MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 4.4: Onshore and intertidal ornithology survey methodologies

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Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Baseline	The status of the environment without the Transmission Assets in place.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan process.
Intertidal Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bay inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore export cables, landfall and onshore infrastructure for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Ramsar sites	Wetlands of international importance that have been designated under the criteria of the Ramsar Convention. In combination with Special Protection Areas and Special Areas of Conservation, these sites contribute to the national site network.
Special Protection Areas	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.

Term	Meaning
Study area	This is an area which is defined for each environmental topic which includes the Transmission Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Survey area	The area within which each survey has been undertaken. This may differ from the study area as a survey area will be based on species or survey-specific guidance on the extent of survey required, which may be limited by, for example, habitat conditions, or be defined in terms of buffer areas around an area of potential impact.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits: Onshore	The area within which all components of the Transmission Assets landward of Mean High Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds). Also referred to in this report as the Onshore Order Limits, for ease of reading.

Acronyms

Acronym	Meaning
BTO	British Trust for Ornithology
EIA	Environmental Impact Assessment
ES	Environmental Statement
EWG	Expert Working Group
HNDR	Holistic Network Design Review
HAT	Highest Astronomical Tide
HRA	Habitat Regulation Assessment
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
OTNR	Offshore Transmission Network Review
PRoW	Public Rights of Way
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom

Acronym	Meaning
VP	Vantage Point
WeBS	Wetland Bird Survey

Units

Unit	Description
GW	Gigawatts
hrs	Hours
km	Kilometres
kV	Kilovolt
MW	Megawatt
m	Metres

1 Onshore and intertidal ornithology survey methodologies

1.1 Background

1.1.1 Introduction

1.1.1.1 This document forms Volume 3, Annex 4.4: Onshore and intertidal ornithology survey methodologies of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as the 'Transmission Assets').

1.1.1.2 The purpose of this annex is to present the onshore and intertidal ornithology survey methodologies. These methodologies are presented in **section 1.3** of this annex.

1.1.2 Consultation and engagement

1.1.2.1 On 28 October 2022, the Applicants submitted a scoping report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance and decommissioning phases of the Transmission Assets.

1.1.2.2 Consultation and engagement with interested parties specific to onshore and intertidal ornithology continued following the submission of the EIA Scoping Report. The first onshore ecology and onshore and intertidal ornithology Expert Working Group (EWG) was held in March 2023 where high level survey findings and the proposed onshore and intertidal ornithology survey methodologies were presented for agreement.

1.1.2.3 Proposed survey methodologies were subsequently sent to the EWG for comment on 15 August 2023 and comments from Natural England were received on 18 September 2023. **Section 1.3** reflects the up to date onshore and intertidal ornithology methodologies.

1.1.2.4 The overarching comments made by Natural England in relation to the survey methodologies shared in EWG01 (23 March 2023) are listed in Volume 3, Chapter 4: Onshore and Intertidal Ornithology of the ES, together with details of how these comments have been considered within the ES.

1.2 Survey areas

1.2.1.1 Three discrete survey areas have been used to inform the site-specific surveys.

1.2.1.2 The Transmission Assets Order Limits: Onshore, hereafter referred to as Onshore Order Limits, contains the Onshore Infrastructure Area, which combined with the Intertidal Infrastructure Area, make up the areas within which all components, landwards of Mean Low Water Springs (MLWS), of the Transmission Assets will be located.

1.2.1.3 Due to differences in the expected bird assemblages, and the different techniques required to maximise detection of these assemblages, for the purposes of survey the Onshore Infrastructure Area and Intertidal Infrastructure Area was split into:

- the onshore survey area (used for the breeding, and onshore wintering and migratory bird surveys);
- the coastal survey area (used for the intertidal bird surveys); and;
- the estuarine survey area (also used for the intertidal bird surveys).

A 500 m buffer was applied to the Infrastructure Areas. The 500 m buffer is included to take account of disturbance that may occur as a result of the Transmission Assets during construction, operation and maintenance, and decommissioning activities. The buffer is based on typical disturbance buffers for the bird assemblage expected to be found in the survey areas (Goodship and Furnace, 2022). Please refer to **Figure 1.1**, **Figure 1.2**, and **Figure 1.3** to view the full extent of these survey areas.

