2, VP3 and VP4, and therefore, the values for flights times are considered as inflated activity values. Analysis conducted through the collision risk modelling weights survey effort to account for overlapping viewsheds.

Species highlighted in bold text in Table 7A.13 are those for which collision risk models have been run. Generally, Collision Risk Modelling (CRM) is run for target species with a total aggregate flight time (i.e., number of individuals x flight time) of > 200 seconds within the CRZ and more than two flights recorded in the CRZ, over the study period.

CRMs were not run for several species recording flight time > 200 seconds within the CRZ (indicated by green text in Table 7A.13), as the flight time was generated by a small number of observations including:

- Dunlin 720 secs generated by 1 observation of 16 birds
- Mallard 431 secs generated by 2 observations of 6 and 4 birds
- Mute swan 1,080 secs generated by 1 observation of 9 birds
- Wigeon 2,420 secs generated by 1 observation of 22 birds

In spite of generating high flight times within the 500 m turbine buffer (325,575 secs) no CRM was run for swift, as flights were not recorded systematically by surveyors over the survey period.

A summary of the results for the collision risk modelling is provided in Section 7A.4.2 and the full collision risk modelling report is included in Appendix 7H.

Table 7A.13: Target species flight time recorded within the 500 m turbine buffer

- Aggregated flight seconds is derived from the sum of all the observed flights, where flight time (seconds) is multiplied by the number of birds recorded for each observation
- Values in **Bold** in Band B (CRZ: 25-180 m) indicate the flight seconds inputted into the collision risk model (CRM)
- Values in **Green** in Band B (CRZ: 25-180 m) indicate that although flight seconds were > 200 secs, CRMs were not run for these species, as the number of flight observations generating the flight time was notably low - only one or three observations at collision risk height recorded over the two-year study period

Target species BoCCI (Gilbert *et al*., 2021) Red, Amber & Green listed *Species listed on Annex I	**No. of obs.**	**No of bird**		**Aggregated flight secs in the 500 m turbine buffer**		
		Min	**Max**	**Band A < 25 m**	**Band B 25-180 m** (CRZ)	**Band C >180 m**
Black-headed gull	6	2	22	1,190	**1,035**	-
Buzzard	193	1	4	2,613	**41,192**	1,149
Common gull	2	1	2	43	70	-
Cormorant	33	1	3	855	**989**	-
Dunlin*	1	16	16	-	**720**	-
Golden plover*	42	3	400	10,100	**719,967**	-
Green sandpiper	1	1	1	11	-	-
Grey heron	54	1	3	1,226	**1,306**	-
Greylag goose	1	1	1	10	-	-
Hen harrier*	1	1	1	89	-	-
Kestrel	83	1	1	2,077	**5,225**	-
Lapwing	153	1	200	50,258	**531,730**	
Lesser black-backed gull	53	1	70	4,661	**52,161**	715
Little egret*	48	1	5	1,960	**721**	-
Mallard	16	1	60	3,047	**431**	-
Mute swan	11	1	9	620	**1,080**	-
Peregrine*	9	1	1	43	**1,107**	-
Snipe	13	1	7	662	**480**	-
Sparrowhawk	7	1	1	53	**785**	-
Swift	6	2	25	324,040	1,575	-
Whimbrel	2	3	3	174	157	-
Whooper swan*	1	2	2	Foraging	-	-
Wigeon	1	22	22	-	**2,420**	-

Table 7A.14: Seasonal breakdown for flight time (aggregated flight seconds)

	Non-breeding season 2021-21				Non-breeding season 2022-23			
Species	**A: 0-25 m**	**B: 25-180 m**	**C: > 180 m**	**Seasonal Total**	**A: 0-25 m**	**B: 25-180 m**	**C: > 180 m**	**Seasonal Total**
Black-headed gull	1,190	570		**1,760**		465		**465**
Buzzard	549	729		**1,278**	9	2,088	3,040	**5,138**
Common gull		70		**70**				
Cormorant	721	275		**996**	42	180		**222**
Dunlin						720		**720**
Golden plover	10,100	178,986		**189,086**		467,592		**467,592**
Grey heron	353	332		**685**	91			**91**
Greylag goose	10			**10**				
Kestrel	437	229		**666**	161	151		**312**
Lapwing	42,642	109,758		**152,401**	1,995	418,395		**420,390**
Lesser black-backed gull	4,167	4,877		**9,043**	195	2,752		**2,947**
Little egret	238	52		**290**	94	140		**234**
Mallard	150	360		**510**		71		**71**
Mute swan	333			**333**	116	1,080		**1,196**
Peregrine	43	96		**139**		9		**9**
Snipe		470		**470**	72			**72**
Sparrowhawk	53			**53**				
Whooper swan	Foraging (2 birds)			**0**				
Wigeon						2,420		**2,420**
	Breeding season 2022				**Breeding season 2023**			
Species	**A: 0-25 m**	**B: 25-180 m**	**C: > 180 m**	**Seasonal Total**	**A: 0-25 m**	**B: 25-180 m**	**C: > 180 m**	**Seasonal Total**
Buzzard	1,153	31,691	1,109	**33,953**	902	6,684		**7,586**
Common gull					43			**43**
Cormorant		38		**38**	92	496		**588**
Green sandpiper					11			**11**
Golden plover		73,389		**73,389**				
Grey heron	268	748		**1,016**	514	225		**740**
Hen harrier					89			**89**
Kestrel	1,163	1,072		**2,236**	316	3,772		**4,088**
Lapwing	5,606	480		**6,086**	15	3,097		**3,112**
Lesser black-backed gull	180	43,724	715	**44,619**	119	807		**926**
Little egret	949	442		**1,391**	679	87		**766**
Mallard	90			**90**	2,807			**2,807**
Mute swan	171			**771**				
Peregrine		960		**960**		42		**42**
Snipe	590	10		**600**				
Sparrowhawk		29		**29**		756		**756**
Swift		1,530		**1,530**	324,040	45		**324,085**
Whimbrel					174	157		**331**

7A.4.2. Summary results for Collision Risk Modelling

Appendix 7H provides the detailed methodology and results for the Collision Risk Models (CRMs) that were run for selected target species. A summary of the outputs is provided in Table 7A.15.

Models were run for target species with a total aggregate flight time of > 200 seconds and more than three flights within the Collision Risk Zone (CRZ) over the two-year study period (October 2021 to September 2023). The CRZ was defined as all flights recorded within the 500 m turbine buffer and at flight heights ranging from 25 to 180 m, which was based on the lowest rotor swept height and highest tip height for the turbine specifications proposed. No CRMs were run for target species recorded with an aggregated flight time of less than 200 seconds, as low flight activity generates imperceptible levels of predicted collision risk over the lifetime of the proposed wind farm. Based on the criteria outlined above, CRMs were run for the following 12 species:

- Black-headed gull: 1,035 flight seconds in CRZ
- Buzzard: 41,192 flight seconds in CRZ
- Cormorant: 989 flight seconds in CRZ
- Golden plover: 719,967 flight seconds in CRZ
- Grey heron: 1,306 flight seconds in CRZ
- Kestrel: 5,225 flight seconds in CRZ
- Lapwing: 531,730 flight seconds in CRZ
- Lesser black-backed gull: 52,161 flight seconds in CRZ
- Little egret: 721 flight seconds in CRZ
- Peregrine: 1,107 flight seconds in CRZ
- Snipe: 480 flight seconds in CRZ
- Sparrowhawk: 785 flight seconds in CRZ

Models were run for three turbine types with the following specifications:

- Turbine Type A: Rotor - swept dimensions: 30 m to 180 m diameter: 150 m Max cord: 4.2 m
- Turbine Type B: Rotor - swept dimensions: 25 m to 180 m diameter: 155 m Max cord: 4.5 m
- Turbine Type C: Rotor - swept dimensions: 31 m to 180 m diameter: 149 m Max cord: 4.2 m

For the three turbine types, CRMs were run inputting the same operating parameters, including a rotational period of 6.85 seconds and blade pitch of 6 degrees. A range in rotational period was also tested (5.5 to 8.0 seconds) and was found to have minimal effect on the modelled outputs. Therefore, the outputs can be considered representative of a range operational conditions that may be encountered by birds flying through the proposed Wind Farm Site. For the dimensions and operational specifications inputted, the outputs for predicted collision risk are comparable for the three turbines assessed, with only marginally higher values generated by Turbine Type B – see Table 7A.15.

The CRMs outputs are considered to represent precautionary levels of theoretical collision risk, as the parameters entered in the models were notably precautionary, including the turbine dimensions, especially the max chord for the blades, relatively high rotational period and selecting flapping flight behaviour for each species. It is also important to note that for certain species, namely wintering golden plover and lapwing, default avoidance rates were applied, which will inflate predicted collision risk to unrepresentative levels.

The CRMs generated notably low levels of theoretical collision risk for four of the 12 target species analysed, including:

- Black-headed gull
- Peregrine
- Snipe
- Sparrowhawk

For these four species the levels of collision risk predicted is negligible and will not affect these species at the population level, i.e. collision-mediated mortality would not add significantly (>1%) to background levels of mortality.

The CRMs predicated collisions risk of one or more collision over 35 years for eight species, including buzzard, cormorant, golden plover, grey heron, kestrel, lapwing, lesser black-backed gull and little egret, with the outputs shown for worst-case scenario - Turbine Type B, being as follows:

- Buzzard 1 collision every 1.2 years (weighted, 98.0% avoidance)
- Cormorant 1 collision every 31.2 years (weighted, 98.0% avoidance)
- Golden plover 1 collision every 0.1 years (weighted, 98.0% avoidance)
- Grey heron 1 collision every 27.6 years (weighted, 98.0% avoidance)
- Kestrel 1 collision every 4.8 years (weighted, 95.0% avoidance)
- Lapwing 1 collision every 0.1 years (weighted, 98.0% avoidance)
- Lesser black-backed gull 1 collision every 3.2 years (weighted, 99.5% avoidance)
- Little egret 1 collision every 36.5 years (weighted, 98.0% avoidance)

Predicted collision risk for three of these species, including cormorant, grey heron and little egret was one or close to one collision over the 35 years, and this relatively low level of predicted collision risk is considered unlikely to have any significant population level effects. For the other species, buzzard, golden plover, kestrel, lapwing and lesser black-backed gull, while the CRM outputs are representative of high levels of flight activity within the CRZ, it is important to acknowledge that the application of a default avoidance rate (0.98), as suggested by SNH (2018a), is notably low for some species and leads to inflated estimates, in particular for wintering golden plover and lapwing. Application of higher avoidance rate, if it can be justified in certain cases, provides more realistic outputs for predicted collision risk. For golden plover and lapwing, CRMs were re-run to investigate the appropriateness of applying default avoidance rates, as well as annual and seasonal variation in collision risk for lapwing. Details of this analysis are included in Appendix 7H – see Section 7H.5.

Based on emerging evidence from post-construction monitoring at operational wind farms sites supporting wintering golden plover and lapwing (see review in Gittings, 2022), one of the main findings of the review was that it is appropriate to apply of higher avoidance rates for golden plover, and re-running the models with more appropriate avoidance rates gives the following outputs, with outputs default (98%) avoidance included for reference (results shown for Turbine Type B):

- Golden plover
  - 599 collisions over 35 years at 98.0% avoidance
  - 150 collisions over 35 years at **99.5%** avoidance
  - 60 collisions over 35 years at **99.8%** avoidance
  - 30 collisions over 35 years at **99.9%** avoidance
- Lapwing
  - 351 collisions over 35 years at 98.0% avoidance
  - 88 collisions over 35 years at **99.5%** avoidance
  - 35 collisions over 35 years at **99.8%** avoidance
  - 18 collisions over 35 years at **99.9%** avoidance

For lapwing the model was re-run to investigate seasonal difference in collision risk. Significantly lower flight activity over the breeding season results in lower levels of predicted collision risk compared to the winter seasons. The outputs from the breeding season models run for lapwing (see Appendix 7H, Table 7H.19) showed that collision risk becomes negligible for breeding birds once avoidance is set to 99.5%. Higher recorded aggregate flight times resulted in predicated collision risk being higher in the second breeding season (2023), with estimated collisions over 35 years for both breeding seasons ranging from:

- Lapwing
  - 0.7 to 4.3 collisions over 35 years at 98.0% avoidance
  - 0.2 to 1.1 collisions over 35 years at **99.5%** avoidance
  - 0.1 to 0.4 collisions over 35 years at **99.8%** avoidance

In both breeding seasons (2022 & 2023), while a small number of pairs attempted to breed within the proposed Wind Farm site; these attempts failed entirely in 2022 and in 2023 only a single pair persisted, which contributed to relatively low levels of flight activity overall. Therefore, it is acknowledged that these outputs are not representative of flight activity if more pairs were breeding successfully; however, the results are considered representative of the prevailing conditions on site, which result in high failure rates for breeding lapwing. Seasonal analysis also showed that predicted collision risk over the two winter seasons was variable for lapwing, due to large differences in flight time recorded between the two seasons– see Table 7A.14, with estimated collisions over 35 years for each non-breeding season ranging from:

- Lapwing
  - 116 to 425 collisions over 35 years at 98.0% avoidance
  - 29 to 106 collisions over 35 years at **99.5%** avoidance
  - 12 to 43 collisions over 35 years at **99.8%** avoidance

The additional analysis for lesser black-backed gulls found that flight activity was significantly different between the study years. Therefore, the model was re-run for the year exhibiting highest levels of flight activity only, which showed that predicted collision risk almost doubles from one collision every one collision every 3.2 years to one collision every 1.6 years. Adoption of the higher estimate is considered appropriate, rather than taking the average between a higher activity year and a lower activity year. This precautionary approach is supported by similar levels of activity being recorded over the preliminary study year, (October 2020 to August 2021).

For the five target species generating the highest levels of predicted collision risk, further analysis was undertaken to investigate the potential for population level effects to arise due to predicted collision risk. The results of this analysis are provided in Appendix 7H – see Table 7H.20 to Table 7H.25 in Section 7H.6. The ornithological baseline sections covering each target species investigate the potential for predicted collision risk to have a > 1% population level effects above background mortality. The range of predicted annual collision values considered within the analysis for population level effects for each species were as follows:

<u>Buzzard</u>

- 0.86 collision/year (98.0% avoidance) - no adjustment

<u>Golden plover</u>

- 17.10 collision/year (98.0% avoidance) - default avoidance too low
- 4.28 collision/year (99.5% avoidance) - precautionary assessment
- 1.71 collision/year (99.8% avoidance) - anticipated collision rate likely to be lower

<u>Lapwing</u> - all year

- 10.02 collision/year (98.0% avoidance) - default avoidance too low
- 2.15 collision/year (99.5% avoidance) - precautionary assessment
- 1.00 collision/year (99.8% avoidance) - anticipated collision rate likely to be lower

<u>Lapwing</u> - breeding

- 0.12 collision/year (98.0% avoidance) - default avoidance too low
- 0.03 collision/year (99.5% avoidance) - precautionary assessment
- 0.01 collision/year (99.8% avoidance) - anticipated collision rate likely lower

Lesser black-backed gull

- 0.31 collision/year (99.5% avoidance) - estimate for two study years
- 0.64 collision/year (99.5% avoidance) - collision rate busier year, precautionary

Kestel

- 0.21 collision/year (95.0% avoidance) - no adjustment

Table 7A.15: CRM weighted results (with avoidance) for three turbine types

CRM outputs inputting flight seconds recorded between 25 m and 180 m, a 6.85 second rotational period and pitch of 6 degrees
*indicates species for which there is no species specific avoidance rate available and default avoidance at 98% has been applied, as suggested by SNH (2018a). Higher avoidance rates are likely to be more appropriate for most species.
The turbine models/specifications with the highest and lowest predicted collision risk are highlighted in red and green, respectively
Species in listed **bold** exhibit predicted collision risk values of one or more collisions over the 35 years life span of the proposed Wind Farm site

	Collisions/year			Collisions per decade			Collisions per 35 years (WF life span)			Equivalent to 1 bird every x years		
	Turbine Type			Turbine Type			Turbine Type			Turbine Type		
Species	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
Black-headed gull	0.007	0.008	0.007	0.07	0.08	0.07	0.3	0.3	0.3	135.20	128.20	135.30
Buzzard*	0.818	0.861	0.817	8.18	8.61	8.17	28.6	**30.1**	28.6	1.2	1.2	1.2
Cormorant*	0.031	0.032	0.030	0.31	0.32	0.30	1.1	**1.1**	1.1	32.8	31.2	32.8
Golden plover*	16.153	17.104	16.120	161.53	171.04	161.20	565.4	**598.6**	564.2	0.1	0.1	0.1
Grey heron*	0.035	0.036	0.035	0.35	0.36	0.35	1.2	**1.3**	1.2	28.9	27.6	29.0
Kestrel	0.199	0.21	0.198	1.99	2.1	1.98	6.9	**7.3**	6.9	5.0	4.8	5.0
Lapwing*	9.478	10.022	9.475	94.78	100.22	94.75	331.7	**350.8**	331.6	0.1	0.1	0.1
Lesser black-backed gull	0.299	0.314	0.298	2.99	3.14	2.98	10.5	**11.0**	10.4	3.3	3.2	3.4
Little egret*	0.026	0.027	0.026	0.26	0.27	0.26	0.9	**1.0**	0.9	38.5	36.5	38.6
Peregrine*	0.021	0.022	0.021	0.21	0.22	0.21	0.7	0.8	0.7	47.2	44.8	47.3
Snipe*	0.010	0.011	0.010	0.10	0.11	0.10	0.4	0.4	0.4	99.0	93.2	99.4
Sparrowhawk*	0.012	0.012	0.012	0.12	0.12	0.12	0.4	0.4	0.4	86.1	81.5	86.4

7A.4.3. Results – Breeding bird surveys

Lowland breeding wader surveys following methodology detailed in O'Brien & Smith (1992), as summarised in Gilbert *et al*. (1989), were undertaken over the 2022 and 2023 breeding seasons. Surveys conducted around dusk/dawn were conducted for crepuscular species and covered woodland/scrubby habitats, with a focus on detecting displaying (roding) woodcock and calling long-eared owls. A kingfisher habitat suitability assessment was conducted along the River Suir.

Table 7A.16 lists red and amber listed species recorded and gives details of breeding status within the proposed Wind Farm Site based on surveys conducted in 2022 and 2023. A list of all species recorded, including green-listed species, is provided in Appendix 7F, along with distribution maps showing the distribution of red and amber listed species recorded. Maps in Appendix 7G shows the locations of breeding wader and raptor territories that were identified based on surveying.

Walkover surveys conducted over the 2022 breeding season recorded 54 bird species, with 57 species recorded during the 2023 breeding bird surveys. The assemblage of birds recorded in both years was comparable and were considered to be representative of the habitats available within the proposed Wind Farm Site.

As summarised in Table 7A.17, dusk surveys found that there were no territorial (roding) woodcock, although there was potential breeding habitat available. Long-eared owls were heard calling from the woodland on the southern boundary of the 500 m turbine buffer and were considered likely to be breeding in the vicinity.

Breeding season walkover surveys highlighted a number of key areas associated with the River Suir floodplain that are utilised by lowland breeding waders including:

- Lapwing: up to 6 territorial birds recorded, however land management, especially field improvement in 2021 and 2022 were thought to have negatively affected productivity and sites were abandoned early in the season.
- Snipe: several wetland habitats, including marshy, wet grassland support breeding snipe, and it was estimated that there are up to 6 territories within the 500 m turbine buffer

No curlew breeding site were detected.

The results of the kingfisher habitat suitability survey found that in all sections of the River Suir within the 500 m turbine buffer, the extent of suitable nesting banks was less than 10 m of suitable bank (Score 1, as per Cummin *et al*., 2010). The assessment only identified very localised points where banks appeared to be superficially suitable. While the material forming the banks was found to be suitable for nesting, exposed steep face were limited and the banks themselves were prone to inundation due to low height (< 1.5 m) and fluctuating water levels. The only other area classed as possibly offer potential nesting opportunities was some older growth woodland in the southern extent of the 500 m turbine buffer, where dead wood could offer nesting holes that are occupied on occasion by kingfishers (Morgan & Glue, 1977). This area coincided with the highest level of kingfisher activity detected in 2023, including a bird carrying prey and possibly provisioning young at a nest to the south of the 500 m turbine buffer.

Table 7A.16: Summary of findings for breeding bird walkover - red and amber listed species

† Indicates species possibly breeding within the 500 m turbine buffer
†† Indicates species confirmed breeding within the 500 m turbine buffer
[X] Indicates species not breeding in the 500 m turbine buffer, but recorded over the breeding season and may have a nest site nearby

Species	BTO code	Breeding status in 2022	Breeding status in 2022	Pres. in 2021
BoCCI (2020-2026) Red listed species				
Grey wagtail ††	GL	Recorded on River Suir at Rossestown Bridge. No nest observed - possible breeding within the within the 500 m turbine buffer.	No nest observed – confirmed breeding within the 500 m turbine - family group recorded along the River Suir upstream of Rossestown Bridge.	✓
Kestrel [X]	K	Foraging within the 500 m turbine buffer. Breeding in the wider area.	Foraging within the 500 m turbine buffer. Breeding in the wider area.	✓
Lapwing ††	L	Breeding/territorial behaviour noted at a minimum of four sites within suitable habitat in the 500 m turbine buffer. Breeding attempts failed/did not persist.	Breeding/territorial behaviour noted at 5-6 sites within suitable habitat in the 500 m turbine buffer. Breeding attempts failed, one still active June/July	
Meadow pipit ††	MP	Confirmed breeding within the 500 m turbine buffer – mostly associated with less heavily managed grassland.	Confirmed breeding within the 500 m turbine buffer – mostly associated with less heavily managed grassland	✓
Snipe ††	SN	Suitable habitat in the 500 m turbine buffer associate with wetter areas - chipping and drumming snipe recorded.	Suitable habitat in the 500 m turbine buffer associate with wetter areas - chipping and drumming snipe recorded. An influx of individuals in March/early April were considered birds on passage, as they were not recorded on later survey visits.	✓
Stock dove †	SD	One record of an individual in the southern woodland – possible breeding within the 500 m turbine buffer.	Not recorded	
Swift [X]	SI	Single observation (2 birds) foraging/flying through 500 m turbine buffer - no potential breeding opportunities.	Three observation of single birds foraging/flying through 500 m turbine buffer – no potential breeding opportunities	✓
Yellowhammer ††	Y	Possible (singing) breeding in the 500 m turbine buffer. Single territory associated with hedgerow.	Possible (singing) breeding in the 500 m turbine buffer. Single territory associated with hedgerow.	
BoCCI (2020-2026) Amber listed species				
Black-headed gull [X]	BH	Not recorded on breeding season walkovers	Flock of 80 birds roosting along River Suir floodplain in March just south of 500 m turbine buffer, the flock of 6 birds roosting in same area in July	
Cormorant [X]	CA	Not recorded on breeding season walkovers	Foraging/flying along the River Suir. Not breeding in 500 m turbine buffer.	
Goldcrest ††	GC	Common and widespread breeding in suitable woodland/hedgerow habitat within the 500 m turbine buffer.	Common and widespread breeding in suitable woodland/hedgerow habitat within the 500 m turbine buffer.	✓

Species	BTO code	Breeding status in 2022	Breeding status in 2022	Pres. in 2021
House martin [X]	HM	Recorded foraging/flying through 500 m turbine (1-2 birds). No breeding behaviour recorded	Recorded foraging/flying through 500 m turbine, with flocks of up to 20 birds. No breeding behaviour recorded	✓
House sparrow †	HS	Recorded beyond the 500 m turbine buffer. Likely breeding in suitable structures.	Recorded beyond the 500 m turbine buffer. Likely breeding in suitable structures.	
Kingfisher [X]	KF	One record of single bird flying along River Suir to north of 500 m turbine buffer. Banks assessed as offering limited suitability for nesting, but river likely to form part of territory.	Two consecutive records, probably same bird, in southern part of 500 m turbine buffer. Recorded carrying fish, possibly provisioning young to south of proposed Wind Farm Site	
Linnet †	LI	Possible (singing) breeding in the 500 m turbine buffer. Associated with areas of scrub.	Possible (singing) breeding in the 500 m turbine buffer. Associated with areas of scrub.	✓
Mallard †	MA	Recorded during breeding season - likely to be nesting in areas with suitable cover within the 500 m turbine buffer.	Recorded during breeding season - likely to be nesting in areas with suitable cover within the 500 m turbine buffer.	✓
Mute swan ††	MS	Confirmed breeding within the 500 m turbine buffer, with nest located in emergent vegetation along River Suir, north (upstream) of Rossestown Bridge.	Present throughout breeding season – no nest site located.	✓
Sand martin [X]	SM	Small number (1-2 birds) foraging along floodplain of River Suir within the 500 m turbine buffer. No nesting colonies located, and banks were assessed as offering limited suitability for nesting.	Flocks of 6 to 8 birds recorded foraging along floodplain of River Suir within the 500 m turbine buffer. No nesting colonies located, and banks were assessed as offering limited suitability for nesting.	✓
Skylark ††	S	Confirmed breeding within the 500 m turbine buffer – mostly associated with less heavily managed grassland.	Confirmed breeding within the 500 m turbine buffer – mostly associated with less heavily managed grassland.	✓
Spotted flycatcher ††	SF	Confirmed (provisioning) breeding at two locations, with possible (singing) breeding at another two locations within/adjacent to the 500 m turbine buffer. Breeding in south associated with woodland/parkland.	Not recorded	✓
Starling †	SG	Only recorded outside the 500 m turbine buffer in 2022; however considered likely to be breeding in tree cavities or buildings.	Only recorded outside the 500 m turbine buffer in 2022; however considered likely to be breeding in tree cavities or buildings.	✓
Swallow †	SL	Only foraging birds recorded within 500 m turbine buffer, with up to 9 birds recorded - breeding confirmed adjacent to buffer.	Only foraging birds recorded within 500 m turbine buffer, with up to 10 birds recorded.	✓
Willow warbler ††	WW	Widespread breeding species within 500 m turbine buffer nesting associated with scrub and hedges.	Widespread breeding species within 500 m turbine buffer nesting associated with scrub and hedges.	✓

Table 7A.17: Dusk surveys results - owls and woodcock (WK) observations

Date	Survey type	Species
Breeding season 2022		
11/05/2022	Dusk survey (WK/owl)	No target species recorded
22/05/2022	Dusk survey (WK/owl)	No target species recorded – buzzard flushed from roost
23/06/2022	Dusk survey (WK/owl)	No target species recorded
Breeding season 2023		
23/03/2023	Dusk survey (Owl)	No owls detected – woodcock active, however wintering/passage birds
09/05/2023	Dusk survey (WK/owl)	Long-eared owls heard calling from southern woodland
22/05/2023	Dusk survey (WK/owl)	No target species recorded
09/06/2023	Dusk survey (WK/owl)	No target species recorded
28/06/2023	Dusk survey (WK/owl)	No target species recorded
25/07/2023	Dusk survey (Owl)	No target species recorded
16/08/2023	Dusk survey (Owl)	No target species recorded

7A.4.4. Results – Wider area breeding raptor surveys

Table 7A.18 gives an overview the results of breeding raptor survey conducted in 2022 and 2023. Maps in Appendix 7G show the locations of raptor records recorded during specific raptor surveys in 2022 and 2023. These observations were then analysed in conjunction with flight behaviour recorded during VP watches, other surveys and incidental records to create a map showing breeding raptor territories – see Figure 7G.4 in Appendix 7G.

Buzzard and kestrel were the most frequently recorded raptors during the wider area surveys, with both species confirmed to be breeding within or adjacent to the proposed Wind Farm Site. Three buzzard territories were identified within the 500 m turbine buffer, with two territories (BZ.5, BZ.6 - see Appendix 7G: Figure 7G.4) recorded in the southern woodland and another pair recorded utilising a smaller section of woodland in the north-east section of the proposed Wind Farm Site (BZ.4 - see Appendix 7G: Figure 7G.4). These breeding site were confirmed by observations of young buzzards calling for food from these locations. A further three buzzard breeding territories were identified beyond the 500 m turbine buffer in areas of woodland/forestry and fledglings were observed from these sites (BZ.1, BZ.2, BZ.3 - see Appendix 7G: Figure 7G.4).

Kestrels were recorded utilising the proposed Wind Farm Site for hunting and where regularly recorded commuting through the area over summer 2022 and 2023. A pair of kestrels were regularly observed perching atop an old, ruined church (Templeshyane) located directly beside VP2 (K.2 - see Appendix 7G: Figure 7G.4), just outside the 500 m turbine buffer; however no breeding was confirmed. Based on observation over the 2021 breeding season (see Appendix 7I - Fehily Timoney, 2022), the nest is located further southeast and is likely to be located with the nearby farm buildings. Breeding was confirmed at a second nest site located in an area of forestry to the south of the 500 m turbine buffer and within the 2 km turbine buffer area (K.3 - see Appendix 7G: Figure 7G.4), confirming at least one kestrel breeding pair in the wider area.

Peregrines were confirmed breeding at one location and observed as possibly breeding at an additional two locations, within the 2 km turbine buffer. All these locations were castles and were beyond the 500 m turbine buffer.

As shown in Figure 7G.5 in Appendix 7G, peregrines were confirmed nesting on Brittas Castle immediately adjacent to the proposed Wind Farm Site, with young heard begging on several occasions. Loughmore Castle, *c.* 2.8 km north of the proposed Wind Farm Site, was noted as a possible breeding site based on a suspected pair roosting the site; and likewise, Rahealty Castle, *c.* 2.6 km east of the proposed Wind Farm Site was classed as a possible breeding site, as another pair was observed perching.

Sparrowhawk were recorded less frequently, and the limited amount of breeding behaviour observed, such as soaring or actively displaying birds, did not facilitate identification of breeding sites beyond the general blocks of woodland in the south of the proposed Wind Farm Site. This was still the case on examining supplementary sources of data collected, including observations from VP watches. Potential nesting habitat in tree/scrub cover in the northern part of the proposed Wind Farm Site was limited and it is considered that sparrowhawk breeding sites are likely to occur in the southern woodland.

7A.4.5. Results – Barn owl site searches

No new barn owl breeding sites were identified during surveys conducted from October 2021 to August 2023. Barn owls occur in the area, with a breeding site identified in abandoned farm building approximately 1.1 km to the northwest of the proposed Wind Farm Site – see Appendix 7H (Fehily Timoney, 2022). The Cabragh Wetlands, south of Thurles is also a known site for barn owls where the utilise a nest box. There is suitable foraging habitat for barn owls within the proposed Wind Farm Site and it is likely that this species utilises the less agriculturally improved grasslands along the floodplain of the River Suir.

Table 7A.18: Summary of breeding raptor survey results

Season		Breeding season 2022							Breeding season 2023								
Visit		1		2	3	4	5		1			2	3	4	5	6	
Survey date		28 Apr 2022	29 Apr 2022	11 May 2022	22 May 2022	26 Jul 2022	25 Aug 2022	28 Aug 2022	21 Mar 2023	22 Mar 2023	23 Mar 2023	11 Apr 2023	20 Apr 2023	26 May 2023	27 Jun 2023	25 Jul 2023	28 Jul 2023
Kestrel	K	5		1					4		1	1	4	1		1	1
Buzzard	BZ		7	12		1			2	6	5	2	9	9	1	3	5
Peregrine	PE					3											
Sparrowhawk	SH		1			1		2						1		1	

Notes			
Species	BTO code	Breeding season 2022	Breeding season 2023
Kestrel	K	Kestrel were recorded primarily in April 2022, with at several birds hunting to the north of the 500 m turbine buffer. Two kestrels were noted interacting with each other during these surveys – possible breeding behaviour.	Kestrels were observed frequently from March-July 2023 within the 2 km turbine buffer. Observations included single birds flying or hunting. Breeding behaviour between three birds was noted to the north of the 2 km turbine buffer within an area of forestry. While a nest site was not located, kestrel are breeding in the wider area.
Buzzard	BZ	Buzzards were recorded from April to May 2022 in several areas within the 2 km turbine buffer. Breeding behaviour was identified within the expanse of woodland present in the south-west area of the site.	Buzzards were observed during each visit in the period March-July 2023 within the 2 km turbine buffer. Breeding was confirmed in the western part of the 2 km turbine buffer, the area of woodland in the south-west area of the 500 m turbine buffer and to the north-east of the 2 km turbine buffer in July. Juveniles were noted making food begging calls in these areas. Additionally, although no fledgling birds were recorded, a further two buzzard breeding territories were identified in the west part of the 2 km turbine buffer in separate woodland areas. An occupied nest (no chicks) was identified in addition to buzzards exhibiting breeding/territorial displays in these areas.
Peregrine	PE	Peregrines were recorded confirmed nesting on Brittas Castle with two juvenile birds observed begging calls and mobbing parents for food in July 2022. Brittas Castle is located directly adjacent to the 500 m turbine buffer.	Confirmed breeding at Brittas Castle, possible breeding at Loughmoe Castle, with an additional site at Rahealty Castle
Sparrowhawk	SH	Four observations of sparrowhawks were made from April-August 2022, primarily hunting within the 2 km turbine buffer, however, no breeding behaviour was detected during these surveys.	Two observations of sparrowhawk were made in May and July in flight within the 2 km turbine buffer, however, no breeding behaviour was detected during these surveys.

7A.4.6. Results – Winter site walkovers

Winter site walkovers covering the proposed Wind Farm Site were undertaken over the 2021-22 and 2022-23 non-breeding seasons, Table 7A.19 and Table 7A.20 provide the list of species recorded with red and amber conservation status (Gilbert *et al*., 2021) for each season respectively, along the number of individuals for each visit. The combined distribution of birds recorded during walkovers is shown in Figure 7A.9 (swans, geese & ducks), Figure 7A.10 (waders), Figure 7A.11 (other waterbirds), Figure 7A.12 (birds of prey), Figure 7A.13 (red listed passerines) and Figure 7A.14 (amber listed passerines).

A total of 21 different bird species were recorded during the walkover surveys over the 2021-22 non-breeding season compared to 19 different bird species recorded over the 2022-23 non-breeding season. This result was driven by more visits being conducted over winter 2021-22. An interesting record was the occurrence of relatively large foraging flocks of redwing and starling utilising the proposed Wind Farm Site. In addition a short-eared owl was flushed from cover on the flood plain during Visit 1 conducted in December 2022.

A list of all species recorded on each visit, including green-listed species, is provided in Appendix 7F – see Table 7F.3.

Table 7A.19: Summary of winter walkover surveys carried out in non-breeding season 2021-22

Species	BTO code	No. individuals				Location within 500 m turbine buffer
		Visit 1 18 & 19 Dec-22	Visit 2 21 & 22 Jan-22	Visit 3 30 Jan-22	Visit 4 27 & 28 Feb-22	
BoCCI (2020-2026) Red listed						
Curlew	CU	-	-	-	1	One bird was recorded in flying within the 500 m turbine buffer, calling adjacent to the River Suir in February
Golden plover	GP	7	-	-		One observation of 7 birds flying over improved grassland in the northern part of the 500 m turbine buffer
Grey wagtail	GL	1	1	1	5	Most records of this species of birds utilising the River Suir within the 500 m turbine buffer. One record was made in the northern area of the site *c*. 310 m north of the River Suir.
Kestrel	K	-	3	2	2	Kestrel were recorded in the northern section of the 500 m turbine buffer – hunting and commuting
Lapwing	L	-	120	-	5	Flock of 120 birds (Visit 2) were flushed up by a peregrine from in fields adjacent to the River Suir at the northwestern extent of the 500 m turbine buffer - Clonamuckoge. The other birds recorded (Visit 3) were observed in flight just outside the eastern edge of the 500 turbine buffer.
Meadow pipit	MP	63	16	19	45	Winter birds were found to be ubiquitous throughout the 500 m turbine buffer, with greatest concentration associated with the River Suir floodplain
Redwing	RE	683	869	195	301	This species was primarily observed foraging in large flocks (up to 300 birds) along treelines and hedgerows within the 500 m turbine buffer
Snipe	SN	36	28	9	26	Winter birds were mainly recorded present in agricultural fields and rough grassland directly adjacent the River Suir as it flows the 500 m turbine buffer
Woodcock	WK	2	3	-	1	Small numbers were flushed in the south section of the 500 m turbine buffer
BoCCI (2020-2026) Amber listed						

Species	BTO code	No. individuals				Location within 500 m turbine buffer
		Visit 1 18 & 19 Dec-22	Visit 2 21 & 22 Jan-22	Visit 3 30 Jan-22	Visit 4 27 & 28 Feb-22	
Brambling	BL	1	-	-	-	One bird was recorded flying over the 500 m turbine buffer area
Cormorant	CA	3	3	-	13	All observations were of birds in flight or roosting along the course of the River Suir within the 500 m turbine buffer
Goldcrest	GC	4	5	-	8	Recorded throughout the 500 m turbine buffer
House sparrow	HS	60	35	20	62	Mainly recorded in and around agricultural sheds in within and adjacent to the 500 m turbine buffer
Kingfisher	KF	-	-	-	1	One kingfisher observation was made along the River Suir in the southern section of the 500 m turbine buffer area
Linnet	LI	3	26	-		Birds recorded in flight moving through 500 m turbine buffer area, including flock of 26 birds
Mallard	MA	-	14	-	8	Small numbers (1-6 birds) recorded swimming along the River Suir within the 500 m turbine buffer area. A small number were utilising the small pond in the southern woodland
Mute swan	MS	12	3	-	2	Observations mainly concentrated within and along the banks of the River Suir within the 500 m turbine buffer with 1-6 birds recorded
Short-eared owl	SE	1	-	-	-	One individual was flushed from rushy habitat within the 500 m turbine buffer, then landed again. No other observations were made. Suitable winter habitat along floodplain
Skylark	S	-	3	-	8	Recorded in open areas throughout the 500 m turbine buffer
Starling	SG	470	479	207	847	Large flocks (up to 400 birds) recorded on all visits throughout the 500 m turbine buffer area
Teal	T	-	33	-	1	Small number (1-4 birds) recorded in the River Suir within the 500 turbine buffer, with a flock of 26 birds utilising were utilising the small pond in the southern woodland

Table 7A.20: Summary of winter walkover surveys carried out in non-breeding season 2022-23

Species	BTO code	No. individuals		Location within 500 m turbine buffer
		Visit 1 23 & 24 Jan-23	Visit 2 16 Mar-23	
BoCCI (2020-2026) Red listed				
Golden plover	GP	-	18	A group of six birds were recorded in flight in the centre of the 500 turbine buffer and another group of 12 birds were recorded in flight in the southern part of the 500 m buffer.
Grey wagtail	GL	1	-	One individual grey wagtail was recorded perched in a field adjacent to the River Suir in the centre of the 500 m buffer.
Kestrel	K	1	-	One male observed flying south through 500 m turbine buffer
Lapwing	L	222	14	Only 15 birds on Visit 1 were foraging on fields within 500 m buffer, two flocks were flying (87 birds), and 120 birds roosting off site approx. 2.5 km NW in flooded field at Ballybristy
Meadow pipit	MP	34	4	Ubiquitous throughout the 500 m turbine buffer, with greatest concentration associated with the River Suir floodplain.
Redwing	RE	185	27	Flocks recorded within 500 m turbine buffer, foraging in agricultural fields and hedgerows/treelines – numbers slightly lower than previous winter
Shoveler	SV		4	Four recorded roosting in a flood field directly east of the River Suir main channel, in the south part of the 500 m turbine buffer
Snipe	SN	7	6	Winter birds were mainly recorded present in agricultural fields and rough grassland directly adjacent the River Suir as it flows the 500 m turbine buffer
BoCCI (2020-2026) Amber listed				

Species	BTO code	No. individuals		Location within 500 m turbine buffer
		Visit 1 23 & 24 Jan-23	**Visit 2** 16 Mar-23	
Black-headed gull	BH	-	83	Birds roosting in flooded fields east of the River Suir main channel, just south of the 500 m buffer
Cormorant	CA	1	-	One individual cormorant recorded flying high (180m) heading west within the 500 m buffer
Goldcrest	GC	1	-	One bird recorded in the 500 m buffer
House sparrow	HS	6	-	A small group (6 birds) recorded perching NE of the 500 m turbine buffer
Linnet	LI	3	6	Small flocks 2-4 birds fly-land/perching within 500 m turbine buffer
Mallard	MA	2	-	Male and female were flushed from a drainage ditch from within the 500 m turbine buffer
Mute swan	MS	4	2	All observations were of male and female (paired birds), with one observation of birds in flight, one observation of a pair within the 500 turbine buffer at Rossestown Bridge and one observation approx. 2.5 km NW in flooded field at Ballybristy
Skylark	S	-	4	Recorded within the 500 m turbine buffer
Starling	SG	386	340	Large flocks (up to 350 birds) recorded on all visits throughout the 500 m turbine buffer area.
Teal	T	-	1	One bird flushed from River Suir in the southern part of the 500 m turbine buffer – also incidental record of 120 birds utilising flooded are just south of buffer on 28-Nov-22
Wigeon	WN	80	-	A flock (80 birds) recorded foraging in a field directly east of the River Suir, south of 500 m turbine buffer

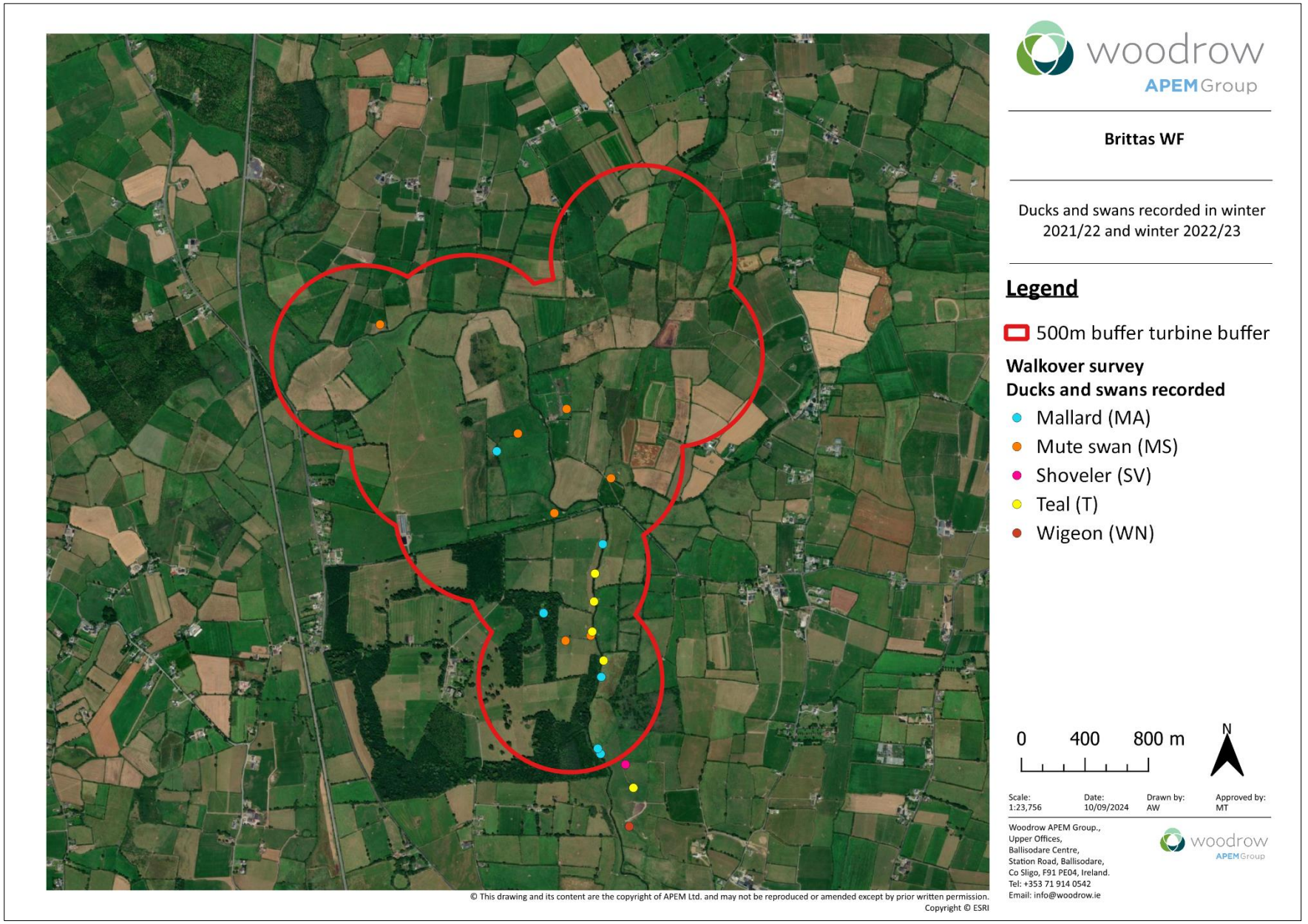

Figure 7A.9: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution of wintering swans, geese and ducks

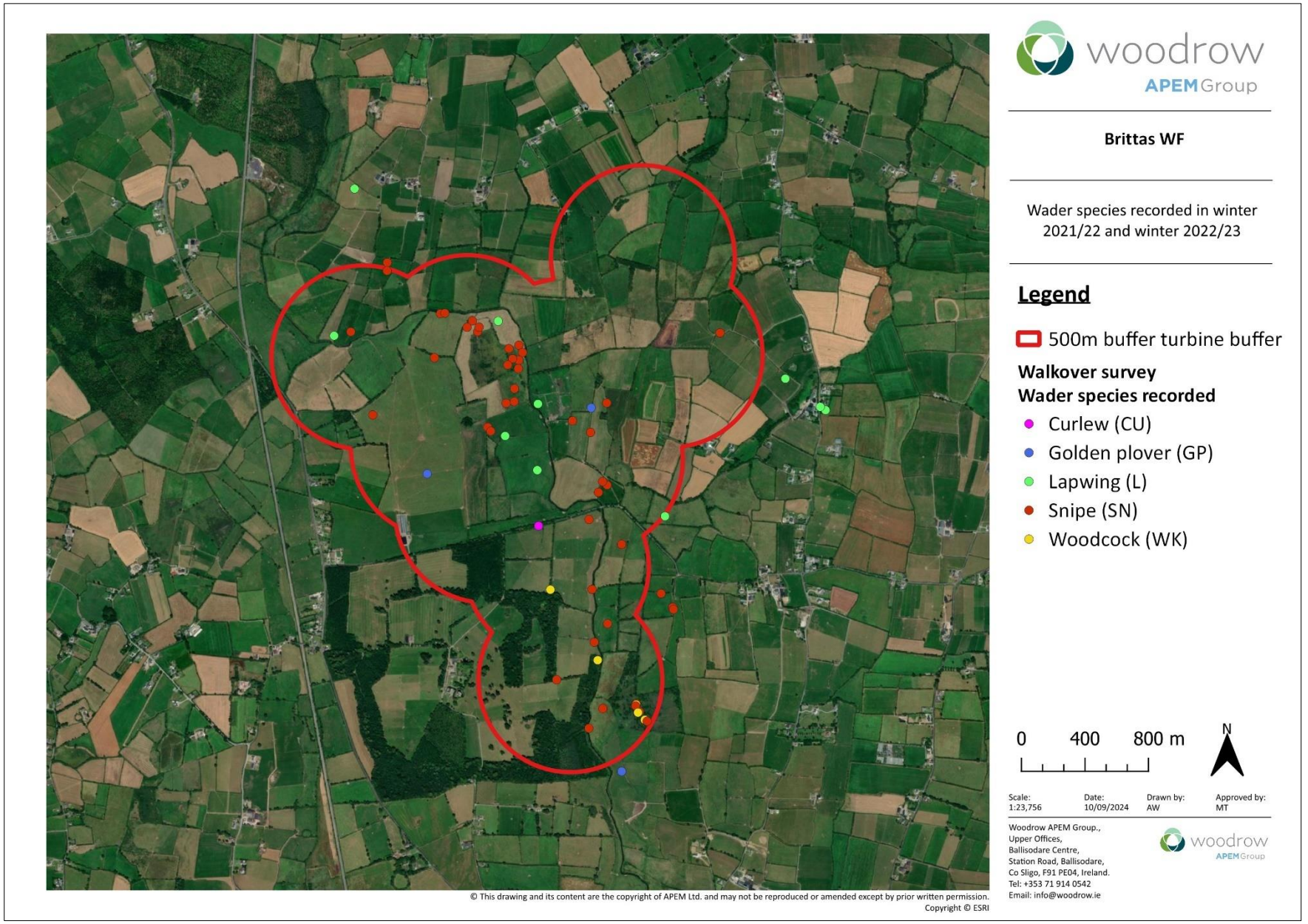

Figure 7A.10: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution of wintering waders