1.3 Ornithology survey methodologies

1.3.1 Ornithology site-specific surveys

1.3.1.1 This document sets out the methodologies of the onshore breeding bird surveys, onshore wintering and migratory bird surveys, and the intertidal bird surveys.

1.3.1.2 Site-specific surveys undertaken for the onshore survey area, coastal survey area and estuarine survey area aim to respectively characterise the distribution and abundance of birds in the terrestrial habitats, and the supratidal, intertidal and subtidal habitats associated with elements of the Transmission Assets.

1.3.1.3 The findings of these surveys have been used to inform the ES (ES Volume 3, Chapter 4: Onshore and intertidal ornithology, document reference F3.4) of the Transmission Assets together with the Habitats Regulations Assessment (HRA) (Information to Support Appropriate Assessment part 3, document reference E2.3C) required in relation to the designated sites with potential connectivity to the Transmission Assets. This document sets out the ornithological survey methodologies that were followed to inform these assessments.

1.3.1.4 The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets. As such, flight lines are not considered in these methodologies.

1.3.2 Qualifications and experience

1.3.2.1 All bird survey work has been undertaken by field ornithologists with competency in bird identification and knowledge of species ecology.

1.3.3 Survey overview

Breeding bird surveys

1.3.3.1 Site-specific surveys were undertaken within the onshore survey area (see **Figure 1.1**) with the aim of characterising the distribution and abundance of breeding bird assemblage.

1.3.3.2 A total of nine monthly visits have been undertaken across two breeding seasons. Breeding bird surveys have been undertaken with monthly visits during the 2022 breeding season (April to July) and have been repeated monthly during the 2023 breeding season (March to July) (see **Table 1.1)**.

1.3.3.3 Breeding bird surveys aim to locate and map birds using visual and aural cues. The survey methodology is based on a modified Common Bird Census survey methodology (Marchant *et al*., 1983; Gilbert *et al*., 1998; Bibby *et al*., 2000). A detailed methodology is provided in **section 1.4** and survey coverage can be seen in **Figure 1.4**.

Wintering and migratory bird surveys

1.3.3.4 Two types of survey were used to characterise the abundance and distribution of wintering and migratory birds in the onshore survey area.

- Terrestrial waterbird surveys were carried out monthly from public access land with waterbirds as primary target species.
- Supplementary walkover surveys were carried out between two and three times over the winter period and targeted all bird species.

Terrestrial waterbird surveys

1.3.3.5 Site-specific surveys were undertaken within the onshore survey area (**Figure 1.1**) with the aim of characterising the assemblage of wintering and migratory waterbirds that utilise terrestrial habitats. These wintering and migratory bird surveys were primarily used to identify waterbirds (e.g., waders and wildfowl).

1.3.3.6 The surveys used a ‘look and see’ approach to locate and map birds broadly based on guidance from Scottish Natural Heritage (now NatureScot) (2017). Terrestrial waterbird surveys were undertaken monthly between September and March over a two year period (see **Table 1.1)**. A detailed methodology is provided in **section 1.4** and survey coverage can be seen in **Figure 1.5** to **Figure 1.6.**

Supplementary walkover surveys

1.3.3.7 In addition to the monthly driven transects, supplementary walkover surveys were conducted in areas where access was possible (e.g., privately owned land parcels where access was granted). The aim of these surveys was to fully characterise the winter bird assemblage by recording all bird species not just waterbirds.

1.3.3.8 A total of five supplementary walkovers were conducted, two during the winter of 2022/23 and three during the winter of 2023/24. See **Table 1.1** for full details and a detailed methodology is contained in **section 1.4** and survey coverage can be seen in **Figure 1.7**.

Intertidal bird surveys

Coastal bird surveys

1.3.3.9 Site-specific surveys within the coastal survey area aimed to characterise waterbird abundance and distribution of the supra-tidal, intertidal, and sub-tidal habitats from Highest Astronomical Tide (HAT) seaward, and throughout all periods of the tidal cycle.

1.3.3.10 Diurnal and nocturnal surveys used a 'through-the-tidal-cycle count' survey methodology. Diurnal surveys were undertaken twice per month between September 2021 and August 2023 (see **Table 1.1**). Nocturnal surveys were planned once per month over the wintering period only (November to March for two separate winters), although due to bad weather one survey visit was missed meaning that only nine were completed. A detailed summary of the nocturnal and diurnal survey methodology is provided in **section 1.4**.