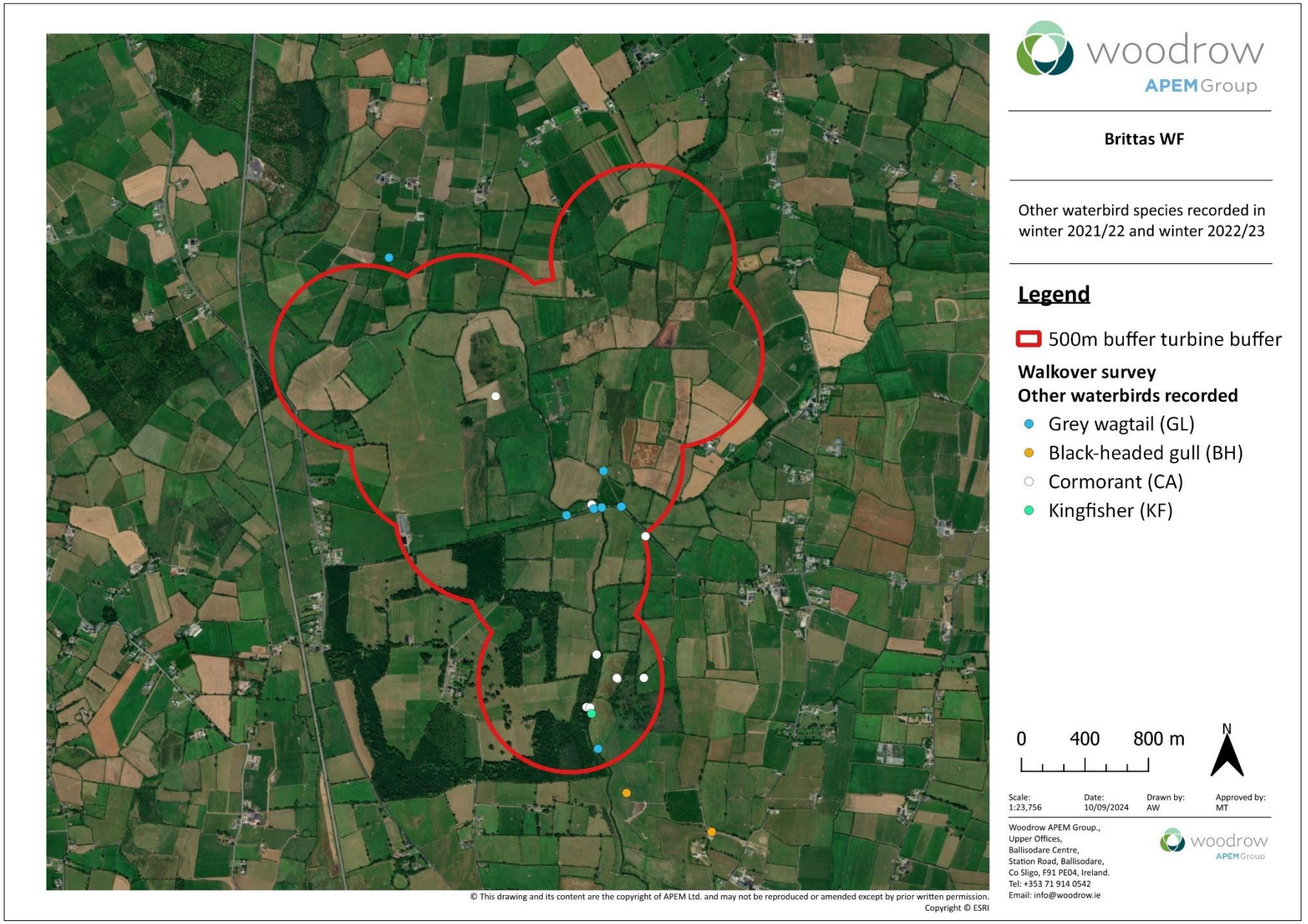

Figure 7A.11: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution of other wetland/riverine birds

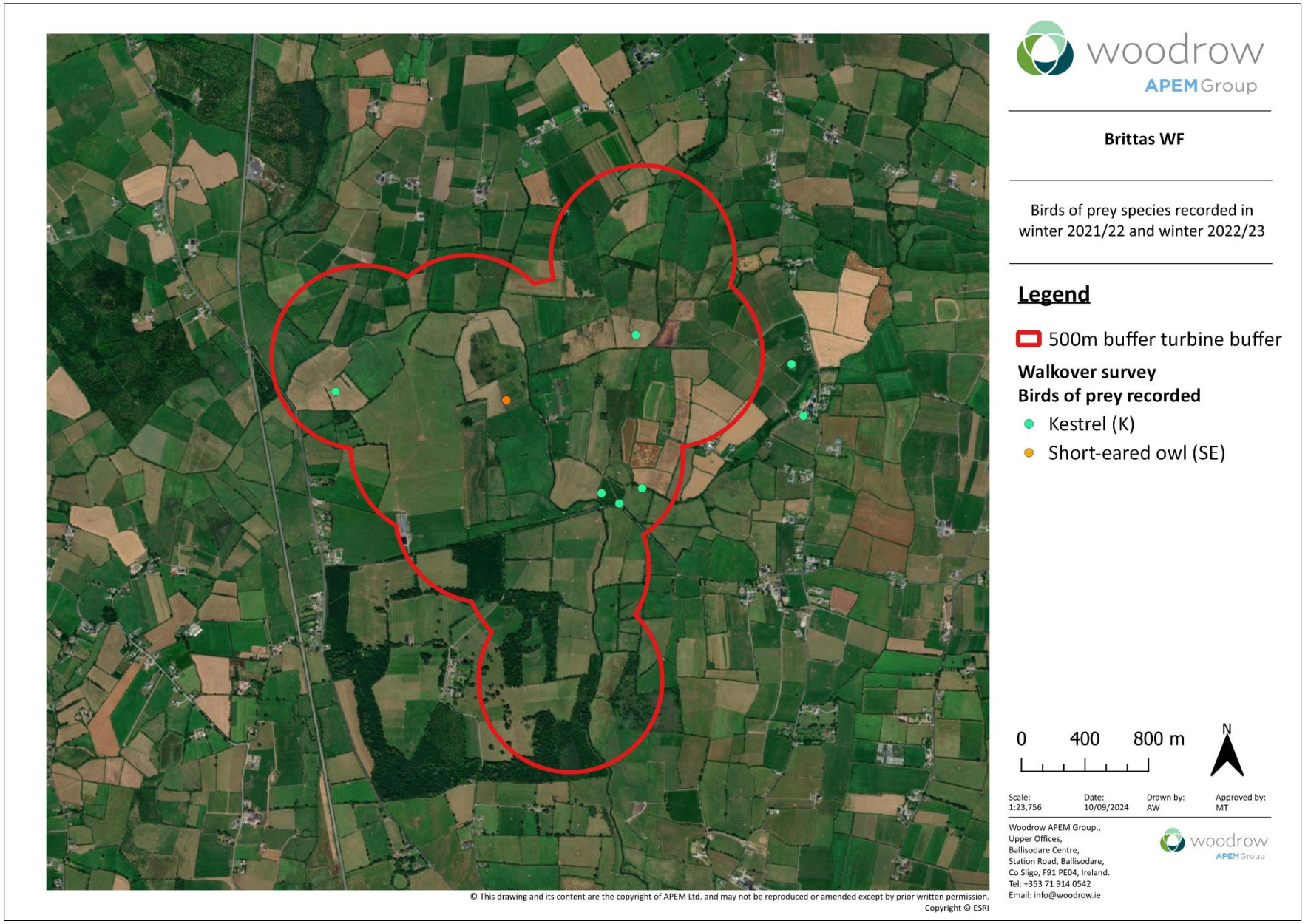

Figure 7A.12: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution for birds of prey

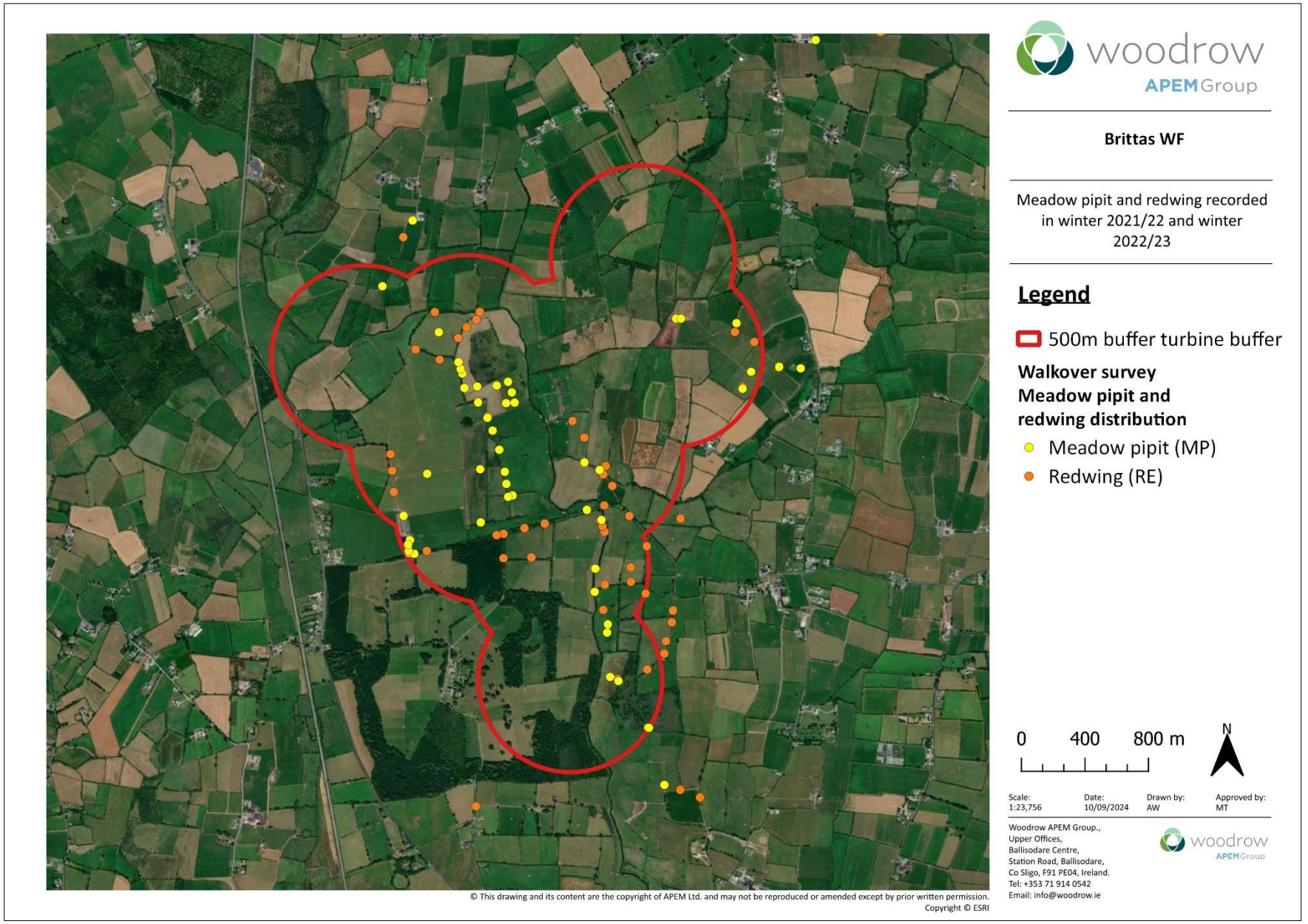

Figure 7A.13: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution of wintering red listed passerines

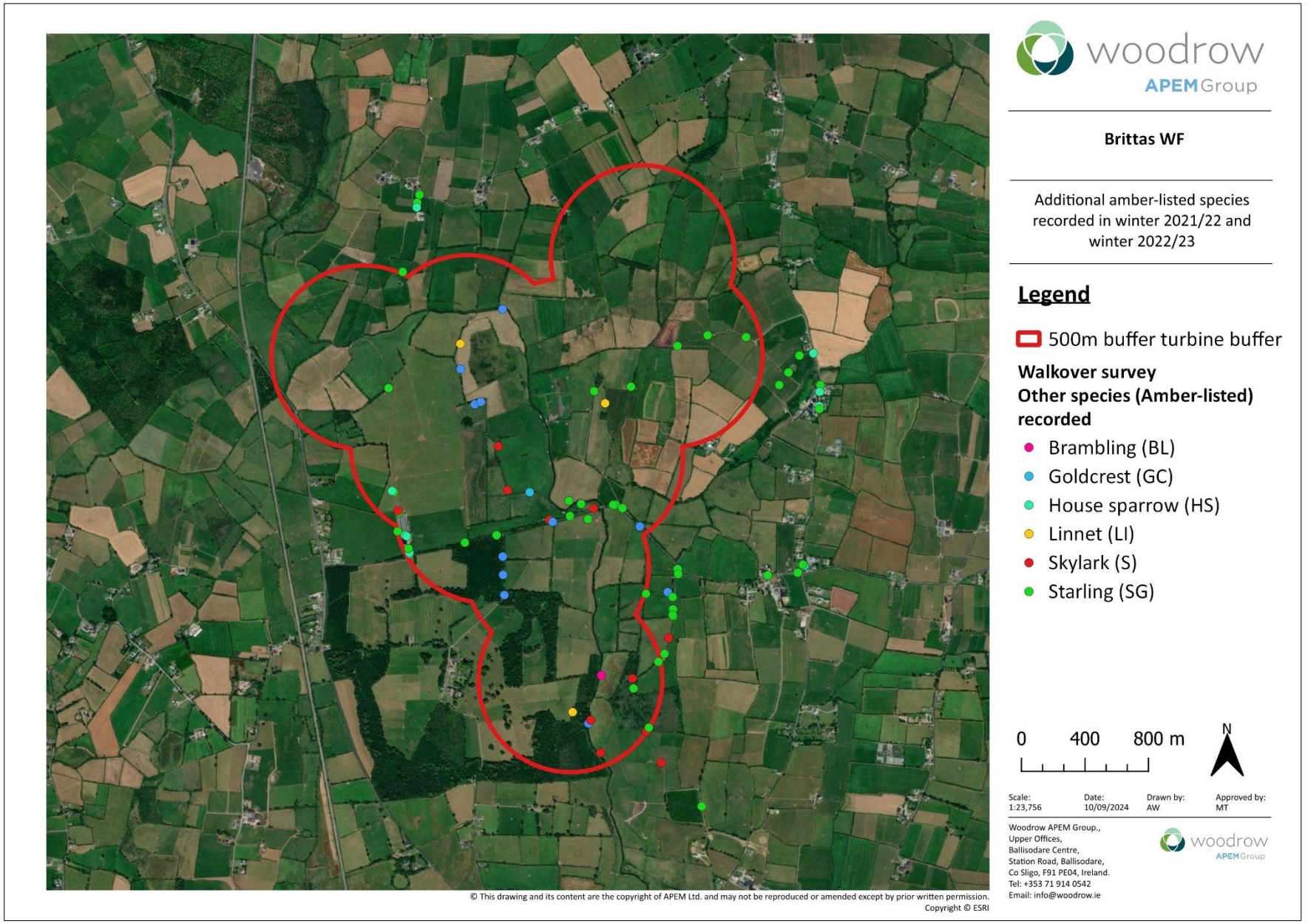

Figure 7A.14: Non-breeding walkover surveys 2021/22 & 2022/23 – distribution of wintering amber listed passerines

7A.4.7. Results – Wider area wintering waterbird surveys

Wider area wintering waterbird surveys were carried out in winter 2021-22 and winter 2022-23, largely focusing on the floodplain of the River Suir and any other wetlands identified within the wider area (5-6 km turbine buffer). Table 7A.21 and Table 7A.22 provide the waterbird counts recorded during wider area wintering water surveys conducted over the 2021-22 and 2022-23 non-breeding season, respectively, with the distribution of different groups of wetland birds, combined for all visits, shown in Figure 7A.15 (swans, geese & ducks), Figure 7A.16 (waders), Figure 7A.17 (gulls) and Figure 7A.18 (other waterbirds species).

Over winter 2021/22 a total of 11 waterbird species were recorded, compared to 13 over winter 2022/23, with golden plover, teal and wigeon not recorded over the first winter and cormorant going unrecorded in the second winter. No roosts or foraging sites utilised by migratory swans or geese were recorded during wider area wintering waterbird surveys in 2021/22 or 2022/23; although it is noted that a small flock of whooper swans (3-5 birds) was present over winter 2022/21 along the River Suir to the north of the 500 m turbine buffer - see Appendix 7I (Fehily Timoney, 2022). Wader populations in this region appear to be highly mobile and these snapshot counts need be examined in the context provided by other surveys undertaken, including VP watches which involve more regular and prolonged monitoring of the proposed Wind Farm Site.

The aggregate species counts were low for each visit and did not exceed nationally important thresholds, as shown in Table 7A.21 and Table 7A.22. The maximum number of waterbirds recorded on any visit did not exceed 600 birds, which is relatively low considering the size of the search area. It is acknowledged that over the two years counts were influenced by survey effort and improving surveyor knowledge of the search area over time. Coverage was expanded over the second winter and detection rates increased as surveyors became more familiar with the area.

Other target species recorded during the wider area wintering waterbird surveys included hunting buzzards and kestrels. Peregrines were recorded perching/prospecting/paring up on two ruined castles, one *c.* 2.7 km east and other *c*. 3.7 km north of the proposed Wind Farm Site.

7A.4.8. Results – Hen harrier roost searches

There is some suitable hen harrier roost habitat within the 2 km turbine buffer; however, no hen harrier roosts, or individual birds were recorded during the targeted hen harrier roost searches that were undertaken over the non-breeding seasons 2021/22 and 2022/23.

During all the surveys conducted over three years hen harriers were only recorded twice during VP watches including:

- 24-Dec-2020 11:18 Adult male flying S, *c*. 2 km W of buffer 137 sec at 100-200 m
- 28-Aug-2023 12:58 Adult male hunting though the buffer 89 sec at 1-4 m

Based on the low levels of hen harrier activity recorded it can be concluded that the 2 km turbine buffer is not heavily utilised by this species and therefore it is highly unlikely that a regularly occupied communal roost exists in the area.

Table 7A.21: Wider area wintering waterbird counts for 2021-2022 non-breeding season

Species	BTO Code	No. individuals						1% National
		Visit 1 25-Oct-21	Visit 2 23-Nov-21	Visit 3 17-Dec-21	Visit 4 20-Jan-22	Visit 5 25-Feb-22	Visit 6 13-Mar-22	
Red listed								
Lapwing	L	54	2	-	42	35	8	**850**
Snipe	SN	-	-	1	-	-	-	**-**
Amber listed								
Black-headed gull	BH	-	-	-	-	-	32	**-**
Coot	CO	-	-	-	-	1	2	**190**
Cormorant	CA	-	-	-	-	-	6	**110**
Lesser black-backed gull	LB	26	-	-	-	7	14	**-**
Mallard	MA	42	112	98	2	8	26	**280**
Mute swan	MS	-	4	2	1	2	2	**90**
Green listed								
Grey heron	H	-	-	1	-	-	-	**25**
Little egret	ET	-	-		-	2	-	**20**
Moorhen	MH	-	4	3	-	-	3	**-**

Table 7A.22: Wider area wintering waterbird counts for 2022-2023 non-breeding season

Species	BTO Code	No. individuals						1% National
		Visit 1 18-Oct-22	Visit 2 28-Nov-22 30-Nov-22 02-Dec-22	Visit 3 18-Dec-22 31-Dec-22	Visit 4 21-Jan-23 22-Jan-23	Visit 5 14-Feb-23	Visit 6 06-Mar-23 07-Mar-23 13-Mar-23	
Red listed								
Golden plover	GP	245	-	-	200	-	-	**920**
Lapwing	L	1	240	8	153	350	-	**850**
Snipe	SN	1	-	-	-	-	-	**-**
Amber listed								
Black-headed gull	BH	-	-	-	50	-	-	**-**
Coot	CO	-	-	-	-	4	4	**190**
Lesser black-backed gull	LB	115	-	-	-	-	-	**-**
Mallard	MA	-	-	-	2	4	-	**280**
Mute swan	MS	-	-	4	-	2	-	**90**
Teal	T	-	-	-	185	94	22	**360**
Wigeon	WN	-	80	-	-	-	4	**560**
Green listed								
Grey heron	H	1	1	-	-	3	-	**25**
Little egret	ET	-	-	-	-	9	-	**20**
Moorhen	MH	-	-	1	3	2	1	**-**

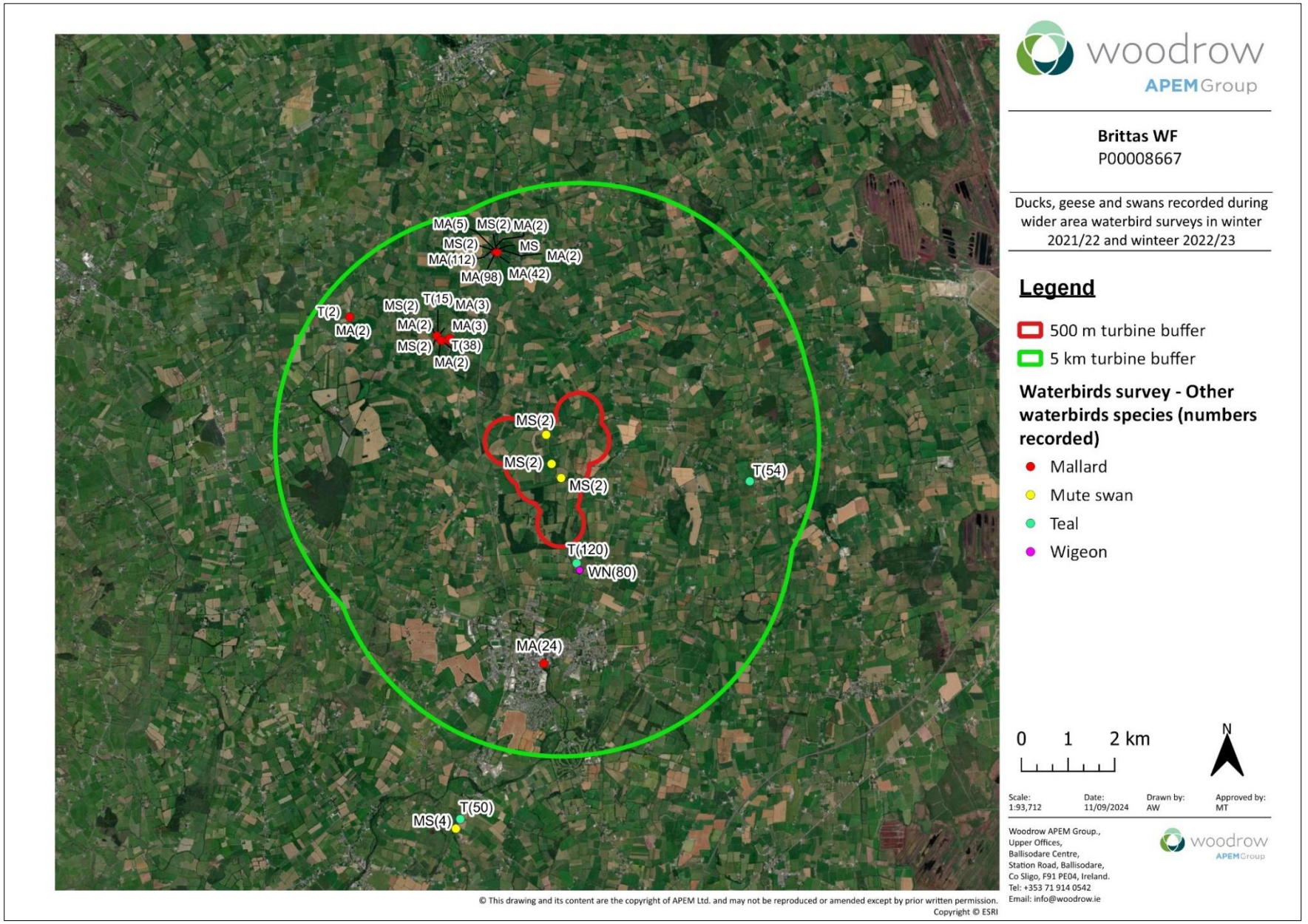

Figure 7A.15: Wider area distribution of wintering swans, geese and ducks - non-breeding seasons 2021/22 & 2022/23

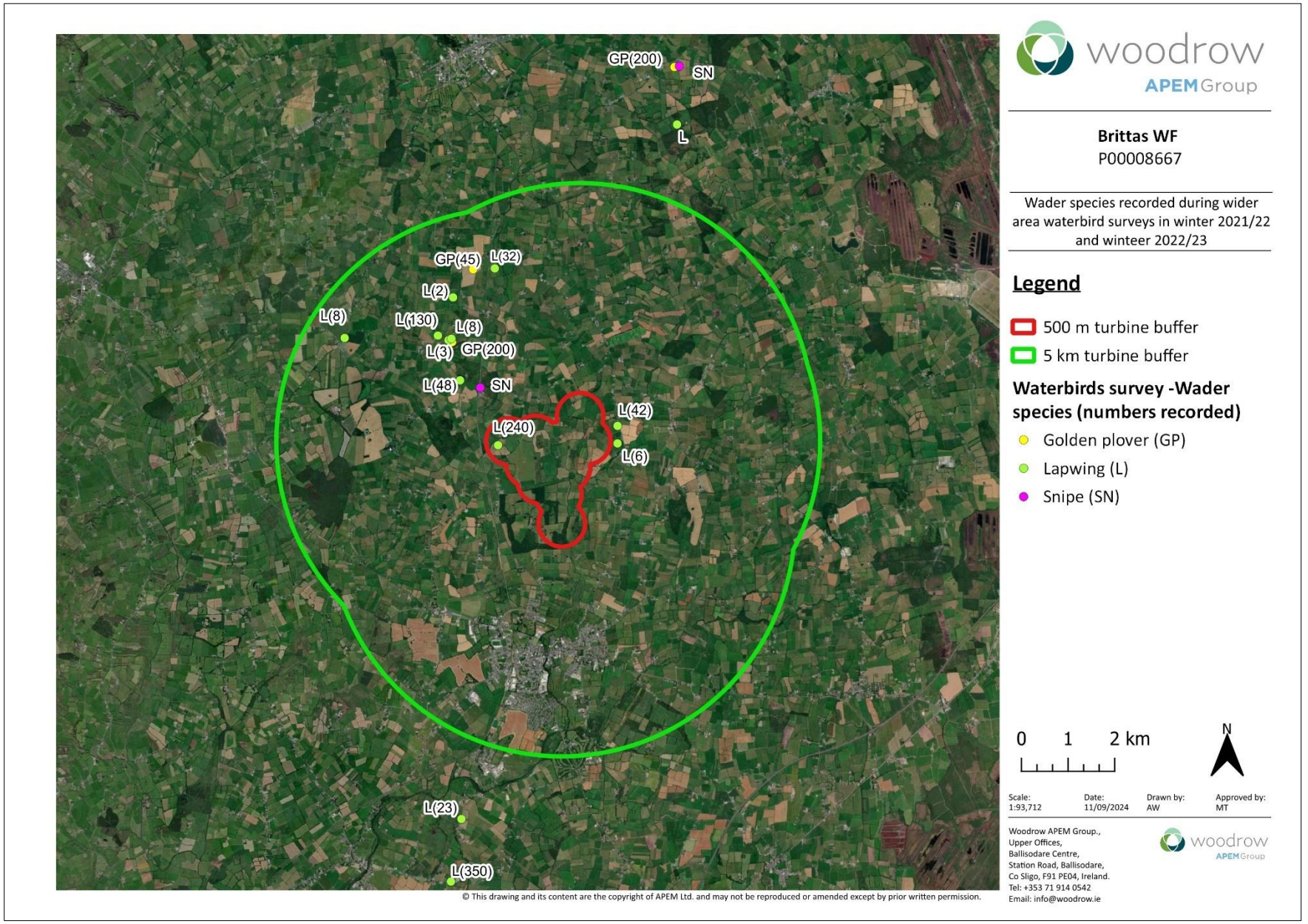

Figure 7A.16: Wider area distribution of wintering waders - non-breeding seasons 2021/22 & 2022/23

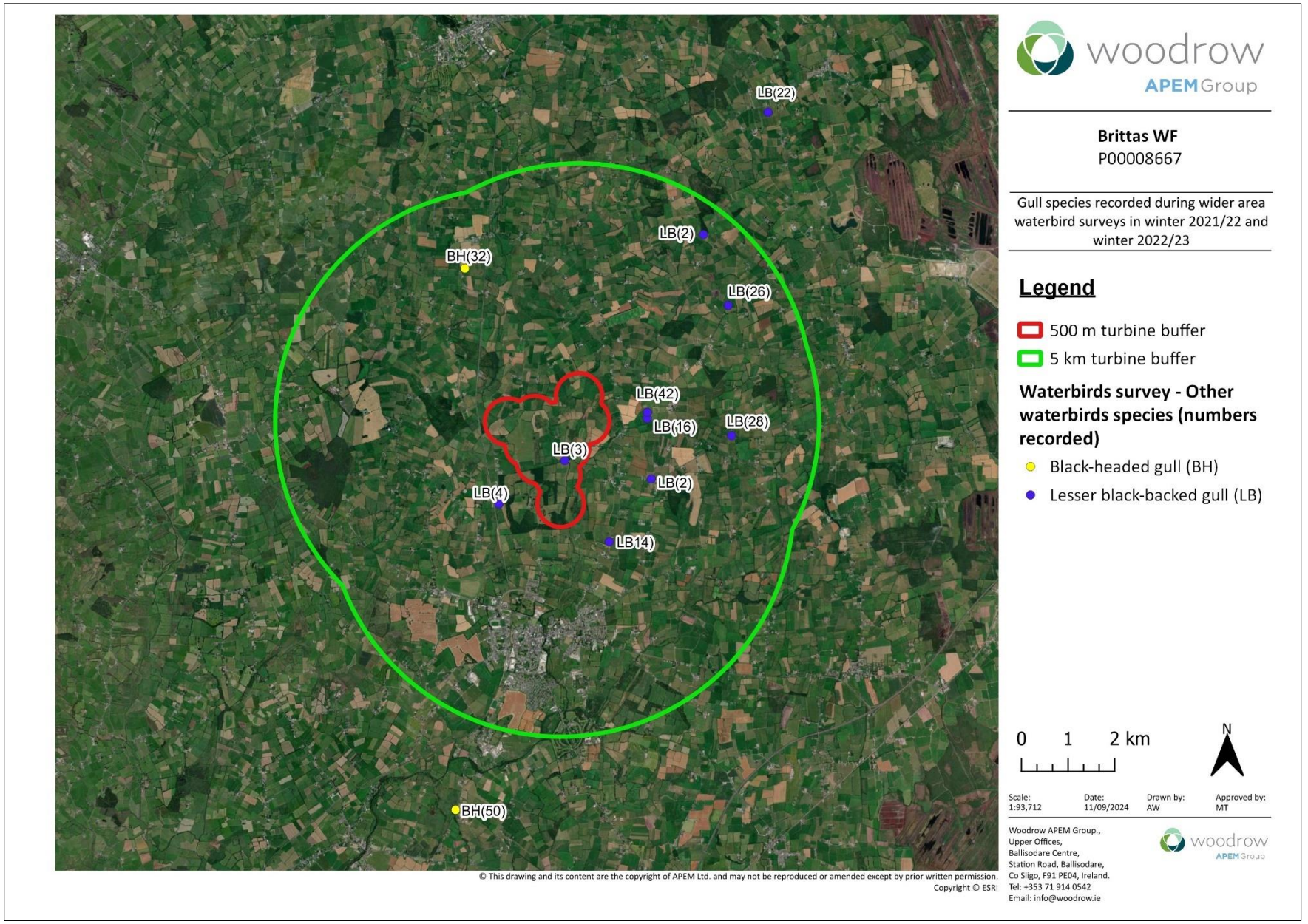

Figure 7A.17: Wider area distribution of wintering gulls - non-breeding seasons 2021/22 & 2022/23

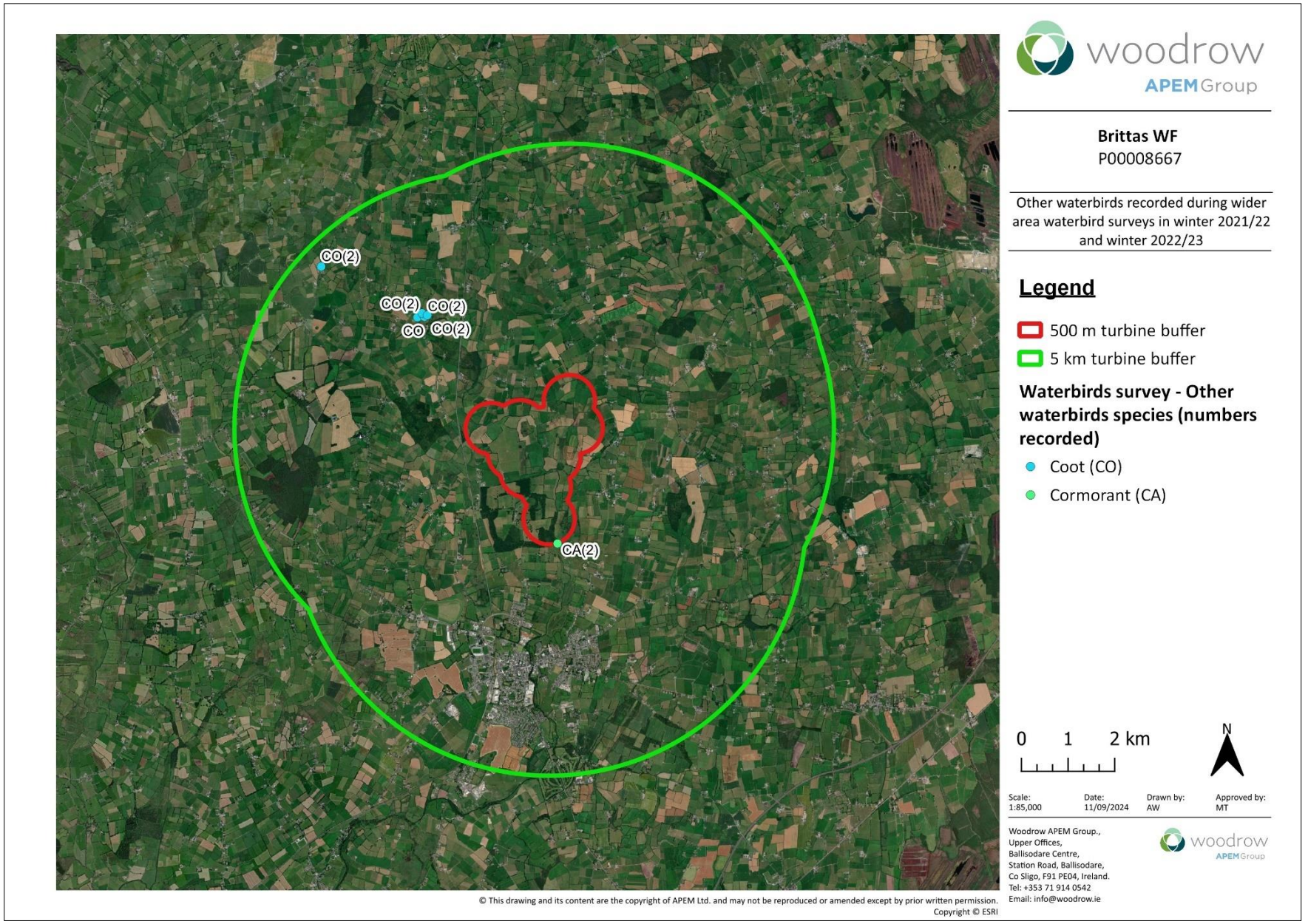

Figure 7A.18: Wider area distribution of other wintering waterbirds - non-breeding seasons 2021/22 & 2022/23

7A.5. ORNITHOLOGICAL BASELINE

The following sections provide the baseline assessment for the occurrence of target species in relation to the proposed Wind Farm Site. These baseline species accounts assimilate all the ornithological information collected for target species and the avian assemblages over three years of surveying, spanning the period October 2020 to September 2023, with additional location specific surveys conducted over breeding season 2024. Where appropriate the finding from the desk study are included. The aim is to provide species accounts that allow for the identification of important ornithological features and determination of whether or not there is potential for likely significant effects.

7A.5.1. Wetland birds

The following waterbird species were recorded utilising or flying through the 500 m turbine buffer or in close vicinity to the proposed Wind Farm Site:

- Swans, geese and ducks
  - Greylag goose, mute swan, whooper swan, shoveler, wigeon mallard, teal
- Waders
  - Lapwing, golden plover, curlew, whimbrel, dunlin, snipe, jack snipe, woodcock, green sandpiper
- Gulls
  - Black-headed gull, common gull, great black-backed gull, herring gull
- Other waterbirds
  - Cormorant, grey heron, little egret, kingfisher

The following sections provide baseline accounts for each of these species, with Section 7A.5.1.5 and Section 7A.5.1.6, respectively providing an overview at the end for the winter waterbird assemblage and the breeding lowland wader population associated with the proposed Wind Farm Site.

7A.5.1.1. Swans, geese & ducks

For all the surveys conducted covering the proposed Wind Farm Site, the following species of geese, swans and ducks were recorded utilising or flying through the 500 m turbine buffer or in close vicinity:

- Greylag goose, mute swan, whooper swan, shoveler, wigeon, mallard, teal

The following sections provide baseline accounts for each of these species.

7A.5.1.1.1. Greylag goose

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where migratory Icelandic greylag geese are listed as a SCI (NPWS, 2013). In addition, no wetlands supporting nationally important flocks (1% threshold: 35 birds) were identified within 30 km of the proposed Wind Farm Site (Burke *et al*., 2022).

During VP watches the only record for greylag goose was a single bird flying through the 500 m turbine buffer at *c.* 15 m on 31 November 2021. No CRM was run for this species and based on observed usage of the 500 m turbine buffer, collision risk for greylag goose is assessed as negligible. Based on I-WeBS counts and wider area wintering waterbird surveys (winters 2020/21, 2021/22, 2022/23), greylag geese have only been recorded within the proposed Wind Farm Site in one season since winter 2011/12, with a maximum count of 2 birds.

The desk study and wider area wintering waterbird surveys, show that usage of the hinterland by this species is infrequent, with counts never exceeding nationally important numbers (1% threshold: 35 birds). The closest occasionally occurring flock to the proposed Wind Farm Site is recorded at the Cabragh Wetlands pNHA, south of Thurles and approximately 6.5 km from the proposed Wind Farm Site, where numbers over the last 10 years have not exceeded 20 birds. The provenance of the flocks occurring, feral or Icelandic, is unknown and it is likely that at least some of the records, if not all, relate to the feral population[4].

Therefore, it can be objectively concluded that the proposed Wind Farm Site is not important for this species and there is no potential for any likely significant effect on the migratory Icelandic greylag goose population wintering in Ireland.

7A.5.1.1.2. Mute swan

The desk study determined that there are no SPAs or other wetland sites supporting nationally or internationally important numbers this species (1% threshold: 90 birds)[5] within the zone of influence of the proposed Wind Farm Site (NPWS, 2013, Lewis *et al*. 2019b).

During VP watches, 10 mute swan flights were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 9 birds. Flights occurred in all seasons, but activity was higher over the winter, which was associated with slightly more birds occurring in the general area during the winter months. Only one flight (9 birds) was recorded within the CRZ, equating to a total of 1,080 aggregated flight seconds. No regular flight paths between foraging and roosting locations were identified. As only a single flight occurred within the CRZ, no CRM was run for this species and no significant (> 1%) population level effects due to collision risk is anticipated for mute swan.

Based on I-WeBS counts and wider area wintering waterbird surveys (winters 2020/21, 2021/22, 2022/23), relatively small numbers of wintering mute swan (2-6 birds) are regularly recorded within the proposed Wind Farm Site, with utilisation of the site associated with River Suir and adjacent floodplain. In addition, a pair have been recorded breeding along the River Suir within the 500 m turbine buffer.

The wintering population of mute swans recorded across the hinterland, out to 5 km, consists of equally small numbers that utilise most available wetland sites that have some open water. Cumulatively, wintering numbers within the 5 km turbine buffer are estimated at less than 20 birds, which is below nationally/internationally important numbers (1% threshold: 90 birds). If assuming Co. Tipperary supports a mute swan population of 1,200 birds based on I-WeBS counts, the 1% threshold for county importance can be taken as 12 birds.

Based on the data presented, it can be objectively concluded that the proposed Wind Farm Site is utilised by locally important numbers of wintering mute swan. Likewise, taking 13-14 pairs as an informed estimate of the 1% threshold for national importance[6], then the pair utilising the proposed Wind Farm Site is assessed as locally important.

7A.5.1.1.3. Whooper swan

[4] The feral greylag goose population in Ireland is listed on the Third Schedule of EC (Birds and Natural Habitats) Regulations 2011, as an invasive species subject to restrictions under Regulations 49 and 50.

[5] As the Irish mute swan population is considered to be largely a resident population, 1% thresholds for national and international importance are the same (90 birds).

[6] There is no estimate for the Irish mute swan breeding population. Therefore, taking an all-Ireland mute swan wintering population as approximately 9,000 birds (Lewis *et al*. 2019b) and assuming these are mostly resident birds, and that 40% of these breed annually, generates an estimated breeding population of 1,350 pairs.

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where whooper swans are listed as a SCI (NPWS, 2013). In addition, no wetlands supporting nationally important flocks (1% threshold: 150 birds) were identified within 30 km of the proposed Wind Farm Site (Burke *et al*., 2021).

During VP watches the only record for whooper swan were two birds foraging in grassland, adjacent to the River Suir on 07 March 2022 and no flights were detected. No CRM was run for this species and based on observed usage of the 500 m turbine buffer, collision risk for whooper is assessed as highly unlikely to result in any significant (> 1%) population level effects. Over winters 2021/22 and 2022/23 there were no regular flight paths between roosts and foraging areas identified for whooper swan, and this species was not recorded during wider area surveys extending out to 5 km from the proposed Wind Farm Site. Over winter 2020/21, a small flock (3-5 birds) was regularly recorded along the River Suir, just north of the 500 m turbine buffer at Clonamuckoge Beg/Killkillahra. Based on I-WeBS data for the area (Upper River Suir I-WeBS site) historically supported a flock of whooper swans, with annual peak counts ranging from 10 to 28 birds. However, apart from usage recorded over 2020/21, no birds have been recorded in the area since winter 2016/17.

Historic maximum counts are below the threshold for national importance (1% threshold: 150 birds). The most recent whooper swan population estimate for Co. Tipperary is 441 birds (Burke *et al*. 2021); therefore, based on a 1% threshold, a regularly occurring population of 4 or more birds is classed as being of county importance. A precautionary assessment, given the sporadic usage of the area by whooper swans in recent years, is that the proposed Wind Farm site occasionally supports numbers of county importance, however it is noted that birds are not regularly occurring.

7A.5.1.1.4. Shoveler

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where shoveler are listed as a SCI (NPWS, 2013). The Cabragh Wetlands pNHA south of Thurles and approximately 6.5 km south of the proposed Wind Farm Site is the closest wetland noted as historically supporting nationally important numbers of this species (1% threshold: 20 birds) – see Crowe (2005).

During all the surveys conducted, shoveler were only recorded once during winter site walkovers with four birds recorded on 16 March 2023, and were utilising flood waters along the southern extent of the 500 m turbine buffer. Therefore, it considered that shovelers may occasionally utilise the proposed Wind Farm Site when the River Suir is under certain flood conditions, with numbers likely to be lower than the requisite for nationally importance (1% threshold: 20 birds).

7A.5.1.1.5. Wigeon

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where wigeon are listed as a SCI (NPWS, 2013). In addition, there are no wetlands within the 5 km turbine buffer regularly supporting nationally important numbers (1% threshold: 560 birds) – see Lewis *et al*. (2019b). The Cabragh Wetlands pNHA, south of Thurles and approximately 6.5 km south of the proposed Wind Farm Site is the closest wetland noted as supporting numbers of county importance, with a maximum count of 350 birds (winter 2020/21).

During VP watches one wigeon flight consisting of 22 birds was recorded flying through the proposed Wind Farm Site on 29 December 2022 and the flock was detected flying within the CRZ at 40-50 m, with flight time equating to 2,420 aggregated flight seconds. As only a single flight was recorded no CRM was run for this species and based on observed usage of the 500 m turbine buffer, collision risk for wigeon is assessed as highly unlikely to result in any significant (> 1%) population level effects.

The only other record of wigeon in the vicinity of the proposed Wind Farm Site was a flock of 80 birds recorded during a site walkover on 16 March 2023, when the flock were foraging in flooded fields on the eastern bank of the River Suir, just south of the 500 m turbine buffer. These numbers are lower than the threshold for nationally important numbers (1% threshold: 560 birds).The baseline assessment for wigeon finds low levels of periodic usage for the proposed Wind Farm Site, as recorded over three winters (2020/21, 2021/22, 2022/23), and this is supported by I-WeBS counts for the River Suir Upper, where small numbers of wigeon (2 to 10 birds) were only recorded in three out of nine of the most recent winters of monitoring.

7A.5.1.1.6. Mallard

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where mallard are listed as a SCI (NPWS, 2013). There are no wetlands within the 5 km turbine buffer regularly supporting nationally important numbers (1% threshold: 280 birds). The Cabragh Wetlands pNHA, south of Thurles and approximately 6.5 km south of the proposed Wind Farm Site is the closest wetland noted as supporting numbers of county importance, with a maximum count of 250 birds (winter 2017/18).

Mallards were found to be a regularly occurring wetland species within the proposed Wind Farm Site during both the winter and breeding season. During VP watches a total of 16 flight observations were recorded within the 500 turbine buffer, with numbers recorded ranging from 1 to 60 birds and generating 3,478 aggregate flight seconds. However, only two flights were recorded at heights above 25 m, equating to 431 aggregate flight seconds within the CRZ. As only two flight were recorded within the CRZ, no CRM was run for this species and based on observed usage of the 500 m turbine buffer, collision risk for mallard is assessed as assessed as highly unlikely to result in any significant (> 1%) population level effects.

The numbers of mallard utilising or flying through the proposed Wind Farm Site over the winter months was low, ranging from 1 to 6 birds across all the monitoring completed over three winters (2020/21, 2021/22, 2022/23), and this is supported by I-WeBS counts for the River Suir Upper, where small numbers of mallard (2 to 7 birds) were only recorded in two out of nine of the most recent winters of monitoring.

Mallard numbers over breeding season 2022 were low (1-2 birds), with higher numbers recorded over breeding season 2023, when on three dates counts of 12, 16 and 60 birds were recorded. Higher counts in 2023 were associated with flooding along the River Suir late in the season (July and August), when most young birds would be fully fledged and therefore mobile with potential to have moved away from natal sites. As a widespread breeding species in Ireland, it is likely that that several mallards will nest within the proposed Wind Farm Site. Based on an all-Ireland breeding population of 15,400 pairs (NPWS, 2019), the 1% threshold for national importance is estimated at 154 pairs.

7A.5.1.1.7. Teal

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where teal are listed as a SCI (NPWS, 2013). There are no wetlands within the 5 km turbine buffer regularly supporting nationally important numbers (1% threshold: 360 birds). The Cabragh Wetlands pNHA, south of Thurles and approximately 6.5 km south of the proposed Wind Farm Site is the closest wetland noted as supporting numbers of national importance in the last 10 years, with a maximum count of 450 birds (winter 2014/15). Based on I-WeBS count data, a notional county/regional wintering teal population is estimated at 2,000 to 3,000 birds and the 1% threshold for county importance can be taken as a regularly occurring population of 20-30 birds.