Estuarine bird surveys

1.3.3.11 Site-specific surveys where the Onshore Infrastructure Area crosses the tidal River Ribble aimed to characterise waterbird abundance and distribution within the supratidal, intertidal and subtidal/river habitats along the River Ribble.

1.3.3.12 Diurnal surveys used a 'through-the-tidal-cycle count' survey methodology. Diurnal surveys were undertaken twice per month between October 2022 and September 2024 (see **Table 1.1**). No nocturnal surveys were carried out. A detailed summary of the survey methodology is provided in **section 1.4**.

Table 1.1: Ornithology survey areas, methods and frequency

Survey area	Survey type	Survey methodology	Survey frequency	No. of visits and survey duration
Onshore survey area	Terrestrial waterbird surveys	Driven and walked transects scanning fields with optics from public access land.	Monthly between September and March.	14 visits (September 2022 to March 2023 and September 2023 to March 2024).
	Supplementary wintering and migratory walkover surveys	'Look and see' walkover methodology.	Two to three visits over the core winter period (November to March).	Five visits (two between November 2022 and February 2023 in the first winter, and three between November 2023 and March 2024 in the second winter).
	Breeding bird surveys	'Look and see' walkover methodology using a modified Common Bird Census methodology.	Monthly during the breeding season (March to July).	Nine visits (four between April 2022 and July 2022, and five between March 2023 and July 2023).
Coastal survey area	Coastal bird surveys	Diurnal, 'through-the-tidal-cycle count' (full tidal cycle per month) from VPs (VP locations are shown in Volume 3. Annex 4.3: Intertidal birds. Document F3.4.3).	Twice monthly year-round.	48 visits (September 2021 to August 2023).
		Nocturnal, 'through-the-tidal-cycle count' (half tidal cycle per month).	Monthly over the core winter period (November to March).	Nine visits (between November and April in 2021/22 and 2022/23).
Estuarine study area	Estuarine bird surveys	Diurnal, 'through-the-tidal-cycle count' (full tidal cycle per month) from VPs.	Twice monthly year-round.	48 visits (October 2022 to September 2024).

1.4 Survey methodologies

1.4.1 Onshore survey area

Breeding bird survey

1.4.1.1 A total of nine surveys have been undertaken across two breeding seasons. Breeding bird surveys were undertaken monthly (April 2022 to July 2022) during the 2022 breeding season and repeated monthly (March 2023 to July 2023) during the 2023 breeding season. Due to the amount of time taken to complete one survey visit (approximately 15 days), surveys were conducted

once per month with any one site survey conducted at least 10 days apart from any other visit.

1.4.1.2 Site-specific surveys followed a 'look and see' walkover methodology whereby birds are detected both visually, and aurally through their vocalisations. The method consists of walking as close to all areas of habitat as possible in order to detect birds. The survey follows the same broad guidance as the Common Bird Census (Marchant, 1983; Gilbert *et al.*, 1998; Bibby *et al.*, 2000).

1.4.1.3 During each survey the position of birds was plotted onto a field map or digitally mapped (via mobile data capture) and details of behaviour indicative of breeding (such as singing males, or birds carrying food) were noted. Results were then transferred onto geographic information system software from which further analysis of each species was used to identify and map putative territory centres.

1.4.1.4 These data were analysed, and territories were assigned following the identification of clusters of registrations of birds of the same species displaying breeding characteristics (e.g., singing, alarm calling, nest building, mating) in the same general area over successive survey visits. A breeding territory is normally defined as at least two registrations conforming to breeding behaviour evidence recorded on separate survey visits. However, where fewer visits were carried out (i.e., on parcels of land where regular access could not be arranged), one registration of breeding behaviour was regarded as the minimum to ascertain possible breeding. The definitions of breeding likelihood are set out below (BTO, 2024) and territories were assigned using the lowest level of breeding likelihood (possible).

- **Confirmed breeders**: distraction display or injury feigning observed, used nest or eggshells found, recently fledged young, adults entering or leaving nest-site indicating an occupied nest, adult carrying faecal sac or food for young, nest containing eggs or nest with young seen or heard.
- **Probable breeders**: pair observed in suitable nesting habitat in the breeding season, permanent territory presumed through registration of territorial behaviour on at least two different days a week or more apart, courtship and display in or near potential breeding habitat, visiting a probable nest site, agitated behaviour or anxiety calls from adults, brood patch on adults examined in the hand, nest building or excavating nest-hole.
- **Possible breeders**: species observed in breeding season in suitable habitat, singing male present in breeding season within suitable breeding habitat.