No teal flights within the 500 m proposed turbine buffer were recorded during VP watches. Typically, small numbers (1-4 birds) were recorded along the River Suir over the winter, with the highest numbers recorded in the small pond in the southern woodland where 26 birds were recorded on 21 January 2022, in addition to 7 birds recorded along the river. An incidental record on 28 November 2022 recorded 120 teal along the River Suir, just south of the 500 m turbine buffer. Highest numbers recorded during I-WeBS counts of the River Suir Upper count area covering the northern part of the proposed Wind Farm Site is 50 birds, with teal recorded on five out of nine of the most recent winters of monitoring.

No teal were recorded during the breeding season and Co. Tipperary has recorded some of the lowest breeding densities for teal in the country (Balmer *et al*., 2013). There were a small number of potentially suitable nesting sites noted, including the pond in the southern woodland and some of the denser vegetation associated with the River Suir floodplain.

7A.5.1.2. Waders

For all the surveys conducted covering the proposed Wind Farm Site, the following wader species were recorded utilising or flying through the 500 m turbine buffer or in close vicinity:

- Lapwing, golden plover, curlew, whimbrel, dunlin, snipe, jack snipe, woodcock and green sandpiper

The following sections provide baseline accounts for each of these species.

7A.5.1.2.1. Lapwing

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where lapwing are listed as a SCI (NPWS, 2013). In addition, there are no wetlands identified as regularly supporting nationally important numbers (1% threshold: 850 birds) within 30 km of the proposed Wind Farm Site (Lewis *et al*., 2019b).

Based on I-WeBS data for the count site covering the northern part of the proposed Wind Farm Site (River Suir Upper), lapwings were recorded in seven out of nine of the most recent winters of monitoring, with peak counts ranging from 12 to 300 birds. Over the three winters covering the proposed Wind Farm Site lapwing were recorded flying through the 500 m turbine buffer in most winter months, with peak counts of 500 birds, 160 birds and 200 birds recorded over winters 2020/21, 2020/21 and 2022/23, respectively. These flocks of lapwing were often moving through the 500 m turbine buffer, appearing to favour the area around Clonamuckoge Beg/Kilkillahara, which is just northwest of the 500 m turbine buffer, as well as some flooded fields at Ballybristy/Clondoty, approximately 2.5 km further to the northwest. This was especially the case over winters 2020/21 and 2021/22, whereas over winter 2022/23 flight activity was more centred along the stretch of the River Suir north of the Rossestown Bridge. The change in flight activity was mirrored by golden plover usage of the area.

Numbers of wintering birds recorded fall below the 1% threshold for national importance (850 birds). Based on I-WeBS data the lapwing population for Co. Tipperary was estimated at 2,000 to 3,000 birds and applying a 1% threshold, the wintering population of lapwing occurring within the proposed Wind Farm Site is classified as being of county importance, as an area regularly supporting more than 20-30 birds.

Lapwing were recorded breeding within the proposed Wind Farm Site, and although it was difficult to differentiate between birds displaying on passage and genuine breeders, due high failure rates it is estimated that there were a maximum of 6 pairs was recorded. This is classed as nationally important based on an Irish breeding population estimate of 476 to 620 pairs (NPWS, 2019), i.e. 1% threshold of 4-6 pairs. As mentioned, breeding success was exceptionally low and in 2022 no birds were recorded after May indicating complete failure. Surveyors noted that site abandonment may have been related to active land

management occurring the area, as well as nest site de-predation by hooded crows. In 2023, of the 5-6 pairs attempting to breed, only a single pair was recorded later in the season as potentially raising chicks. It is likely that implementing some basic habitat management measures, e.g. allowing some areas to develop longer and tussocky vegetation for nesting cover and controlling hooded crow numbers would have a positive effect on this population.

During VP watches 153 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 200 birds and generating 581,988 aggregate flight seconds. A high proportion of the flight time was recorded above 25 m and 531,730 aggregate flight seconds were recorded within the CRZ. As detailed in Appendix 7H, several CRMs were run for lapwing to account for different seasonal usage of the 500 m turbine buffer and also to test the effects of different avoidance rates on predicted collision risk. Application of the default avoidance rate (0.98) is considered too low for lapwing and higher avoidance, closer to 99.8%, is consider more appropriate for this species.

Applying 98.0% default avoidance results in 351 predicted collision over 35 years and applying 99.8% avoidance results in 35 predicted collisions over 35 years. Running CRMs to examine differences in seasonal collision risk, finds that substantial reduced flight activity within the CRZ during the breeding season generated lower levels of collision risk, which emerges as negligible once avoidance is set to 99.5%, with outputs predicting 0.2 to 1.1 collisions over 35 years (Turbine Type B). The wide range between outputs was due to higher aggregate flight times recorded in the second breeding season (2023), which was reflective of a slightly more successful breeding season compared to the first breeding season (2022), when breeding attempts had failed by May and the site was abandoned early in the season.

The CRM run for the non-breeding seasons showed that lapwing flight activity over the winter drives higher collision risk, with winter 2022/23 resulting in the highest predicted collision risk. Estimated collisions over 35 years for each non-breeding season analysed ranges from:

- 166 to 425 collisions over 35 years with avoidance at 98.0%
- 29 to 106 collisions over 35 years with avoidance at 99.5%
- 12 to 43 collisions over 35 years with avoidance at 99.8%

Potential for predicted collision risk to have a > 1% population level effects above background mortality are tested by applying an annual adult survival rate of 0.71 (BTO BirdFacts[7]) to the all-Ireland lapwing wintering population of 84,690 birds (Lewis *et al*. 2019b), an estimated county/regional wintering population of 2,000-3,000 birds (estimated using I-WeBS data) and a local population of 200-500 birds. For additional annual turbine mediated mortality to have a 1% effect on the:

- All-Ireland population (84,690 birds) would require: 245 collisions per year
- Country population (2000-3000 birds) would require: 5 to 8 collisions per year
- Local population (200-500 birds) would require: 0.5 to 1 collisions per year

Taking an intermediate modelled output for predicted annual lapwing collision risk of 2.51 collisions per annum (precautionary, 99.5% avoidance for Turbine Type B), any additional mortality due to predicted collision risk would have a less than 1% effect on the all-Ireland population (0.01%, excluding cumulative effects) and the county population (0.29-0.43%). In terms of the local lapwing population (200-500 birds) regularly utilising the proposed development site over the winter, applying the intermediate modelled output for predicted lapwing collision risk, 2.51 collisions per annum, would expresses an effect > 1% above background mortality, ranging from 1.7 to 4.3% depending on the size of the local population assessed.

[7] BTO BirdFacts – Lapwing: https://www.bto.org/understanding-birds/birdfacts/lapwing

To test magnitude of effect on the lapwing breeding population, an annual adult survival rate of 0.71 (BTO BirdFacts[8]) is applied to the low and high all-Ireland lapwing breeding population estimates of 952 to 1,240 birds (NPWS, 2019), and the local breeding population of 12 birds. For additional annual turbine mediated mortality to have a 1% effect on the:

- All-Ireland breeding population - high est. (1,240 birds) would require: 4 collisions per year
- All-Ireland breeding population - low est. (952 birds) would require: 3 collisions per year
- Local breeding population (12 birds/6 pairs) would require: 0.03 collisions per year

Applying 0.03 collisions per annum for breeding season predicted collision risk, based on the intermediate output from the 2023 breeding season (precautionary, 99.5% avoidance for Turbine Type B), which accounts for highest levels of flight activity recorded over the study period, would expresses an effect very close to 1% of background mortality.

In summary, the proposed Wind Farm Site supports nationally important numbers of breeding lapwing, all be it a struggling one, and a wintering population that is classed as regionally (county) important. The outputs from CRMs, assessed at an intermediate avoidance rate (0.995) indicate that collision risk over the breeding season has the potential for low level (*c.* 1%) effect on the lapwing breeding in the area. Similarly for wintering lapwing applying intermediate outputs for predicted collision risk indicates that any population level effects would be expressed at the local population level and the magnitude of effect is anticipated to be low (1-5%).

7A.5.1.2.2. Golden plover

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where golden plover are listed as a SCI (NPWS, 2013). In addition, there are no wetlands identified as regularly supporting nationally important numbers (1% threshold: 920 birds) within 30 km of the proposed Wind Farm Site (Lewis *et al*., 2019b).

Based on I-WeBS data for the count site covering the northern part of the proposed Wind Farm Site (River Suir Upper), golden plover were recorded in two out of nine of the most recent winters of monitoring, with peak counts ranging from 1 to 4 birds. Over the three winters covering the proposed Wind Farm Site golden plovers were recorded flying through the 500 m turbine buffer in most winter months, with peak counts of 700 birds, 200 birds and 400 birds recorded over winters 2020/21, 2020/21 and 2022/23, respectively. These flocks of golden plover were often moving through the 500 m turbine buffer, appearing to favour the area around Clonamuckoge Beg/Kilkillahara, which is just northwest of the 500 m turbine buffer, as well as some flooded fields at Ballybristy, approximately 2.5 km further to the northwest. This was especially the case over winters 2020/21 and 2021/22, whereas over winter 2022/23 flight activity was more centred along the stretch of the River Suir north of the Rossestown Bridge. The change in flight activity was mirrored by lapwing usage of the area.

Numbers of wintering birds recorded did not exceed the 1% threshold for national importance (920 birds). Based on I-WeBS data the golden plover population for Co. Tipperary was estimated at 3,000 to 5,000 birds and applying a 1% threshold, the wintering population of golden plover occurring within the proposed Wind Farm Site is classified as being of county importance, as an area regularly supporting more than 30-50 birds. Golden plover usage of the proposed Wind Farm Site did not extend beyond April and there is no suitable breeding habitat for this species, which has an Irish breeding range that is restricted to the uplands of the mid-west and northwest (Sharrock, 1976, Hutchinson, 1989, Gibbons *et al*., 1993, Balmer *et al*. 2013).

[8] BTO BirdFacts – Lapwing: https://www.bto.org/understanding-birds/birdfacts/lapwing

During VP watches 42 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 3 to 400 birds and generating 730,067 aggregate flight seconds. A high proportion of the flight time was recorded above 25 m and 719,967 aggregate flight seconds were recorded within the CRZ. As detailed in Appendix 7H, several CRMs were run for golden plover to test the effects of different avoidance rates on predicted collision risk. Application of the default avoidance rate (0.98) is considered too low for golden plover and higher avoidance, closer to 99.8%, is consider more appropriate for this species.

Applying 98.0% default avoidance results in 599 predicted collision over 35 years and applying 99.8% avoidance results in 60 predicted collisions over 35 years. Potential for predicted collision risk to have a > 1% population level effects above background mortality are tested by applying an annual adult survival rate of 0.73 (BTO BirdFacts[9]) to the all-Ireland golden plover wintering population of 92,060 birds (Lewis *et al*. 2019b), an estimated county/regional wintering population of 3,000-5,000 birds (estimated using I-WeBS data) and a local population of 200-700 birds. For additional annual turbine mediated mortality to have a 1% effect on the:

- All-Ireland population (92,060 birds) would require: 248 collisions per year
- Country population (3,000-5,000 birds) would require: 8 to 13 collisions per year
- Local population (200-700 birds) would require: 0.5 to 2 collisions per year

Taking an intermediate modelled output for predicted annual golden plover collision risk of 4.28 collisions per annum (precautionary, 99.5% avoidance for Turbine Type B), any additional mortality due to predicted collision risk would have a less than 1% effect on the all-Ireland population (0.02%, excluding cumulative effects) and the county population (0.3-0.5%). In terms of the local golden plover population (200-700 birds) regularly utilising the proposed development site over the winter, applying the intermediate modelled output for predicted golden plover collision risk, 4.28 collisions per annum, would express an effect > 1% above background mortality, ranging from 2.3 to 7.9% depending on the size of the local population assessed.

In summary, the proposed Wind Farm Site supports a wintering golden plover population that is classed as regionally (county) important. The outputs from CRMs, assessed at an intermediate avoidance rate (0.995) indicate that collision risk has the potential for low to moderate level effects (2 to 8%) on the golden plover population wintering in the area.

7A.5.1.2.3. Curlew

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where curlew are listed as a SCI (NPWS, 2013). In addition, there are no wetlands identified as regularly supporting nationally important numbers (1% threshold: 350 birds) within 30 km of the proposed Wind Farm Site (Lewis *et al*., 2019b).

Based on I-WeBS data (2011/12 to 2020/21) for the count site covering the northern part of the proposed Wind Farm Site (River Suir Upper), curlew were recorded in four out of nine of the most recent winters of monitoring, with peak counts ranging from 1 to 30 birds. Even for previous monitoring periods peak count remained < 100 birds, with Crowe (2005) reporting a peak count of 88 birds for this I-WeBS count site for winters 1996/97 to 2000/01. A flock of up to 200 birds is more regularly recorded at the Cabragh Wetlands pNHA, south of Thurles and approximately 6.5 km from the proposed Wind Farm Site. This wintering population falls below the 1% threshold (350 birds) for consideration as nationally important but qualifies as being of county importance.

[9] BTO BirdFacts – Golden plover: https://www.bto.org/understanding-birds/birdfacts/golden-plover

Over the three winters covering the proposed Wind Farm Site (2020/21, 2020/21 and 2022/23) only a single curlew was recorded flying within the 500 m turbine buffer during a winter site walkover in February 2022. The only other curlew observations in the vicinity of the proposed Wind Farm Site were two flight records from VP watches, both of single birds flying outside to the 500 m turbine buffer over the summer, including:

- 10 August 2021: 1 bird flying south, *c*. 1 km from the proposed Wind Farm Site close to VP3
- 09 June 2023: 1 bird flying south, *c*. 2 km from the proposed Wind Farm Site east of VP1

Although recorded during the breeding season, no breeding behaviour was associated with these two observation and birds were noted as commuting through the area. There were no breeding curlew encountered within the 2 km of the proposed Wind Farm Site and the closest documented breeding sites are over 10 km away to the southeast and over 20 km away to the west (O'Donoghue *et a*l., 2019, Fehily Timoney, 2022, Colhoun *et al*., 2022).

Therefore, in summary based on sporadic recorded usage of the River Suir Upper I-WeBS count site by wintering curlew since 2011/12 and the near lack of usage over the study period, it can be objectively concluded on a precautionary basis that the proposed Wind Farm Site is only very occasionally utilised by curlew in numbers of county importance over the winter and there is no contemporary breeding population associated with this area.

7A.5.1.2.4. Whimbrel

Whimbrel do not breed in Ireland, they are spring and autumn passage migrants, with very limited numbers over wintering (Lewis *et al*., 2019b). A small number of whimbrel were recorded on autumn passage commuting through the proposed Wind Farm Site. Three birds were observed on 09 August 2023 and 157 aggregate flight seconds was recorded within the 500 m turbine buffer and at collision risk height (> 25 m). The low level of flight activity did not warrant a CRM, and it is considered highly unlikely that the proposed Wind Farm poses any significant population level risks to whimbrel, which are green listed in Ireland (Gilbert *et al*., 2021).

7A.5.1.2.5. Dunlin

This species is predominately coastal over the winter and is only regularly recorded at a small number of inland I-WeBS sites (Lewis *et al*., 2019b). Based on I-WeBS data for the count site covering the northern part of the proposed Wind Farm Site (River Suir Upper), dunlin were recorded in one out of nine of the most recent winters of monitoring, with peak counts of 3 birds. The I-WeBS counts for the Carbragh Wetland site show similarly low levels of limited usage and these counts indicate that this species does not regularly occur in this region. The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where dunlin are listed as a SCI (NPWS, 2013), either wintering or breeding. In addition, there are no wetlands identified as regularly supporting nationally important wintering numbers (1% threshold: 460 birds) within 30 km of the proposed Wind Farm Site (Lewis *et al*., 2019b). A small population of dunlin breed in Ireland approximately 50 pairs and the breeding range is restricted to coastal machair sites and a few upland site along west coast of Ireland (Suddaby *et al*. 2020).

There was only one observation of dunlin, which was recorded during VP watch on 29 December 2022, when 16 birds were observed flying for 720 seconds within the 500 m turbine buffer at 30-40 m. As only a single flight was recorded no CRM was run for this species and based on observed usage of the 500 m turbine buffer, collision risk for dunlin is assessed as negligible. It is considered highly unlikely that the proposed Wind Farm poses any significant (> 1%) population level risks to this species.

7A.5.1.2.6. Snipe

Snipe are not listed as SCIs of any SPAs in Ireland (NPWS, 2013). It is difficult to effectively count this cryptic species over the winter, as birds tend to spend the majority of the day hidden away in long vegetation, only

becoming visible in flight, typically when flushed or at dusk/dawn when commuting between roosting and foraging areas or on spring/autumn passage when more cohesive flocks are often observed. Due to the difficulty in counting snipe no population estimate for the number of snipe wintering in Ireland is given in Lewis *et al*. (2019b), and therefore, there is no 1% threshold for national importance; although previous I-WeBS reporting (Crowe, 2005) used a notional value, based on professional judgement, and applied an estimate of 100 birds for national importance, i.e. a wintering population of 10,000 birds.

Based on I-WeBS data (2011/12 to 2020/21) for the count site covering the northern part of the proposed Wind Farm Site (River Suir Upper), snipe were only recorded once out of nine of the most recent winters of monitoring, and only one bird was recorded. However, for the reasons outlined above, counting from a fixed point, as is typically employed by I-WeBS, will underestimate snipe numbers. Walked surveys, counting flushed birds provide better estimates of numbers utilising a given area. Walkover surveys conducted over winters 2021/22 and 2022/23 covering suitable habitat within the proposed Wind Farm Site generated the following flush counts: 36 birds (18 & 19 December 2021), 28 birds (21 & 22 January 2022), 26 birds (27 & 28 February 2022) and 7 birds (23 & 24 January 2023), with records concentrated along the River Suir and flood plain. Taking into account the species widespread distribution over the winter and noting that there is a high degree of uncertainty regarding the size of the wintering population (Lewis *et al*. 2019b), the proposed Wind Farm Site is considered to support wintering snipe in numbers of county importance.

Snipe were recorded breeding within the proposed Wind Farm Site and based on breeding behaviour observed (drumming and chipping), it is estimated that there are up to six territories, located in three areas. These breeding sites were associated with very distinct areas holding wetland habitats and the locations where territorial birds were recorded is shown in Appendix 7G – see Figure 7G.1, including:

- Wetland adjacent to T2, west bank of River Suir supporting:
  - 4 territories in 2021, 1-2 territories in 2022
- Field of wet grassland between T7 and T5, east of River Suir supporting:
  - 2 territories in 2021, 3-4 territories in 2022
- Wetland in southeast of 500 m turbine buffer, SE of T10, supporting:
  - 1 possible territory in 2022

Taking an Irish breeding population estimate of 4,275 pairs, i.e. 1% threshold of 42 pairs, based on NPWS (2019) applying findings of a review by Lauder & Donaghy (2008) and also reported in BWI (2010), the proposed Wind Farm Site does not support a nationally important breeding population. There are no county population estimates for breeding snipe; however assuming a relatively even distribution across the country, an appropriate threshold for county importance is taken as 1-2 pairs. The fact that suitable areas of breeding snipe habitat are so distinctly separated from the significantly poorer areas of improved grasslands, highlights that habitat management measures could easily be targeted at these areas to enhance habitat quality for snipe. Several locations in the wider area were also identified as supporting good numbers of wintering and breeding snipe, including the Cabragh pNHA, both the Marshes (south of Thurles) and Tank subsites.

During VP watches 13 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 7 birds and generating 1,142 aggregate flight seconds. A low proportion of the flight time was recorded above 25 m and only 480 aggregate flight seconds were recorded within the CRZ. As detailed in Appendix 7H, although snipe were recorded year round a CRM was only run for wintering flight activity, as only 10 seconds was recorded within the CRZ during the breeding season. The CRM for snipe found that predicted collision risk was low, with only 1 collision every 93 years (weighted, 98.0% avoidance). As discussed in Appendix 7H, flight activity for this species is largely crepuscular and VP surveys are carried out

during daylight hours, and therefore, VP surveys are not always an effective method of estimating snipe flight activity. In addition, being a small, cryptic species flights at distance can easily go undetected. As such, flight time within the 500 m turbine buffer is likely to be underestimated (see Madders & Whitfield, 2006). A correction factor of 25% can be applied to account for nocturnal flight times. However, in this instance applying this factor still generates low outputs, with only 1 collision every 74 years (weighted, 98.0% avoidance).

Potential for predicted collision risk to have a > 1% population level effects above background mortality are tested by applying an annual adult survival rate of 0.48 (BTO BirdFacts[10]) to an estimated all-Ireland snipe population of 10,000 birds (based on Crowe, 2005), a notional county/regional population of 380 birds and a local breeding population of 12 birds. For additional annual turbine mediated mortality to have a 1% effect on the:

- All-Ireland population (10,000 birds) would require: 51 collisions per year
- County population (380 birds) would require: 2 collisions per year
- Local breeding population (12 birds) would require: 0.06 collisions per year (2 over 35 years)

Due to low annual survivorship, background mortality for snipe is notably high and the generational timeframe is also relatively short with the typical lifespan given as 3 years, with breeding occurring at two years (BTO BirdFacts).

In summary the proposed Wind Farm Site is assessed as supporting a wintering (up to 36 birds) and breeding (up to 6 territories) snipe population of county importance. While the CRM suggests low predicted collision risk, there is uncertainty around the use of CRMs for this species and it is also noted that typically, displacement effects are more of concern for this species than collision risk, especially displacement of breeding birds.

7A.5.1.2.7. Jack snipe

Jack snipe are often recorded in similar habitat to snipe over the winter, although typically occurring at lower densities. A single jack snipe was flushed from wetland habitat on the west bank of the River Suir during a winter site walkover on 22 January 2022. This species does not breed in Ireland and was downgraded from the amber to green list in the latest BoCCI (2020-2026) assessments (Colhoun & Cummins, 2013 and Gilbert *et al*., 2021). Given the low level of activity it is considered highly unlikely that the proposed Wind Farm poses any significant population level risks to jack snipe.

7A.5.1.2.8. Woodcock

Woodcock were not recorded within the proposed Wind Farm Site during dusk survey undertaken over the breeding season. Despite adequate potential nesting cover identified in the southern woodlands, surveys indicate that the species does not breed in the area. The breeding component of the Irish woodcock population currently has an unfavourable (red listed) conservation status, whereas the wintering population is assessed as relatively stable (Gilbert *et al.*, 2021). Small numbers of overwintering woodcock were flushed during winter walkover surveys covering the 500 m turbine buffer. Woodcock are quarry species in Ireland and can be hunted each winter over the open season, November to January inclusive. Therefore, it is considered highly unlikely that the proposed Wind Farm poses any significant population level risks to wintering woodcock utilising the area, although there will be some loss of potential habitat.

7A.5.1.2.9. Green sandpiper

[10] BTO BirdFacts – Snipe: https://www.bto.org/understanding-birds/birdfacts/snipe

Green sandpiper do not breed in Ireland, they are mainly passage migrants, with small numbers over wintering. During VP watches one observation of a single green sandpiper was recorded on 28 August 2023 flying for 11 seconds within the 500 m turbine buffer. The low level of flight activity did not warrant a CRM, and it is considered highly unlikely that the proposed Wind Farm poses any significant population level risks to green sandpiper, which have a favourable (green listed) conservation status in Ireland (Gilbert *et al*., 2021).

7A.5.1.3. Gulls

For all the surveys conducted covering the proposed Wind Farm Site, the following gull species were recorded utilising or flying through the 500 m turbine buffer or in close vicinity:

- Black-headed gull, common gull, great black-backed gull, herring gull, lesser black-backed gull

The following sections provide baseline accounts for each of these species. It is important to note that gull counts are conducted on optional basis for I-WeBS and therefore data on gull numbers is not always representative of actual populations trends.