1.4.1.5 Coverage of the onshore survey area during 2022 was achieved through a combination of surveys from PRoW (Public Rights of Way) and privately owned land parcels (where access was agreed). Four visits were undertaken between April 2022 and July 2022, with five taken between March 2023 and July 2023. A total survey coverage of the Onshore Order Limits (excluding urban areas and the airport) of 75.23 % was achieved. Detail of the survey coverage per visit is shown in **Figure 1.4** and **Table 1.3**.

1.4.1.6 For the breeding bird surveys undertaken in 2022 only species of conservation concern were recorded. These were species listed on Annex 1 of the European Union Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981, or section 41 of the Natural Environment and Rural Communities Act (NERC) (2006), and UK red and amber listed species of the Birds Of Conservation Concern 5 (BOCC5) (Stanbury *et al.*, 2021).

1.4.1.7 For the breeding bird surveys undertaken in 2023 all species present, regardless of their conservation status or protection, were recorded.

Wintering and migratory bird survey methodology

Terrestrial waterbird survey

1.4.1.8 Site-specific surveys were undertaken within the onshore survey area with the aim of characterising the abundance and distribution of the wintering and migratory waterbird assemblage.

1.4.1.9 The terrestrial waterbird surveys aimed to assess the abundance and distribution of waterbirds during the winter months, and to identify habitats within the survey area that may be functionally linked to the Ribble and Alt Estuaries SPA. Surveys were carried out using observation points from publicly accessible land (e.g., footpaths, bridleways and road verges). Due to a lack of survey methodology guidance from Natural England, this broadly follows guidance from Scottish Natural Heritage (SNH) , now NatureScot, on surveys for terrestrial waterbirds, particularly wildfowl such as geese (SNH, 2017).

1.4.1.10 Waterbird survey visits across the survey area were undertaken monthly and only from publicly accessible land (e.g., footpaths, bridleways and road verges). Monthly survey coverage can be seen in **Figure 1.5** and **Figure 1.6**, differences in coverage between the years is due to different iterations of the Onshore Order Limits.

1.4.1.11 Fields and suitable habitat for foraging, loafing, or roosting waterbirds within the onshore survey area were systematically scanned from either vehicles (when safely parked), or on foot, using binoculars and telescopes. If waterbird species were observed, then individuals were counted, mapped, and behaviour noted. A total coverage of the Onshore Order Limits (excluding urban areas and the airport) of 94.89 % was achieved during the 2023/24 winter surveys (**Table 1.3**).

Supplementary walkover survey

1.4.1.12 Supplementary walkover surveys were conducted to gather further information relating to the abundance and distribution of all wintering and migratory bird species (e.g., raptors and passerines) within the onshore survey area. The survey used a ‘look and see’ walkover methodology with surveyors visiting areas on foot where access was possible (including privately owned land parcels where access was granted).

1.4.1.13 Two visits were carried out during the winter of 2022/23 (visit 1 – December/January, visit 2 – February/March) and three visits over the winter

of 2023/24 (visit 1 – December, visit 2 – January/February, visit 3 – February/March). Full details of survey coverage can be seen in **Figure 1.7** and **Table 1.3**.

1.4.1.14 Where possible, surveys were only conducted during periods of good visibility and suitable weather conditions, i.e., avoiding persistent rain or fog, and high winds. During each survey visit an experienced ornithologist, equipped with binoculars, came as close as possible to all habitats present to maximise the detection of birds both visually and aurally. The number, behaviour and location of the individuals or flocks detected were mapped.

1.4.1.15 Surveys were undertaken from a combination of footpaths, bridleways, and within privately owned land parcels where access was agreed. Access throughout the survey area enabled a high level of coverage to be achieved. A total coverage of the Onshore Order Limits (excluding urban areas and the airport) of 90.24 % was achieved during the supplementary walkover surveys (**Table 1.3**).

1.4.2 Intertidal survey methodology (coastal survey area and estuarine survey area)

Through-the-tidal-cycle counts (diurnal survey)

1.4.2.1 The survey methodology that was agreed with Natural England (including the nocturnal aspect) is as follows:

1.4.2.2 The programme comprised of a series of monthly intertidal and nearshore coastal waterbird surveys undertaken from VPs located on the upper shore or the bank of the estuary (see Volume 3, Annex 4.3: Intertidal ornithology technical report of the ES for the locations of the VPs, document reference F3.4.3). The VPs were chosen so that, by using a combination of two VPs, 100 % of the survey areas could be observed.