7A.5.1.3.1. Black-headed gull

Black-headed gulls are reported as the most numerous and widespread wintering gull species in Ireland and regularly venture inland from the coast (Lewis *et al*., 2019b). This species also breeds in Ireland and does establish colonies in wetlands away from the coast Cummins *et al*., 2019). The desk study, see Section 7A.2.2.1, determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where black-headed gull is listed as a SCI, either wintering or breeding (NPWS, 2013).

The exact size of the Irish winter population is not accurately reported (Lewis *et al*., 2019b), although NPWS (2019) provides an estimate for the wintering population of 48,821 birds based on I-WeBS mean peak counts (2011/12 to 2015/16). Based on this estimate, a regularly occurring wintering population of 488 birds would be considered nationally important. I-WeBS data for count sites in Co. Tipperary, including River Suir Upper, Cabragh Wetland and River Suir Middle, is considered unreliable for gulls and on face value suggests there are no locations within 30 km of the proposed Wind Farm Site regularly supporting more than 100 birds. On reviewing the wider I-WeBS data set, the size of the black-headed gull population likely to be ranging widely across Co. Tipperary over the winter has been estimated at 1,000 to 2,000 birds, and applying a 1% threshold, a regularly occurring wintering population of more than 10-20 birds is taken as being of county importance.

Across three winters of monitoring (2022/21, 2021/22 and 2022/23) black-headed gull were regularly recorded in most months, within or directly around the proposed Wind Farm Site, with peak monthly counts ranging from 2 to 80 birds, and a flock of 200 birds was recorded on one survey day (29 December 2020). Therefore, the wintering population is assessed as being of county importance.

Based on Cummins *et al*. (2019), the closest black-headed gull colony is within 11 km of the proposed Wind Farm Site, located to the east, near Lisheen Mine and supported 10 or less pairs. One of the largest colonies is located at Lough Derg, which is > 30 km from the proposed Wind Farm Site and over the last monitoring period (2016-2018) supported 400 breeding pairs. Based on NatureScot (2023) the maximum/mean maximum breeding season foraging range for black-headed gull is 18.5 km, so this colony is assessed as being beyond the potential zone of influence. The Irish black-headed gull breeding population is reported as 7,810 pairs and therefore, a site supporting 78 pairs is considered nationally important (Cummins *et al*., 2019). The only significant breeding numbers in Co. Tipperary are on Lough Derg (400 pairs) and therefore 4 pairs (8 birds) is considered to be of county importance.

Across three breeding seasons of monitoring (2021, 2022 and 2023), black-headed gulls were observed less frequently than over the winter months, and the numbers recorded was also lower, ranging from 1 to 8 birds. The record of 8 birds was only recorded on one date (30 May 2021) and lower counts, 1-4 birds, were more typical. Therefore, based on the small numbers recorded, the population utilising the proposed Wind Farm Site over the breeding season is assessed as locally important, which in combination with the lower frequency of use and the distance from the closest known breeding colony (> 10 km) means that any potential for likely significant effects is considered unlikely.

During VP watches 6 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 2 to 22 birds and generating 2,225 aggregate flight seconds. Approximately half of the flight time was recorded above 25 m and 1,035 aggregate flight seconds were recorded within the CRZ. As detailed in Appendix 7H, the CRM for black-headed gull was run allowing for year-round utilisation of the 500 m turbine buffer and found that predicted collision risk was low, with only 1 collision every 128 years (weighted, 99.2% avoidance). This level of turbine mediated mortality would be totally imperceptible to background levels and no significant population level effects are anticipated based on the measured level of predicted collision risk for the proposed Wind Farm Site.

In summary, the proposed Wind Farm Site is assessed as being utilised by a wintering black-headed gull population (up to 200 birds) of county importance and smaller numbers (up to 8 birds) over the breeding season assessed as locally important.

7A.5.1.3.2. Common gull

Over a three year period (October 2020 to September 2021) there were only two common gull observations recorded within or adjacent to the 500 m turbine buffer. These observations were both recorded during VP watches and included two bird flying through the area in December 2021 and a single juvenile (1st calendar year) flying through the area over the summer, in July 2023. These flights amounted to 113 aggregated flight seconds within the 500 m turbine buffer, however only 70 seconds were recorded above 25 m, i.e. within the CRZ. Common gulls were not recorded during wider area surveys and the lack of I-WeBS data for this species from the River Suir Upper and Cabragh Wetlands suggests that area is not regularly utilised by common gulls. Based on Cummins *et al*. (2019), the closest breeding common gull colony is a small colony (10 pairs or less) at Lough Derg, more than 30 km away from the proposed Wind Farm Site.

No CRM was run for this species, as only two flights amounting to 70 seconds within the CRZ were recorded. Based on observed usage of the 500 m turbine buffer, collision risk for common gull is as assessed as highly unlikely to result in any significant (> 1%) population level effects. In addition low overall usage of the wider area out to 5 km from the proposed Wind Farm Site, means it can be objectively concluded that this area is not important for common gulls and the proposed Wind Farm does not poses any significant population level risks to this species.

7A.5.1.3.3. Great black-backed gull

Over a three year period (October 2020 to September 2021) there was only one great black-backed gull observations recorded adjacent to the 500 m turbine buffer. This observation was recorded during VP watches and included two bird recorded over 1 km from the 500 m turbine buffer, flying northeast in April 2022 and amounted to 160 aggregated flight seconds at *c*. 20 m, i.e. out of the CRZ. Great black-backed gull were not recorded during wider area surveys and the lack of I-WeBS data for this species from the River Suir Upper and Cabragh Wetlands suggests that area is not regularly utilised by great black-backed gull. Based on Cummins *et al*. (2019), the closest breeding sites are located at the coast or Lough Ree, more than 60 km away from the proposed Wind Farm Site.

No CRM was run for this species, as there were no flights recorded within the CRZ. Based on a lack of observed usage of the 500 m turbine buffer, collision risk for great black-backed gulls is assessed as highly unlikely to result in any significant (> 1%) population level effects. In addition low overall usage of wider area out to 5 km from the proposed Wind Farm Site, means it can be objectively concluded that this area is not important for great black-backed gulls and the proposed Wind Farm does not poses any significant population level risks to this species.

7A.5.1.3.4. Herring gull

Over a three year period (October 2020 to September 2021) there were only two herring gull observations recorded within or adjacent to the 500 m turbine buffer. These observations were both recorded during VP watches and included one bird flying within the 500 m turbine buffer in April 2021 and was heading south along River Suir at 20-50 m (Fehily Timoney, 2022). The other observations was another single bird, identified as a juvenile (2nd calendar year) flying just beyond the 500 m turbine buffer, in August 2023 and was recorded for 204 seconds at approximately 60 m. Herring gull were not recorded during wider area surveys and the lack of I-WeBS data for this species from the River Suir Upper and Cabragh Wetlands suggests that the area is not regularly utilised by herring gulls. Based on Cummins *et al*. (2019), the closest breeding sites are located at the coast, more than 60 km away from the proposed Wind Farm Site.

No CRM was run for this species, as no flights were within the CRZ during the two year study. Based on observed usage of the 500 m turbine buffer, collision risk for herring gull is assessed as highly unlikely to result in any significant (> 1%) population level effects. In addition low overall usage of wider area out to 5 km from the proposed Wind Farm Site, means it can be objectively concluded that this area is not important for herring gulls and the proposed Wind Farm does not poses any significant population level risks to this species.

7A.5.1.3.5. Lesser black-backed gull

Over the last 50 year the number lesser black-backed gulls overwintering in Ireland has increased significantly (Crème *et al*., 2014, Ross-Smith *et al*., 2015, Lewis *et al*., 2019b). This species also breeds in Ireland and does establish colonies in wetlands away from the coast. The desk study, see Section 7A.2.2.1, determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where lesser black-backed gull is listed as a SCI, either wintering or breeding (NPWS, 2013).

The exact size of the Irish winter population is not accurately reported (Lewis *et al*., 2019b), although NPWS (2019) provides an estimate for the wintering population of 11,842 birds based on I-WeBS mean peak counts (2011/12 to 2015/16). Based on this estimate, a regularly occurring wintering population of 118 birds would be considered nationally important. I-WeBS data for count sites in Co. Tipperary, including River Suir Upper, Cabragh Wetland and River Suir Middle, is considered unreliable for gulls and on face value suggests the area periodically supports up to 200 lesser black-backed gulls. On reviewing the wider I-WeBS data set, the size of the lesser black-backed gull population likely to be ranging widely across Co. Tipperary over the winter has been estimated at 500 birds, and applying a 1% threshold, a regularly occurring wintering population of more than 5 birds is taken as being of county importance.

Across three winters of monitoring (2022/21, 2021/22 and 2022/23) lesser black-backed gulls were regularly recorded in most months, within or directly around the proposed Wind Farm Site, with peak monthly counts during VP watches ranging from 1 to 70 birds, although smaller numbers were typically recorded as shown by the following monthly peak counts:

Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023
37	24	2	6	21	14	12	10	-	2	70	-	16	25	-	2	-	-	-	-	2	2	2

Therefore, the wintering population is assessed as being of county importance.

The Irish lesser black-backed gull breeding population is reported as 7,112 pairs and therefore, a site regularly supporting 71 pairs is considered nationally important (Cummins *et al*., 2019). There are no significant breeding numbers reported for Co. Tipperary, with the closest site being low densities (10 pairs or less) at Lough Derg, 37 km to the west. The closest large colony is at Lough Ree, 90 km to the north, which has held over > 1000 pairs in recent seasons (Cummins *et al*., 2019). As this species ranges widely over the breeding season (NatureScot, 2023), an estimate of breeding numbers within approximately 100 km of the proposed Wind Farm Site (*c*. 1,500 pairs) is used to provide a notional value for county/regional importance, which gives a 1% threshold of 15 pairs (30 birds).

Across three breeding seasons of monitoring (2021, 2022 and 2023), lesser blacked gulls were observed less frequently than over the winter months, especially during the 2023 breeding season. Generally the numbers recorded also appeared to be lower, ranging from 1 to 12 birds, with a flock of 70 birds recorded once in August 2022, possibly a post-breeding flock dispersing from a breeding colony. Therefore, based on the small numbers recorded, the population utilising the proposed Wind Farm Site over the breeding season is assessed as locally important.

During VP watches 53 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 70 birds and generating 57,536 aggregate flight seconds. The majority of the flight time was recorded between 25 m and 180 m, with 52,161 aggregate flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for lesser black-backed gull was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 3.2 years (weighted, 99.5% avoidance), equivalent to 11 collisions over 35 years.

Examination of the temporal distribution of flight time over the two year study found that flight activity was different between the study years, with October 2021 to August 2022 generating significantly higher values when compared with October 2022 to August 2023. Therefore, the model was re-run for the year exhibiting highest levels of flight activity only, which found that predicted collision risk almost doubles to one collision every 1.6 years.

Potential for predicted collision risk to have a > 1% population level effects above background mortality are tested by applying an annual adult survival rate of 0.913 (BTO BirdFacts[11]) to the Irish lesser black-backed gull wintering population of 11,842 birds (Lewis *et al*. 2019b, NPWS, 2019), breeding population of 14,224 birds (Cummins *et al*. 2019), an estimated county/regional wintering population of 500 birds (estimated using I-WeBS data) and a local population of 100 birds. For additional annual turbine mediated mortality to have a 1% effect on the:

- Irish population (11,842/14,224 birds) would require: 10 to 12 collisions per year
- Country population (500 birds) would require: 0.4 collisions per year
- Local population (100 birds) would require: 0.1 collisions per year

Taking the highest modelled output for predicted lesser black-backed gull collision risk, 0.64 collisions per annum, any additional mortality due to predicted collision risk would have a less than 1% effect on the Irish breeding population (0.05%, excluding cumulative effects) and the Irish wintering population (0.06%, excluding cumulative effects). Predicted collision risk expresses an effect > 1% above background mortality on the county population and the local population with the potential magnitude of effects estimated at 1.5% and 7.4%, respectively.

[11] BTO BirdFacts – Lesser black-backed gull: https://www.bto.org/understanding-birds/birdfacts/lesser-black-backed-gull

In summary, the proposed development site is assessed as being utilised by a wintering lesser black-backed gull population (up to 37 birds) of county importance and smaller numbers (up to 12 birds) over the breeding season assessed as locally important, with usage by a flock of 70 birds recorded in August 2023 (post-breeding). For lesser black-backed gull the worst-case scenario for predicted collision risk, (0.64 collisions/year), indicates that any population level effects would be expressed at the county population and local population level, with the magnitude of effect estimated to low (1.5%) and moderate (7.4%), respectively.

7A.5.1.4. Other waterbirds

For all the surveys conducted covering the proposed Wind Farm Site, the following other waterbird species were recorded utilising or flying through the 500 m turbine buffer or in close vicinity:

- Cormorant, grey heron, little egret and kingfisher

The following sections provide baseline accounts for each of these species.

7A.5.1.4.1. Cormorants

The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where cormorant are listed as a SCI (NPWS, 2013), either breeding or wintering – see Section 7A.2.2.1.

The closest nationally important wetland for cormorant is Lough Derg, which is *c*. 37 km away. The Lough Derg (Shannon) SPA supports several colonies of breeding cormorant and based on Cummins *et al*. (2019) held 272 pairs over the last monitoring period (2015-18). The size of the national breeding population is estimated at 4,688 pairs, and therefore 47 pairs would be considered nationally important. Taking the Lough Derg cormorant population as representative of Co. Tipperary, then the 1% threshold for county/regional importance is the regular occurrence of 2-3 pairs (4-6 birds).

According to Lewis *et al*. (2019b), in Ireland coastal bays support the largest concentrations of wintering cormorant; however the species is also widespread inland, particularly on the larger loughs and parts of the north midlands and west of the country where there are high densities of waterbodies with fish. There are no wetlands identified as regularly supporting nationally important wintering numbers (1% threshold: 110 birds) within 30 km of the proposed Wind Farm Site and again the closest nationally important wetland is Lough Derg, which has supported a peak count of 163 wintering birds (Lewis *et al*., 2019b). On reviewing I-WeBS data for Co. Tipperary the wintering cormorant population is estimated to be 100-200 birds; therefore, a regularly occurring population of 1-2 birds can be classed as being of county importance.

Most of the observed utilisation of the proposed Wind Farm Site by cormorants, was birds commuting through the area along the River Suir; however small numbers of birds were also recorded loafing and foraging along the river. During VP watches 32 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 3 birds and generating 1,844 aggregate flight seconds. Approximately half the flight time was recorded between 25 m and 180 m, with 989 aggregate flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for cormorant was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 31 years (weighted, 98% default avoidance). This level of turbine mediated mortality would be totally imperceptible to background levels and no significant population level effects are anticipated based on the measured level of predicted collision risk for the proposed Wind Farm Site. Based on an adult survival rate of 0.88 for cormorant (BTO BirdFacts[12]) and taking an estimated Irish

[12] BTO BirdFacts – Cormorant: https://www.bto.org/understanding-birds/birdfacts/cormorant

breeding population of 4,688 pairs (Cummins *et al*., 2019) and a wintering population of 10,870 birds (Lewis *et al*., 2019b), additional annual mortality required to have a 1% population effect would be in the region of 11 to 13 collisions per year.

In summary, the proposed Wind Farm Site is assessed as being of county importance for small numbers of cormorants (1-3 birds) during the wintering and breeding season, with the River Suir noted as the route taken by commuting birds and also providing a resource for foraging birds. Based on documented evidence of habituation to turbines and the measured level of predicted collision risk no population level effects are anticipated.

7A.5.1.4.2. Grey heron

Grey herons are resident in Ireland, with the country hosting an influx of migrants over the winter, and this species is widely distributed, typically occurring in low densities (Lewis *et al*., 2019). Therefore, only large areas of wetland support nationally important numbers (1% threshold: 25 birds). The proposed Wind Farm Site is beyond the potential zone of influence of any nationally important wetlands or SPAs where grey herons are listed as a SCI (NPWS, 2013). The closest SPA is Inner Galway Bay SPA, *c*. 90 km to the NW, which supports a mean peak of 140 birds (Lewis *et al*., 2019b). On reviewing I-WeBS data for Co. Tipperary and allowing for the dispersed distribution of this species, i.e. occurring beyond I-WeBS sites, the wintering grey heron population was estimated to be 50 to 100 birds; therefore, on a precautionary basis a regularly occurring population of 1 birds can be classed as being of county importance.

Surveys in 2020-2021 (Fehily Timoney, 2022) identified a heronry in the woodland south of the proposed Wind Farm Site and approximately 540 m from the closest turbine [ITM 613090 661048]. The heronry was not located in subsequent seasons and was assumed not to have been occupied. Most of the observed utilisation of the proposed Wind Farm Site by grey herons, was birds commuting along the River Suir in the area north of the Rossestown Bridge and birds were also recorded foraging along the river and in adjacent flood plain habitats. The maximum number of birds recorded within the proposed Wind Farm Site was 6 birds, however peak counts of 5-6 birds were only noted occasionally during winter 2020/21 and over the subsequent two survey years, the maximum count was 3 birds, with 1-2 birds most regularly recorded.

During VP watches 51 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 3 birds and generating 2,532 aggregate flight seconds. Approximately half the flight time was recorded between 25 m and 180 m, with 1,306 aggregate flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for grey heron was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 27 years (weighted, 98% default avoidance). This level of turbine mediated mortality would be totally imperceptible to background levels and no significant population level effects are anticipated based on the measured level of predicted collision risk for the proposed Wind Farm Site. Based on an adult survival rate of 0.732 for grey heron (BTO BirdFacts[13]) and taking an acknowledged underestimate of the Irish wintering population of 2,610 birds (Lewis *et al*., 2019b), additional annual mortality required to have a 1% population effect would have to be higher than 7 collisions per year.

In summary, the proposed Wind Farm Site is assessed as being of county importance for grey herons naturally occurring at low densities (typically 1-3 birds) throughout the year, with the River Suir noted as the route taken by commuting birds and also providing a resource for foraging birds. No population level effects are anticipated, based on the measured level of predicted collision risk.

7A.5.1.4.3. Little egret

[13] BTO BirdFacts – Grey heron: https://www.bto.org/understanding-birds/birdfacts/grey-heron

Having only relatively recently colonised Ireland, little egret is not listed as a SCI of any SPAs in spite of its European conservation status as an Annex I species (NPWS, 2013). Since becoming established in Ireland over the late 1990s the little egret population has experienced a notable expansion in range and abundance, with the Irish population estimated at 1,390 birds; and similar to grey heron, this species is now widely distributed across the country, typically occurring in low densities (Lewis *et al*., 2019b). Therefore, only large areas of wetland support nationally important numbers (1% threshold: 20 birds). The proposed Wind Farm Site is beyond the potential zone of influence of any nationally important wetlands, with the closest and most important site being Cork Harbour, *c*. 90 km to the south, which supports a mean peak of over 100 birds (Lewis *et al*., 2019b). On reviewing I-WeBS data for Co. Tipperary and allowing for the dispersed distribution of this species, i.e. occurring beyond I-WeBS sites, the wintering little egret population was estimated to be 50 birds; therefore, on a precautionary basis a regularly occurring population of 1 birds can be classed as being of county importance.

No little egret heronries were identified within or adjacent to the proposed Wind Farm Site. It is possible that the heronry, which has not been active since the 2021 breeding season, also supported little egret, as these two species often nest together; however this was not confirmed. Most of the observed utilisation of the proposed Wind Farm Site by little egrets, was birds commuting along the River Suir in the area north of the Rossestown Bridge and birds were also recorded foraging along the river and in adjacent flood plain habitats. This is remarkably similar with the grey heron activity recorded for the site. The maximum number of little egrets recorded within the proposed Wind Farm Site was 5 birds, however observations of more than 3 birds were only noted occasionally, with 1-2 birds more regularly recorded.

During VP watches 45 flight observations were recorded within the 500 m turbine buffer, with numbers ranging from 1 to 3 birds and generating 2,681 aggregate flight seconds. Only about a quarter of the flight time was recorded between 25 m and 180 m, with 721 aggregate flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for little egret was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 36 years (weighted, 98% default avoidance). This level of turbine mediated mortality would be totally imperceptible to background levels and no significant population level effects are anticipated based on the measured level of predicted collision risk for the proposed Wind Farm Site. Based on an adult survival rate of 0.712 for little egret (BTO BirdFacts[14]) and taking the estimate of the Irish wintering population as 1,390 birds (Lewis *et al*., 2019b), additional annual mortality required to have a 1% population effect would have to be higher than 4 collisions per year.

In summary, the proposed Wind Farm Site is assessed as being of county importance for little egret naturally occurring at low densities (typically 1-3 birds) throughout the year, with the River Suir noted as the route taken by commuting birds and also providing a resource for foraging birds. No population level effects are anticipated, based on the measured level of predicted collision risk.

7A.5.1.4.4. Kingfisher

Kingfisher are listed as an Annex I species on the EU Birds Directive. The desk study determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs where kingfisher are listed as a SCI (NPWS, 2013). The national kingfisher population is estimated at 368 to 1,031 pairs (NPWS,2019) and has an unfavourable (amber list) conservation status (Gilbert *et al*., 2021). Therefore, a waterbody supporting a minimum of 3-4 pairs would be considered nationally important.

[14] BTO BirdFacts – Little egret: https://www.bto.org/understanding-birds/birdfacts/little-egret

Kingfisher were recorded foraging along the River Suir within the 500 m turbine buffer. No kingfishers were recorded from VP4, located on the Rossestown Bridge and covering part of the River Suir, indicating that there was limited movement up and down the river at this location. Birds were recorded during both winter and breeding season site walkover surveys, with birds detected along the river in the southern extent of the 500 m turbine buffer and also to the north of the buffer.

No breeding sites were identified, and the results of the kingfisher habitat suitability survey found that there was limited nesting bank along the section of the River Suir within the 500 m turbine buffer. The old nesting holes identified by Fehily Timoney (2022) - see Appendix 7I, were south of the 500 m turbine buffer. Based on observations of kingfisher during the breeding season, the section of the River Suir occurring within the 500 m turbine buffer is considered to be within the breeding territory of 1 pair nesting somewhere downstream of the proposed Wind Farm Site, with a second territory possibly located upstream.

The low flight trajectory typically employed by this species, as well as the associated flight paths largely following waterbodies, means that the risk of kingfishers colliding with turbines is highly unlikely. Therefore, as is the case for all infrastructural projects potentially affecting watercourses, any activities with the potential for causing a deterioration in water quality leading to a reduction in availability of prey species for kingfishers is the main consideration for mitigation measures aimed at protecting water quality.

In summary, the River Suir within the 500 m turbine buffer is assessed as being of county importance for being within the territories of 1-2 pairs of kingfishers. Potential for likely significant effects relate to prevention of any deterioration in water quality.

7A.5.1.5. Assessment of wintering waterbird assemblage

The baseline accounts for waterbirds provide information on how each species utilises the proposed Wind Farm Site, however it is also important to assess the overall importance of the area for the full assemblage of wintering waterbirds found to be regularly utilising the area. Table 7A.23 lists all the wintering waterbird species recorded and provides data on the typical numbers recorded, maximum counts and frequency of occurrence counts. Count data and frequency of occurrence are used to assess the importance of the population using 1% thresholds for regularly occurring species.

This analysis determined that the section of the River Suir and associated flood plain within the 500 m turbine buffer for the proposed Wind Farm Site is part of a wetland that regularly supports numbers of county (regional) importance for eight species of wintering waterbird, including:

- three red listed species: golden plover, lapwing and snipe;
- three amber listed species: black-headed gull, cormorant and lesser black-backed gull; and,
- two green-listed species: grey heron and little egret.

The wetland also regularly supports numbers of local importance for five species of wintering waterbird, including:

- three amber listed species: mallard, mute swan and teal; and,
- two green listed species: jack snipe, woodcock (wintering population).

Several species were found to utilise the wetland relatively infrequently and therefore while numbers periodically recorded exceeded 1% thresholds, utilisation was not regular enough to be fully considered as populations of county or local importance. This included curlew, kingfisher, shoveler, whooper swan and wigeon. As detailed in species for curlew and whooper swan there has been measured decline in usage of the area in recent winters. For shoveler and wigeon periodic usage of the area appeared to be linked to flood events, which saw increase the numbers of other duck species recorded including mallard and teal.