1.4.2.3 The methodology followed accepted industry standard practice, using through-the-tidal-cycle counts to characterise bird usage over the course of a tidal cycle and is based on a methodology developed and recommended by Armitage *et al*. (2002).

1.4.2.4 Through-the-tidal-cycle counts have been undertaken for both the coastal survey area and the estuarine survey area, with the same methodology being used across both survey areas.

1.4.2.5 Surveys of the coastal survey area commenced in September 2021 and continued twice a month until August 2023. Surveys of the estuarine survey area commenced in October 2022 and continued until March 2024.

1.4.2.6 The surveys were scheduled to cover a range of times of day and different tidal conditions (high, low, ebb and flow). Each month a count of all waterbirds present was made once per hour during the full tidal cycle period of 12 hours (-6 hrs to +5 hrs relative to low tide). This was split into two visits of six hours to reduce the impact of observer fatigue. As weather, or number of birds could impact upon the ability to make hourly counts, a minimum of four counts were undertaken per month to categorise the usage across the four tidal states (high tide, ebb tide, low tide and flood tide).

1.4.2.7 The surveyor mapped species and number of individual birds from VPs along the coast or estuary using binoculars and a telescope. Bird behaviour, i.e., whether individuals are foraging or non-foraging (i.e., roosting, loafing etc) was also recorded. Spatial coverage of the diurnal surveys was 100%.

1.4.2.8 Weather conditions including wind speed (using the Beaufort Scale), cloud cover (estimated as eighths or octas of the sky) and visibility were also recorded.

1.4.2.9 Any source of disturbance to the birds at the time of the count was recorded under the following categories: walkers, dogs, anglers, bait diggers, shell fishers, vehicles, unpowered boats, powered boats, aircraft and 'other'. The perceived effect of disturbance on abundance and behaviour of birds in the count section is scaled according to the following categories (**Table 1.2**).

Table 1.2: Perceived effect of disturbance on abundance and behaviour of birds

Definition of effect	Notation
Weak e.g., change in behaviour, but birds not excluded	W
Moderate e.g., birds excluded from parts of the recording sector	M
Strong e.g., avoidance of the recording sector	S

Through-the-tidal-cycle counts (nocturnal survey)

1.4.2.10 For the coastal survey area only, and after agreement with Natural England, a programme of nocturnal surveys over the core winter period only was undertaken between November 2021 and April 2022 and November 2023 and March 2024 (as agreed with Natural England prior to surveys commencing). The survey methodology used through-the-tidal-cycle counts to characterise bird usage over the course of a tidal cycle. The survey methodology has been developed for the site-specific surveys, but it uses some key principles from Armitage *et al*. (2002), these are discussed below.

1.4.2.11 Whilst similar to the diurnal through-the-tidal-cycle counts surveys, the nocturnal through-the-tidal-cycle counts were undertaken on a reduced intensity (i.e., up to three counts over half tidal cycle) and reduced frequency.

1.4.2.12 Due to the more limited range of nocturnal equipment, only the first 500 m of the intertidal zone (from MHWS) was fully surveyed. Each monthly through-the-tidal-cycle count was undertaken across a half tidal cycle of approximately 6 hrs (versus a full tidal cycle of approximately 12 hrs for the diurnal), equating to one visit per month.

1.4.2.13 The frequency of counts was adapted to the amount of bird activity in the section (sometimes leading to extended count times) and survey effort required to effectively use nocturnal equipment. During periods of high bird activity, the frequency of counts over half tidal cycle was reduced to two (i.e., high and ebb, or low and flood). Working in pairs, one observer located birds using a thermal monocular (HIK Micro OWL 35 mm), whilst the second

observer videoed and identified individuals or groups using an image-intensifying camera (or camcorder) coupled with an infra-red spotlight. This approach allowed the detection and identification of most waterbird species within 400 m from the observer's position.

1.4.2.14 The position of the birds was directly mapped and behaviour was recorded as foraging (actively looking for food) and non-foraging.

1.5 Limitations

1.5.1 Onshore surveys

Breeding bird survey

1.5.1.1 The first breeding bird survey was not mobilised until April 2022. It is acknowledged that early breeding species may have been missed during 2022. However, for the majority of the breeding assemblage, breeding does not start in earnest until April, and even later with some migratory species.