Regardless of low frequency usage by kingfisher over the winter, the section of the River Suir within the proposed Wind Farm Site is assessed as being of county importance for being within the territory of 1, possibly 2 pairs of kingfishers.

Very infrequent occurrence was noted for a further seven waterbird species, including common gull, dunlin, great black-backed gull, greylag goose, green sandpiper, herring gull and whimbrel. For these species, based on frequency of utilisation and relatively small numbers being recorded, it can be objectively concluded that this area is not important for these species and therefore the proposed Wind Farm does not pose any significant population level risks. On this basis it is advised that these species do not need to be carried forwarded into the ornithological impact assessment, as they are not important ecological features for the proposed Wind Farm Site.

Table 7A.23: Wintering waterbirds ranked by geographical importance of populations

Thresholds for 1% national importance were taken from Lewis *et al*. (2019b) or were based on population estimates from NPWS (2019) - when available all-Ireland estimates have been reported in favour of Republic of Ireland estimates. Thresholds for 1% county importance were derived by reviewing I-WeBS data for Co. Tipperary and applying a precautionary approach.
*denotes species listed on Annex I of EU Birds Directive
Red, Amber & Green as listed in BoCCI (2020-2026) - birds of conservation concern in Ireland, as per Gilbert *et al*. (2021)

Species	Level of importance	Typical numbers	Max. count	Frequency of occurrence	1% county	1% national
Black-headed gull	County importance	2-80	200	regularly occurring	10-20	488
Cormorants	County importance	1-2	3	regularly occurring	1-2	110
Golden plover*	County importance	10-200	700	regularly occurring	30-50	920
Grey heron	County importance	1-2	6	regularly occurring	1	25
Lapwing	County importance	10-200	500	regularly occurring	20-30	850
Lesser black-backed gull	County importance	1-37	70	regularly occurring	5	118
Little egret*	County importance	1-2	5	regularly occurring	1	20
Snipe	County importance	n/a	36	regularly occurring	n/a	100
Curlew	County importance	1-30 (I-WeBS)	1	infrequent	n/a	350
Kingfisher	County importance	1	1	infrequent	1 pr	3-4 prs
Shoveler	County importance	n/a	4	infrequent - limited to flood conditions	n/a	20
Whooper swan*	County importance	3-5	5	infrequent - in recent seasons	4	150
Jack snipe	Local importance	1	1	regularly occurring	n/a	n/a
Mallard	Local importance	1-7	60	regularly occurring	n/a	280
Mute swan	Local importance	2-6	6	regularly occurring	12	90
Teal	Local importance	1-4	120	regularly occurring	n/a	360
Woodcock	Local importance	n/a	3	regularly occurring	n/a	n/a
Wigeon	Local importance	< 20	80	infrequent	n/a	560
Common gull	Not important	n/a	2	very infrequent	n/a	n/a
Dunlin*	Not important	3	16	very infrequent	n/a	460
Great black-backed gull	Not important	n/a	1	very infrequent	n/a	n/a
Green sandpiper	Not important	n/a	1	very infrequent	n/a	n/a
Greylag goose	Not important	1-2	2	very infrequent	n/a	30
Herring gull	Not important	n/a	1	very infrequent	n/a	n/a
Whimbrel	Not important	n/a	3	very infrequent	n/a	20

7A.5.1.6. Assessment of breeding waterbird population

Three waterbird species were recorded breeding within the proposed wind farm site including mute swan, lapwing and snipe, with two species potentially breeding including mallard and teal. The section of the River Suir within the 500 m turbine buffer was assessed as being within the territory of 1, possible 2 pairs of kingfishers.

A pair of mute swan bred along the River Suir within the 500 m turbine buffer and this pair was assessed as locally important. As a widespread breeding species in Ireland, it is likely that that several mallard will nest within the proposed Wind Farm Site. It is also considered possibly that a smaller number of teal have the potential to nest, with the small pond in the southern woodland or denser vegetation cover associated with River Suir flood plain offering suitable habitat.

Two species of wader were recorded breeding within the 500 m turbine buffer, including lapwing and snipe, with breeding densities estimated at 5-6 pairs for lapwing and 6 territories for snipe. The areas where breeding activity was recorded is shown in Appendix 7G – see Figure 7G.1.

Based on the population assessment in Section 7A.5.1.2.6 the breeding snipe population supported by the proposed Wind Farm Site was assessed being of county importance (1% threshold for national important taken as 4-6 pairs). Based on the population assessment in Section 7A.5.1.2.1 breeding lapwing population supported by the proposed Wind Farm Site was assessed being of national importance (1% threshold for national important taken as 42 pairs).

As shown in Appendix 7G - see Figure 7G.1, breeding areas supporting both these species were associated with the least improved habitats within the proposed Wind Farm Site. These less intensively managed areas, which are wetter due to proximity to areas that are prone to flooding can be easily identified and avoid by any proposed development. In addition, identify areas of habitat favoured by these species highlights that habitat enhancement measures could be effectively targeted to improve habitat quality for breeding snipe and lapwing, as well as other lowland breeding wader species.

7A.5.2. Birds of prey

For all the surveys conducted covering the proposed Wind Farm Site, the following birds of prey were recorded utilising or flying through the 500 m turbine buffer or in close vicinity:

- Sparrowhawk, hen harrier, buzzard, kestrel, merlin, peregrine, barn owl, long-eared owl and short-eared owl

The following sections provide baseline accounts for each of these species.

7A.5.2.1. Accipitridae – eagles, kites, hawks, harriers, buzzards

7A.5.2.1.1. Sparrowhawk

Sparrowhawks are one of the most common and widespread resident species of raptor occurring in Ireland, and although there appears to have been a medium-term (18 year) decline in abundance, the population is reported as exhibiting relative stability in recent years, with 8,746-14,252 birds estimated for the Republic of Ireland (Lewis *et al*, 2019a). As such, the conservation status for sparrowhawk has been assessed as favourable (green listed) by Gilbert *et al*. (2021). Sparrowhawk is not listed on Annex I of the EU Birds Directive and there are no SPAs where this species is listed as a SCI. Being a dispersed species, sparrowhawk are unlikely to reach densities required for consideration as nationally important (1% threshold: 87-142 birds). As a widespread and regularly occurring resident breeding species of raptor, with consideration given to the species' favourable conservation status, the sparrowhawk population associated with the proposed Wind Farm Site is assessed as important at the local level.

A limited amount of breeding behaviour, such as soaring or actively displaying birds, was observed for sparrowhawks during the baseline surveys for the proposed Wind Farm Site. This did not facilitate the identification of any specific breeding sites beyond the blocks of woodland in the south of the proposed Wind Farm Site, where the presence of birds in suitable habitat over the breeding was indicative of possibly breeding. In this area it is understood that this species, which often nests in commercial forestry plantation,

will be relatively tolerant of felling operations (outside of the breeding season) and should readily relocate in the remaining woodland adjacent to any felled areas. Potential nesting habitat in tree/scrub cover in the northern part of the proposed Wind Farm Site was more limited, and it is considered that only one possible sparrowhawk breeding site occurs in the southern woodland. There are likely to be several other pairs nesting on the periphery of the proposed Wind Farm Site, which will utilise the area for foraging, and it is judged that the proposal has the potential to have an effect on 2-3 pairs (4-6 birds), which in this assessment is classed as a population of local importance.

As shown by the flight line map in Appendix 7E - see Figure 7E.33, during VP watches the majority of sparrowhawk activity was recorded beyond the 500 m turbine buffer and in close proximity to VP1, VP2 and VP3. There were limited observations detected in the northern part of the proposed Wind Farm Site covered by VP4, as well as VP2 and more distantly by VP3. This pattern of usage probably reflects, in part, habitat availability and the more open areas in the north part of the proposed Wind Farm Site would typically be considered less suitable for sparrowhawk. In addition, the inherent difficulty of detecting this species, especially over longer distance and in habitats with a complex structure means that there will generally be a sharp drop off in sparrowhawk detection rates as distance from the VPs increases.

During VP watches there were only 7 flight observations recorded within the 500 m turbine buffer, with all the observations involving single birds and generating 838 aggregate flight seconds. The majority of the flight time was recorded between 25 m and 180 m, with 785 aggregate flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for sparrowhawk was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 1,185 years (weighted, 98% default avoidance). Notwithstanding the limitations associated with CRMs and sparrowhawk detectability, this level of turbine mediated mortality would be totally imperceptible to background levels.

On balance this species tends to fly relatively low (below rotor swept height), especially when hunting; however, display flights and when commuting over longer distances does result in flight time within the collision risk zone. Running a CRM to account for potential under detection of flight time within the CRZ requires an over two fold increase in the amount of flight time recorded within the CRZ, i.e. 1,800 seconds (785 seconds actually recorded) to result in a predicted collision risk of 1 collision every 35 years. Based on an adult survival rate of 0.69 for sparrowhawk (BTO BirdFacts[15]) and taking a notional population estimate of 350 birds for Co. Tipperary, additional annual mortality required to exert a 1% effect at the county level would have to be at least 1 collision per year. This would require inputting an eighty fold increase in flight time (6,280 seconds). Therefore, it can be objectively concluded that predicted levels of collision risk, even with adjustments to account for the difficulties associated with sparrowhawk detectability, will almost certainly be negligible in effect.

In summary, woodland habitats within the proposed Wind Farm Site are important for this widespread and commonly occurring species of raptor, and the population recorded is assessed being of local importance. Restricting the timing for proposed felling operations to periods outside the breeding season, would limit any potential for direct impacts to this species. No population level effects are anticipated, based on the measured and adjusted level of predicted collision risk.

7A.5.2.1.2. Hen harrier

Hen harriers are an important Annex I species to consider in relation to wind farm developments. The desk study provides a detailed assessment for hen harrier and determined that the proposed Wind Farm Site is

[15] BTO BirdFacts - Sparrowhawk: https://www.bto.org/understanding-birds/birdfacts/sparrowhawk

beyond the potential zone of influence of any SPAs where hen harrier are listed as a SCI (NPWS, 2013) – see Section 7A.2.2.1. Section 7A.2.2.6.1. of the desk study assessed habitat availability within the proposed Wind Farm Site and surrounding hinterland (out to 2 km) as largely unsuitable for breeding hen harrier, an assertion which is support by the reported breeding range of hen harriers in Ireland (NPWS, 2022, Ruddock *et al*., 2024). Based on NPWS (2022) there are no known hen harrier roosts within 2 km of the proposed Wind Farm Site.

The baseline surveys undertaken over three years did not record hen harriers breeding or roosting within the 2 km turbine buffer. For all the surveys conducted over the three years hen harriers were only recorded twice, both during VP watches and included the following observations:

- 24-Dec-2020 11:18 Adult male flying S, *c*. 2 km W of buffer 137 sec at 100-200 m
- 28-Aug-2023 12:58 Adult male hunting though the buffer 89 sec at 1-4 m

Based on the low levels of activity recorded no CRM was run for hen harrier and it can be concluded that the 2 km turbine buffer is not heavily utilised by this species and therefore it is highly unlikely that a regularly occupied communal roost exists in the area. Likewise, there are no breeding sites within 2 km of the proposed Wind Farm Site. The Irish hen harrier breeding population is estimated at 106 pairs (Ruddock *et al*., 2024) and the wintering population is estimated at 311 birds (NPWS, 2019), therefore the 1% threshold of international (if associated with an SPA)/national importance is a regularly occurring population of 1 breeding pair (2 birds) and/or 3 wintering birds. Even for a dispersed species like hen harrier, two records over three years is representative of exceptionally low levels of activity and does not warrant assessment as a regularly occurring population.

In summary, the baseline study concurs with the findings of the desk study, and it can be objectively concluded that the proposed Wind Farm Site and associated wider area (2 km proposed turbine buffer) is not important for breeding or wintering hen harrier populations. Based on exceptionally low recorded usage over a three period no further assessment for this species is required.

7A.5.2.1.3. Buzzard

The Irish buzzard population has increased exponentially over the last 25 years (Lusby, 2011, Balmer *et al*. 2013) and on the basis of an expanding population the species has a favourable (green listed) conservation status (Gilbert *et al*., 2021). Buzzard is not listed on Annex I of the EU Birds Directive and there are no SPAs where this species is listed as a SCI. The size of the population is unknown, with NPWS (2019) giving a best estimate of 1,938 pairs, which is broadly in line with the figure of 3,500-4,000 birds, as review by Mee (2012). Being a dispersed species, buzzards are unlikely to reach densities required for consideration as nationally important (1% threshold: 20 pairs or 40 birds), unless considered over a wide geographic area. As a widespread and regularly occurring resident breeding species of raptor, with consideration given to the species' favourable conservation status, the buzzard population associated with the proposed Wind Farm Site is assessed as important at the local level.

The success of buzzards in Ireland can be attributed to the species having relatively high fecundity for a raptor, capable of fledging broods of up to 4 young (Brown & Amadon, 1986); as well as the ability to exploit numerous food sources, ranging from carrion, worms and larger more mobile prey items like rabbits. Buzzards also employ a variety of foraging techniques (e.g. sitting in tree or active hunting flights), depending on habitat, seasonality and prey types, which has allowed them to expand into a wider range of ecological niches when compared to other raptors occurring in Ireland (Rooney & Montgomery, 2013).

As shown in Appendix 7G – see Figure 7G.4, the proposed Wind Farm Site and surrounding 2 km turbine buffer was found to support up to four breeding territories, with three of these located within the 500 m turbine buffer, including the woodland in the southern part of the buffer and a the small T-shaped

woodland in the north-east of the buffer. Not all the territories were occupied simultaneously within the same breeding season and young birds just entering the breeding population are often detected prospecting for potential nesting sites. It is considered that the proposed Wind Farm Site and associated 2 km turbine buffer supports three pairs. One of the breeding sites, located within the T-shaped woodland, will be impacted by the proposed infrastructure. However, a single pair of buzzards can have 10 or more alternative nest sites within its breeding season home range, with two to four alternative nests being more typical (Brown & Amadon, 1986). Therefore, as with sparrowhawk, buzzards are considered to be relatively tolerant of felling operations (out of the breeding season) and should readily relocate to an alternative site in the remaining woodland/treelines adjacent to any felled areas.

Buzzards were the most frequently recorded raptor species during VP watches, with 188 flight observations within the 500 m turbine buffer, which generated a total of 47,955 aggregated flight seconds over the two-year study period - see Figure 7E.34, Figure 7E.35, Figure 7E.36 and Figure 7E.37 in Appendix 7E. Numbers ranged from 1 to 4 birds and the majority of flight time was recorded at heights between 25 m to 180 m and a total of 41,192 aggregated flight seconds was recorded within the CRZ.

As detailed in Appendix 7H, the CRM for buzzard was run allowing for year-round utilisation of the 500 m proposed turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 1.2 years (weighted, 98% default avoidance). The potential for predicted buzzard collision risk at a rate of 0.86 collision per annum to have a > 1% population level effects above background mortality is tested by applying an annual survival rate of 0.9 for adult birds and 0.63 for juveniles (BTO BirdFacts[16]) to a local population estimated at 6 adult birds and 6 juveniles (< 3 years old). For the local population the high rate of adult survivorship for buzzard drives a 144% increase in annual mortality, with a lower level of 39% increased mortality generated for juvenile birds. If considering magnitude of effect at a regional level on a population notionally estimated at > 90 buzzards, then any population level effects diminishes in significance around 10% additional mortality – see Table 7H.24 in Appendix 7H.

In summary, the buzzard population associated with the proposed Wind Farm Site is assessed as important at the local level. Woodland habitats, including treelines are important for this species and limiting the timing for proposed felling operations to outside the breeding season, would limit any potential for direct impacts to this species. Predicted collision risk is anticipated to have likely significant effects on the local breeding population; however in the context of an expanding population any additional mortality will have a moderate impact (c. 10%) on the regional buzzard population, which will recruit into the local area and replace any birds occasionally lost to turbine mediated mortality.

7A.5.2.2. Falcons

7A.5.2.2.1. Kestrel

The unfavourable conservation status of the Irish kestrel population was upgraded from to amber to red listed by the most recent BoCCI assessment (Colhoun & Cummins, and Gilbert *et al*. 2021), due to recent severe declines both in terms of breeding numbers and range (Lewis *et al*. 2019a). Despite declining numbers, kestrel remains the most widespread raptor in Ireland (Balmer *et al*., 2013), with a best estimate of 13,500 birds or min-max estimate of 9,918 to 17,393 birds (NPWS, 2019, Lewis *et al*., 2019a). Being a dispersed species, kestrels are unlikely to reach densities required for consideration as nationally important (1% threshold: 99-173 birds). Given the species unfavourable conservation status, a precautionary approach is applied and the occurrence of one pair is considered to meet the threshold for county importance.

[16] BTO BirdFacts – Buzzard: https://www.bto.org/understanding-birds/birdfacts/buzzard

Breeding raptor surveys identified at least two breeding territories within the 2 km turbine buffer, with no nest sites located within the 500 m turbine buffer – see Appendix 7G: Figure 7G.4. Based on flight activity recorded during VP watches the proposed Wind Farm Site is within the breeding season home ranges for these two pairs. As shown by kestrel flight line mapping in Appendix 7E, flight activity was concentrated in the vicinity of the breeding territories to the north-east and south of the 500 m turbine buffer.

After buzzard, kestrel was the most active raptor species within the proposed Wind Farm Site during VP watches, with 82 flights observations recorded within the 500 m turbine buffer which generated 7,302 aggregate flight seconds. All observations were of single birds and the majority of flight time was recorded at heights between 25 m to 180 m, with a total of 5,225 aggregated flight seconds recorded within the CRZ. As detailed in Appendix 7H, the CRM for kestrel was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 67 years (weighted, 95% avoidance).

The potential magnitude of effect on the local kestrel population due to predicted collision risk was tested on a local population estimate of 6 adult birds and 4 juvenile subadult birds, using the measured rate of 0.21 collision per annum and applying an annual survival rate of 0.69 to the adult population and 0.32 to the subadult population (BTO BirdFacts[17]). This generates a 11% and 8% increase in mortality above background levels, for the adult and subadults components of the population respectively.

In summary, the kestrel population associated with the proposed Wind Farm Site is assessed as important at the county level. Breeding sites were located beyond the 500 m turbine buffer and the predicted collision risk is anticipated to have a moderate (8-11%) effect on the local breeding population.

7A.5.2.2.2. Merlin

The desk study provides a detailed assessment for merlin and determined that the proposed Wind Farm Site is beyond the potential zone of influence of any SPAs designated for merlin (NPWS, 2013) – see Section 7A.2.2.6.2. Being a highly secretive species the exact size of the population is unknown, with NPWS (2019) giving a best estimate of 200-400 pairs, and therefore 2-4 pairs would be considered consideration as nationally important. As a rarer breeding raptor species listed on Annex I of the EU Birds Directive, with an unfavourable (amber listed) conservation status in Ireland (Gilbert *et al*. 2021), any breeding activity beyond an SPA would be assessed as important at the county/regional level. Over the winter merlin populations are more mobile, with numbers inflated by migrants from Iceland and regularly recorded activity over the winter occurring beyond an SPA would be assessed as important at the county/regional level, with national importance assigned should a regularly occupied winter roost be identified.

No merlin breeding activity was recorded within the proposed Wind Farm Site or associated 2 km turbine buffer. The availability of suitable nesting locations supported by suitably open, and prey abundant foraging habitat was assessed as very limited and considered unlikely to support any pairs. Based on a historic record of probable breeding merlin (Bird Atlas 2007-2011), the closest breeding site was found to be associated with the forestry and raised bog approximately 6 km to the northwest, in the vicinity of Lisheen Mine. This distance exceeds the 5 km core foraging range given for breeding merlin in SNH (2016), which is used in assessing potential connectivity with SPAs, as well as the 2 km breeding merlin search area recommended by SNH (2017) for assessing potential impacts of onshore wind farms.

Over three years merlin were recorded on six dates during VP watches, including:

- 11 December 2020 10:55 flying 10 sec at 25-50 m - in/out of 500 m turbine buffer (VP2)
  Not rec flying 17 sec at 25-50 m - out of 500 m turbine buffer (VP2)

[17] BTO BirdFacts – Kestrel: https://www.bto.org/understanding-birds/birdfacts/kestrel

	14:00	flying 18 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
	14:09	flying 9 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
• 24 December 2020	09:45 male	flying 14 sec at	0-20 m	- in 500 m turbine buffer	(VP2)
• 28 December 2020	10:01	flying 15 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
• 16 January 2021	14:54	flying 22 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
• 02 December 2021	13:04 female	flying 10 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
	13:11 female	flying 10 sec at	0-20 m	- out of 500 m turbine buffer	(VP3)
• 11 April 2022	13:20 female	flying 20 sec at	0-20 m	- out of 500 m turbine buffer	(VP1)

As shown by flight line maps in Appendix 7E and Appendix 7I, the majority of the merlin observations were recorded out of the 500 m turbine buffer and were also low, below the rotor swept area which is typical flight behaviour for this species. There was only one observation recorded during in the breeding season, which was likely to be a bird commuting through the area on route to breeding grounds. Given the low frequency of activity recorded no CRM was run for merlin. Typically, merlin occupy lower ground during the winter months where prey is more abundant, and breed in remoter upland locations. Whilst the proposed Wind Farm Site does have some suitable wintering foraging habitat for merlin, it is not considered that merlin are regularly utilising the area beyond sporadic hunting forays into the surrounding area over the winter.

In summary, it can be objectively concluded that the proposed Wind Farm Site and associated wider area are not utilised by merlin during the breeding season, with the low and irregular frequency of utilisation over the winter meaning the area is of limited importance to the species. Therefore, based on exceptionally low recorded usage over a three period, no likely significant effects are anticipated, and no further impact assessment is required for this species.

7A.5.2.2.3. Peregrine

Peregrine is listed on Annex I of the EU Birds Directive, and the closest SPA designated populations to the proposed Wind Farm Site are along the south coast of Waterford and Cork over 60 km away and in the Wicklow Mountains over 90 km away. These SPA populations are assessed as being beyond the potential zone of influence of the proposed Wind Farm Site, based on SNH (2016), which gives the core foraging range for breeding peregrines as 2 km, with a maximum of 18 km and it is noted that depending on local availability of prey, breeding peregrine can travel significant distances from nest sites (Enderson & Craig, 1997). In Ireland peregrine are a widespread resident species, which has achieved a favourable (green listed) conservation status (Gilbert *et al*., 2021), since the severe population crashed over the 1950s, 60s and 70s, induced by the extensive application of organo-chlorine pesticides. Based on NPWS (2019) the conservative estimated population is given as 425 pairs, therefore a regularly occurring population of four pairs is nationally important. Given the peregrines Annex I status, the occurrence of a single pair, which is not associated with an SPA or nationally important population, the pair associated with the proposed Wind Farm Site is classed as being of county importance.

The baseline study for the proposed Wind Farm Site confirmed Brittas Castle as a peregrine nest site and the site is located approximately 350 m from southern borrow pit and within 600 m of the closest turbine, i.e. beyond the 500 m turbine buffer. The core foraging range for breeding peregrines is 2 km, (SNH, 2016) and the proposed Wind Farm Site is likely to form part of the home range for this pair. Availability of nesting locations in this region will be a factor limiting peregrine breeding densities and it is likely that the some of the other castle sites in the area support neighbouring pairs or may be used as alterative nesting/roosting options by the Brittas Castle pair.

Of note, although the nest is in close proximity to the proposed Wind Farm Site, peregrines were only recorded occasionally during most of the surveys, including VP watches, walkovers, wider area breeding raptors and on wider area wintering waterbird surveys. During VP watches a total of 9 peregrine

observations were recorded. All the observation were of single birds which generated 1,150 flight seconds within the 500 m turbine buffer, the majority of which were recorded at flight heights with the CRZ, i.e. between 25 and 180 m and amounted to 1,107 seconds. As detailed in Appendix 7H, a CRM for peregrine was run allowing for year-round utilisation of the 500 m turbine buffer. The outputs from this model generated predicted collision risk of 1 collision every 44 years (weighted, 98% default avoidance). This level of turbine mediated mortality would be virtually imperceptible to background levels and no significant population level effects are anticipated based on the measured level of predicted collision risk for the proposed Wind Farm Site. However, the CRM was run for adult birds and does not take into account the initial flight period for fledgling birds, which are likely to be more susceptible to turbine collision than adult peregrines.

The potential for predicted peregrine collision risk at a rate of 0.021 collision per annum to have a > 1% population level effects above background mortality is tested by applying an annual survival rate of 0.81 for adult birds and 0.6 for juveniles (BTO BirdFacts[18]) to a local population estimated at 2 adult birds and 3 juveniles (< 1 year). At the local population level, relatively low recorded usage of the site predicts that any additional turbine mediated mortality will be 5.5% for adult birds and 1.8% for juveniles above background levels.

In summary, the pair breeding at Brittas Castle are considered of county importance. Predicted collision risk has the potential for a low magnitude of effect (1-5%) on the local breeding population; and in the context of a stable or expanding national peregrine population any additional turbine mortality will have an imperceptible impact (< 1%) on the regional peregrine population, which will recruit into the local area and replace any birds occasionally lost to turbine mediated mortality. Nevertheless, the proximity of the nest to the proposed turbines introduces a level of uncertainty for collision risk to recently fledged birds, especially if dispersal flight behaviour changes from that observed over the baseline. Post-construction monitoring around fledging time is advised to ensure that young peregrines fledge and disperse safely.

7A.5.2.3. Owls

7A.5.2.3.1. Barn owl

The estimated population for barn owl provided in NPWS (2019) is 562 to 702 pairs. As a dispersed breeding species and given the species unfavourable (red listed) conservation status in Ireland (Gilbert *et al*., 2021), a precautionary approach is applied and the occurrence of one pair is considered to meet the threshold for county importance. It is generally considered that low level flight behaviour of barn owls (typically < 3-4 m) limits collision risk with larger turbines in the UK (and Ireland) where lattice towers are not commonly employed (Barn Owl Trust, 2015). As such, impacts are more likely to be associated with any land use change potentially resulting in loss of breeding territories due to proposed wind farm infrastructure. Collisions associated with traffic, along with secondary poisoning from rodenticide and loss of nest sites are factors affecting barn owl populations in Ireland (Lusby et al., 2021, TII, 2021) and enhancement measures implemented at wind farm sites can have a positive effect, such as erecting nest boxes.

There is a known barn owl breeding site within 1.1 km of the proposed Wind Farm Site, and there is also a breeding site at the Cabragh Wetlands, south of Thurles. The core breeding home range for barn owls in Ireland is reported as 4 to 5 km (9 km max) from the nest (Lusby & Cleary, 2014, TII 2021, Lusby *et al*. 2021). The proposed Wind Farm Site provides suitable foraging habitat for barn owls, and it is likely that this species utilises the less agriculturally improved grasslands along the floodplain of the River Suir. The availability of suitable nesting cavities, e.g. hollows in mature trees within the 500 m turbine buffer, was

[18] BTO BirdFacts – Peregrine: https://www.bto.org/understanding-birds/birdfacts/peregrine

assessed as limited, based on features surveyed for bat roost/nesting owl potential and no evidence of breeding was identified in any of the veteran trees surveyed. Built structures only occur at one location within the 500 m turbine buffer and are associated with a relatively busy farmyard consisting of a series of large, cattle sheds, that although potentially suitable for barn owl have notably poor connectivity to the wider landscape.

In summary, the proposed Wind Farm Site is likely to be utilised by pairs breeding in the surrounding area, which are assessed as being of county importance. Enhancement measures, through the erection of nest boxes could be employed to improve nesting opportunities for this species.

7A.5.2.3.2. Long-eared owl

Long-eared owls are a widespread resident in Ireland and are the most commonly occurring species of owl. Over winter numbers can be increased with continental migrants moving into the country to escape periods of cold weather. Long-eared owls are not listed on Annex I of the EU Birds Directive and have a favourable (green-listed) conservation status in Ireland (Gilbert *et al*., 2021). Woodland habitats are important of this species, which nests in dense cover, with woodlands adjacent to open areas providing habitat edge for hunting being optimal (Mikkola, 1983). The Irish population is estimated at 1,484 to 2,703 pairs (NPWS, 2019). Being a dispersed species in Ireland, long-eared owls are unlikely to reach densities required for consideration as nationally important (1% threshold: 14-27 pairs), although they can gather at communal roosts over the winter, with numbers of 5 to 30 birds reported.

During dusk surveys long-eared owls were heard calling from the woodland on the southern boundary of the 500 m turbine buffer and were considered likely to be breeding in the vicinity, with the area of woodland in the southern extent of the proposed Wind Farm Site being suitable for this species. As a widespread and regularly occurring resident breeding species, with consideration given to the species' favourable conservation status, the long-eared owl population associated with the proposed Wind Farm Site is assessed as important at the local level. It is also worth noting that this species does not build nests and reuses the old nests of other species like crows, magpies and sparrowhawks (Snow & Perrins, 1998), which means suitably erected nest boxes will also be used.

7A.5.2.3.3. Short-eared owl

Short-eared owls are classed as a rare and very occasional breeder in Ireland, with a breeding population of 0-5 pairs that breeds sporadically across Ireland selecting upland habitats (Crowe *et al*., 2021). The breeding population has been assessed as having an unfavourable (amber listed) conservation status (Gilbert *et al*., 2021) and breeding in Ireland is thought to be limited by low availability of rodent prey, specifically voles. Short-eared owls are listed on Annex I of the EU Birds Directive; however in Ireland, due to the unpredictable and exceptional low breeding densities, there are no SPAs where this species is specifically listed as a SCI. Over the winter there can be an influx of migrants, and small numbers of these winter visitors are typically located where rough grasslands back the coastline (Balmer *et al*. 2013).

The proposed Wind Farm Site is not considered suitable for breeding short-eared owl. The wet, marshy grasslands along the River Suir do offer some potential foraging habitat for wintering birds, which can be described as nomadic wonders, moving widely between suitable blocks of habitat in search of prey.

During winter walkover surveys in December 2022, one individual was flushed from rushy habitat within the 500 m turbine buffer, north of Rossestown Bridge and landed in the area again. There were no other observations over the survey period, including three winter (2020/21, 2021/22, 2022/23). Short-eared owls are diurnal, as well as crepuscular, often hunting during the day and if the individual remained in the area for a prolonged period or short-eared owls returned to the area annually, birds would have been recorded more than once. Therefore, based on sporadic occurrence it is assessed that the proposed Wind Farm Site

is not important for short-eared owl, which may utilise the area opportunistically along with similar such habitat patches in the wider area. Furthermore, short-eared owls, like hen harriers, hunt at low flight heights over the ground and are therefore considered to be at low risk of collision with turbines.

7A.5.3. Other species of conservation concern

7A.5.3.1. Red listed other non-passerines

7A.5.3.1.1. Swift

Swifts are a summer visitor to Ireland. The conservation status for swift was upgraded from amber to red listed in the most recently published BoCCI (Gilbert *et al.*, 2021) and as detailed in the desk study swifts are emerging as species susceptible to colliding with turbines (Rydell *et al.*, 2012) – see Section 7A.2.2.7.1. The closest reported breeding population to the proposed Wind Farm Site is located in Thurles, approximately 2.5 km to the south and the proposed Wind Farm Site is within the breeding season foraging range for swift, which can travel considerable distances from breeding sites to forage at profitable locations, up to 20 km. Lewis *et al*. (2019a) give a population estimate of 51,728 birds (range: 19,154 to 97,976) for swift, which gives a 1% threshold for nationally importance in the range of 191 to 979 birds. There is no population estimate for Co Tipperary and taking a conservative county estimate of 500 birds, means a regularly occurring population of 5 birds qualifies for County Importance.

During VP watches flight line data for swifts was not recorded systematically by all surveyors and the data presented is considered to be an underestimate of overall flight time. Swifts were recorded foraging within the 500 m turbine buffer during both breeding seasons 2022 and 2023. Six observations of mostly foraging swifts were recorded during VP watches with flocks ranging in size from two to 25 birds generating a total of 325,615 flight seconds, with a limited amount registered within the CRZ (1,575 seconds).

The high amount of flight time was almost entirely generated by two observations of 20 and 25 swifts foraging for up to one hour at a time, which generated 324,000 seconds of flight time. Both observations were recorded in June and during these foraging bouts relatively low flight height were recorded, with activity concentrated of over the River Suir, north of Rossestown Bridge on one occasion and in the north-east of the 500 m turbine buffer on the other – Appendix 7E: Figure 7E.38. For both foraging bouts a flight height range was reported (4-25 m), which put the majority of the flight time below 25 m; however it is likely that birds were also entering the lower limits of the CRZ for a proportion of this time.

To give a purely modelled indication of potential levels of collision risk for swift, CRM outputs can be generated assuming different amounts of flight time within the CRZ, including:

- 1,575 seconds - flight time as reported within the CRZ
- 162,853 seconds - approximately half the overall flight time added into the CRZ
- 325,575 seconds - all the recorded flight time added into the CRZ, excluding time definitely below

Inputting the default avoidance rate (0.98) and the standard parameters for Turbine Type A (rotational period: 6.85 secs, pitch: 6°), gives following modelled outputs:

- Flight time as reported: 0.081 collision per annum, equivalent to 1 collision every 12 years
- Half the flight time: 8.36 collision per annum, equivalent to 1 collision every 0.12 years
- All the flight time: 16.7 collision per annum, equivalent to 1 collision every 0.06 years

The potential magnitude of effect on the notional regional swift population due to predicted collision risk was tested on a population estimate of 500 birds, using the three outputs for collisions per annum and

applying an annual survival rate of 0.808 (BTO BirdFacts[19]). This generated the following indicative results for magnitude of effect:

- For flight time as reported: 0.08% increase in mortality above background levels
- For half the flight time: 8.71% increase in mortality above background levels
- For all the flight time: 17.4% increase in mortality above background levels

For a population of 500 birds the magnitude for population level effects increases above 5% once additional flight time is added to the model, suggesting that the proposed Wind Farm has the potential to present a moderate effect on the regional swift population.

In summary, the proposed Wind Farm Site is within the breeding season foraging range of swift breeding sites in surrounding towns and villages and periodically supports foraging birds of county importance (> 5 birds). CRMs run on assumed levels of flight time within CRZ indicate that there is potential for moderate (6-20%) population levels effects on the regional swift population.

7A.5.3.1.2. Stock dove

Stock doves are resident species in Ireland. The conservation status for stock dove was upgraded from amber to red listed in the most recently published BoCCI (Gilbert *et al.*, 2021), having experienced severe declines in abundance and contraction in range, thought to be due to a loss of mixed agricultural production, particular cereal crops, across parts the species' former range (Balmer *et al*., 2013). Based on Lewis *et al*. (2019a), the national stock dove population is estimated at 27,486 birds (range: 14,934-43,039 birds). This gives a 1% threshold for nationally importance in the range of 149 to 430 birds. There is no population estimate for Co Tipperary and taking a conservative county estimate of 600 birds, means a regularly occurring population of 6 birds (3 pairs) qualifies for County Importance.

Over the study period there was only one record of an individual bird in the southern woodland noted as possibly breeding within the 500 m turbine buffer. Based on a record of one possible breeding pair the proposed Wind Farm Site is assessed as locally important for stock dove. Overall it was noted that arable production was limited in the immediate area, which is likely to limit the occurrence of this species at higher densities.

7A.5.3.2. Red listed passerines

Four species of passerine with unfavourable (red listed) conservation status were recorded during the baseline study period, including redwing, meadow pipit, grey wagtail and yellowhammer.

7A.5.3.2.1. Redwing

The favourable (green-listed) conservation status for redwing in Ireland was upgraded to red (Colhoun & Cummins, 2013 and Gilbert *et al*., 2021), due to recent consideration as a European species of global conservation concern (SPEC 1). There are no population estimates for redwing wintering in Ireland, however they are generally considered a common and widespread winter visitor. Flocks ranging from two to 300 birds were frequently recorded within the 500 m turbine buffer during the non-breeding season. Hedgerows, in particular fruit bearing shrubs provide foraging opportunities over the winter, including hawthorn, elder, rowan and holly. The proposed Wind Farm Site is assessed as supporting a wintering redwing population of local importance.

7A.5.3.2.2. Meadow pipit

[19] BTO BirdFacts – Swift: https://www.bto.org/understanding-birds/birdfacts/swift

Meadow pipits have an unfavourable (red listed) conservation status in Ireland (Gilbert *et al*., 2021) due to severe population declines. Declines were thought to be related to harsh winters following the 2009 and 2010 breeding seasons, and despite the crash in numbers, the species has remained relatively common and widespread. Based on Lewis *et al*. (2019a), the Irish meadow pipit population is estimated at 1,351,995 birds (range: 1,007,407 to 1,726,880 birds) and numbers are reported to have stabilised and may be recovering (Lewis *et al*., 2020). The 1% threshold for national importance is in the range of 10,000 to 17,000 birds. There is no population estimate for Co Tipperary and taking a conservative county estimate of 30,000 birds, means a regularly occurring population of 300 birds (150 pairs) qualifies for County Importance.

Meadow pipit were the most abundant and widespread passerine recorded during the breeding season (up to 40 birds) and were also regularly recorded during the winter (up to 45 birds). Meadow pipits are ground nesting, breeding within less intensively managed grassland habitat within the 500 m turbine buffer. Based on the numbers recorded, the proposed Wind Farm Site is assessed as supporting a breeding and wintering meadow pipit population of local importance.

7A.5.3.2.3. Grey wagtail

Grey wagtails have an unfavourable (red listed) conservation status in Ireland (Gilbert *et al*., 2021) due to severe population declines. As for meadow pipit, severe winters during the last Bird Atlas (Balmer *et al*., 2013) were thought to contribute to the observed population decline in this species, although grey wagtails remained relatively widespread and common on waterways and other waterbodies across Ireland. While noting continued decline Crowe *et al*. (2014) suggested that this may be stabilising; however based on more recent analysis, Lewis *et al*. (2020) found that grey wagtail numbers have not recovered and continue to decline. Based on Lewis *et al*. (2019a), the Irish grey wagtail population is estimated at 50,768 birds (range: 36,949 to 66,035 birds). The 1% threshold for national importance is in the range of 370 to 660 birds. There is no population estimate for Co Tipperary and taking a conservative county estimate of 1,000 birds, means a regularly occurring population of 10 birds (5 pairs) qualifies for County Importance.

Grey wagtails were observed foraging along the River Suir within the 500 m turbine buffer area and were regularly recorded in small numbers (1 to 4 birds) during breeding and non-breeding seasons. Though no nest sites were identified, a family group of four birds were recorded feeding along the banks of the River Suir during the breeding season (2023), therefore classed as probably breeding within the area. The steep sided, densely vegetated banks of the River Suir within the 500 m turbine buffer which are without rapids or shingle banks were assessed as largely unsuitable for this species.

In relation to development projects, grey wagtails regularly utilise holes/crevices in man-made structures as nest sites, including bridges and rock armouring around culverts, but are sensitive to deterioration in water quality. Based on the numbers recorded, the proposed Wind Farm Site is assessed as supporting a breeding and wintering grey wagtail population of local importance.

7A.5.3.2.4. Yellowhammer

Yellowhammers are a resident species in Ireland and have an unfavourable (red listed) conservation status (Gilbert *et al*., 2021), due to a server contraction in range and are now largely restricted to areas with tillage. Based on Lewis *et al*. (2019a), the Irish yellowhammer population is estimated at 217,252 birds (range: 145,092 to 294,597 birds). The 1% threshold for national importance is in the range of 1,450 to 2,945 birds. There is no population estimate for Co Tipperary and taking a conservative county estimate of 1,000-2,000 birds, means a regularly occurring population of 10-20 birds (5-10 pairs) qualifies for County Importance.

Yellowhammer were not abundant within the 500 m turbine buffer, probably due to the lack of arable crops in the immediate vicinity. Based on breeding season site walkovers there were two territories on the eastern boundary of the 500 m turbine buffer and similarly low numbers were recorded over the winter.

Yellowhammers are a species that responded well to habitat enhancement measures, including hedgerow management to improve structure and introduction of some tillage, including leaving winter stubbles and planting plots of wild bird cover. Based on the numbers recorded the proposed Wind Farm Site is assessed as supporting a breeding and wintering yellowhammer population of local importance.

7A.5.3.3. Amber listed passerines

There were 11 amber listed passerines recorded during survey period and included (* indicates breeding in 500 m turbine buffer) brambling, goldcrest*, house martin, house sparrow, linnet*, sand martin, skylark*, spotted flycatcher*, starling, swallow and willow warbler*.

Most of the breeding species indicated with * nest within scrub and woodland habitats, and therefore are potentially affected by vegetation clearance occurring during the breeding season. Skylarks are the only ground nesting species, nesting in open grassland habitats and like meadow pipits will select the less intensively managed grasslands. Based on the occurrence of the amber listed passerines recorded within the 500 m turbine buffer the proposed Wind Farm Site was assessed as supporting populations of local importance.

7A.6. CONCLUSIONS

This report provides the ornithological baseline information required to undertake a robust ornithological impact assessment for the proposed Wind Farm Site. Ornithological surveys conducted between October 2021 and September 2023 comply fully with the SNH (2017) guidelines for informing impact assessment of onshore wind farms. The information contained in this report includes robust baseline data, which can be used to assess the likely significant effects of the proposed Wind Farm on the avifauna in the area. No substantial limitations were identified in terms of scale, scope or context in the preparation of this report.

The baseline study allows for the identification of avian features associated with the proposed Wind Farm Site that are Important Ecological Features (IEFs), which includes regularly occurring population of birds. The baseline study identifies the following IEFs:

Winter waterbirds assemblage

The River Suir and associated flood plain within the 500 m turbine buffer for the proposed Wind Farm Site is part of a wetland that regularly supports numbers of county (regional) importance for eight species of wintering waterbird, including:

- three red listed species: golden plover, lapwing and snipe;
- three amber listed species: black-headed gull, cormorant and lesser black-backed gull; and,
- two green-listed species: grey heron and little egret.

The wetland also regularly supports numbers of local importance for five species of wintering waterbird, including:

- three amber listed species: mallard, mute swan and teal; and,
- two green-listed species: jack snipe, woodcock (wintering population).

Several species were found to utilise the wetland relatively infrequently and therefore while numbers periodically recorded exceeded 1% thresholds, utilisation was not regular enough to be fully considered as populations of county or local importance. This included curlew, kingfisher, shoveler, whooper swan and wigeon.

Very infrequent occurrence was noted for a further seven waterbird species, including common gull, dunlin, great black-backed gull, greylag goose, green sandpiper, herring gull and whimbrel. For these species, based on frequency of utilisation and relatively small numbers being recorded, it can be objectively concluded that this area is not important for these species and therefore the proposed Wind Farm does not pose any significant population level risks. On this basis these species do not need to be carried forwarded into the ornithological impact assessment, as they are not IEFs for the proposed Wind Farm Site.

Breeding waterbirds

Three waterbird species were recorded breeding within the proposed wind farm site including lapwing (5-6 pairs), snipe (6 territories) and mute swan (1 pairs), with population assessments identifying that proposed Wind Farm Site supports nationally, regionally (county) and locally important breeding populations of these species, respectively. Two additional waterbird species were identified as potentially breeding which included mallard and teal. The section of the River Suir within the proposed Wind Farm Site is assessed as being of county importance for being within the territory of 1, possibly 2 pairs of kingfishers

Birds of prey

The baseline study recorded nine birds of prey, with six species considered to be regularly occurring within the 2 km turbine buffer, including:

- four resident green-listed breeding species: sparrowhawk (2-3 pairs), buzzard (3 pairs) and long-eared owl (1 pair) assessed as locally important, and peregrine (1 pair) assessed as regionally (county) important; and,
- two resident red listed breeding species: kestrel (1-2 pairs) and barn owl (1 pair), both assessed as regionally (county) important.

Based on exceptionally low recorded usage over a three year study period, no likely significant effects are anticipated, and no further impact assessment is required for three birds of prey that were only recorded over the winter, including hen harrier (2 observations), merlin (observed on 6 dates) and short-eared owl (1 observation).

Other species

Other red listed non-passerines that were recorded included foraging swift (up to 25 birds) assessed as regionally (county) important and possibly breeding stock dove (1 pair) assessed as locally important.

Regularly occurring red listed and amber listed passerines were all assessed as locally important, this included the following breeding species, which are notably due the habitat association:

- Ground nesting species, including: meadow pipit and skylark;
- Riverine species, including: grey wagtail;
- Farmland birds - hedgerow nest, including: yellowhammer;
- Scrub nesting species, including: linnets and willow warbler; and,
- Hedgerow and woodland species: including: goldcrest and spotted flycatcher.

Collision risk modelling

Collision risk modelling (Appendix 7H) identified eight species where predicted collision risk was 1 or more collision over the 35 year operational period for the proposed Wind Farm Site, including: buzzard, cormorant, lapwing, golden plover, grey heron, kestrel, lesser black-backed gull and little egret. No official CRM was run for swift, as flight line data was not collected systematically for this species; however indicative modelling was undertaken applying a range of flight seconds to examine hypothetical collision risk for this species, which utilising the lowest and medium amount of flight seconds, suggested that predicted collision risk was between 3 and 293 collisions over 35 years.

Applying default avoidance the rates for lapwing and golden plover resulted in over-inflated predicted collision risk and avoidance rate was increased within the CRMs to test this variable.

The CRMs generated notably low levels of theoretical collision risk for four of the 12 target species analysed, including: black-head gull, peregrine, snipe and sparrowhawk. As part of the assessment, further consideration was given to collision risk for snipe and sparrowhawk, as CRMs are noted as unreliable for these species, due to potential for under recorded of flight time. In spite of the CRM for peregrine generating low predicted collision risk, in view of a breeding site in relatively close proximity to the proposed turbines, as a precaution collision risk was assessed in the context of young birds fledging in an area adjacent turbines.

Assessment for potential population level effects due predicted collision risk found that:

- For buzzard predicted collision risk is anticipated to have likely significant effects on the local breeding population, with recently fledged birds identified as being particularly at risk. The application of default avoidance (98%) in the CRM, while precautionary, acknowledges the susceptibility of buzzards to colliding with turbines and is considered to accurately represent the risk based on recorded flight activity. Predicted collision risk was broadly in line with the results of post-construction collision monitoring studies. The magnitude of effect for any turbine mediated mortality, additional to

background levels, is assessed precautionarily as a moderate: 6-20% effect (Percival, 2003) on the regional buzzard population, which in the context of an expanding population, will see birds readily recruit into the local area and replace any birds occasionally lost to turbine mediated mortality.

- For cormorant, grey heron and little egret modelled outputs predicted one or close to one collision over the 35 years. In the context grey heron and little egret having favourable (green listed) conservation status and the cormorant population not considered threatened at this location, these relatively low levels of predicted collision risk are considered unlikely to have any significant (> 1%) population level effects.
- For kestrel predicted collision risk is anticipated to have a moderate: 6-20% effect (Percival, 2003) on the local breeding population.
- For wintering lapwing the worst-case scenario for predicted collision risk, i.e. applying 98% default avoidance, indicates that any population level effects would be expressed at the local population level and the magnitude of effect is assessed low: 1-5 (Percival, 2003) for the local breeding the population and moderate: 6-20% (Percival, 2003) if assessed with the wintering population. Magnitude of effect is moderated by increasing the avoidance rate to 0.995, which is a more realistic yet still precautionary rate as justified in the species account (Section 7A.5.1.2.1).
- For wintering golden plover the worst-case scenario for predicted collision risk, i.e. applying 98% default avoidance, indicates that any population level effects would be expressed at the county and local population level and the magnitude of effect is assessed low: 1-5% and high: 21-80%, respectively (Percival, 2003). Magnitude of effect is moderated by increasing the avoidance rate to 0.995, which is a more realistic yet still precautionary rate as justified in the species account (Section 7A.5.1.2.2).
- For lesser black-backed gull the worst-case scenario for predicted collision risk, (0.64 collisions/year), indicates that any population level effects would be expressed at the county population level and the magnitude of effect is anticipated to be low: 1-5% (Percival, 2003).
- For swift, based on the hypothetical flight times applied within the CRM, as detailed in the species account (Section 7A.5.3.1.1), taking the middle scenario for flight time indicates that there is potential for moderate: 6-20% (Percival, 2003) population level effects on the regional swift population.

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