1.5.1.2 The frequency of visits was reduced from ten (as recommended in the Common Bird Census protocol) to a minimum of four per breeding season. When it came to assigning territories this was taken into account and if there was any doubt (e.g., a species had made only one registration of breeding behaviour), then a precautionary approach was taken, and a territory assigned.

1.5.1.3 Every effort was made to cover the entire survey area. However, due to different iterations of the Onshore Order Limits, and difficulty gaining access to privately owned land parcels (which were granted on a visit-by-visit basis), the survey effort across the survey area has varied between years and between visits (**Figure 1.4**). However, all areas where access was publicly available were visited monthly over both years (**Figure 1.4**). It must be noted that due to the iterative approach to the project design, some areas were not surveyed in year one as they were previously outside the Onshore Order Limits, and vice versa.

1.5.1.4 Whilst only species of conservation concern were recorded in 2022, all species regardless of their conservation status or protection were recorded in 2023. This was to account for the possibility of the conservation status to changing in future (i.e., birds updated to higher conservation status).

Wintering and migratory bird survey

Terrestrial waterbird survey

1.5.1.5 This survey only carried out once monthly survey visits. This deviates from the twice monthly guidance set out by SNH (2017), however the guidance is to assess the impact of permanent habitat loss from onshore wind farms. As the impacts from Transmission Assets upon terrestrial waders and wildfowl will only be temporary in nature, once monthly visits carried out over two winter seasons were considered adequate to establish the baseline.

1.5.1.6 Every effort was made to cover the entire survey area during all surveys. However, visibility of some areas was not possible due to slope, angle, hedgerows, etc. Despite this, it is considered that the monthly survey coverage was sufficient to fully characterise the abundance and distribution of wintering and migratory waterbirds.

1.5.1.7 Previous outbreaks of Highly Pathogenic Avian Influenza (HPAI) have tended to hit wintering waterfowl, subsiding as wintering flocks disperse. Over the winter of 2021/22 an outbreak of HPAI was confirmed in barnacle geese wintering on the Solway Firth and from late spring 2022, increasing numbers of reports of the disease were received from seabird colonies around the northern UK (Pearce-Higgins *et al*., 2022). The extent of impact of HPAI on individual species is assessed through ongoing monitoring.

1.5.1.8 As the baseline was characterized during the outbreak, there is potential that the baseline is not representative of a typical year. However, it must be noted that bird populations are subject to natural fluctuations in response to a range of environmental conditions (e.g., weather) and this may cause inter-annual variations in abundance. Collecting bird data over a two-year period is considered sufficient to capture the inter-annual variation and characterise the baseline.

Supplementary walkover survey

1.5.1.9 Although access to the airport was arranged, last minute changes meant that it was not possible for surveyors to directly access the airport. Instead, the surveyors walked as much of the perimeter as possible and recorded any birds that were located.

1.5.1.10 Every effort was made to cover the entire survey area. However, due to different iterations of the Onshore Order Limits, and difficulty gaining access to privately owned land parcels (which were granted on a visit-by-visit basis), the survey effort has varied spatially between years and between visits (**Figure 1.4**). Furthermore, some areas were not surveyed in year one as they were previously outside the refined Onshore Order Limits, and vice versa.

1.5.2 Intertidal surveys

Diurnal survey (coastal and estuarine survey areas)

1.5.2.1 See **sections 1.5.1.7** and **1.5.1.8** for the impact of HPAI on surveys. There were no other limitations to these surveys.

Nocturnal survey (coastal survey area)

1.5.2.2 Due to the technical limitations of using nocturnal equipment (thermal monocular and infra-red camcorders), only the first 500 m of the intertidal (from MHWS seaward) could be fully surveyed. Although the thermal imaging equipment could detect birds at a greater distance, accurate counting and identification was not always possible.

1.5.2.3 Both periods of strong wind and precipitation, even slight rain, can interfere with nocturnal equipment and therefore surveys were planned to avoid these weather conditions as far as possible.

1.5.2.4 One survey was missed due to inclement weather during the 2021/22 winter. This survey was caught up during April 2022, however it is acknowledged that some wintering species may have left on migration at that stage.

1.5.2.5 One survey was missed due to inclement weather during the 2022/23 winter.

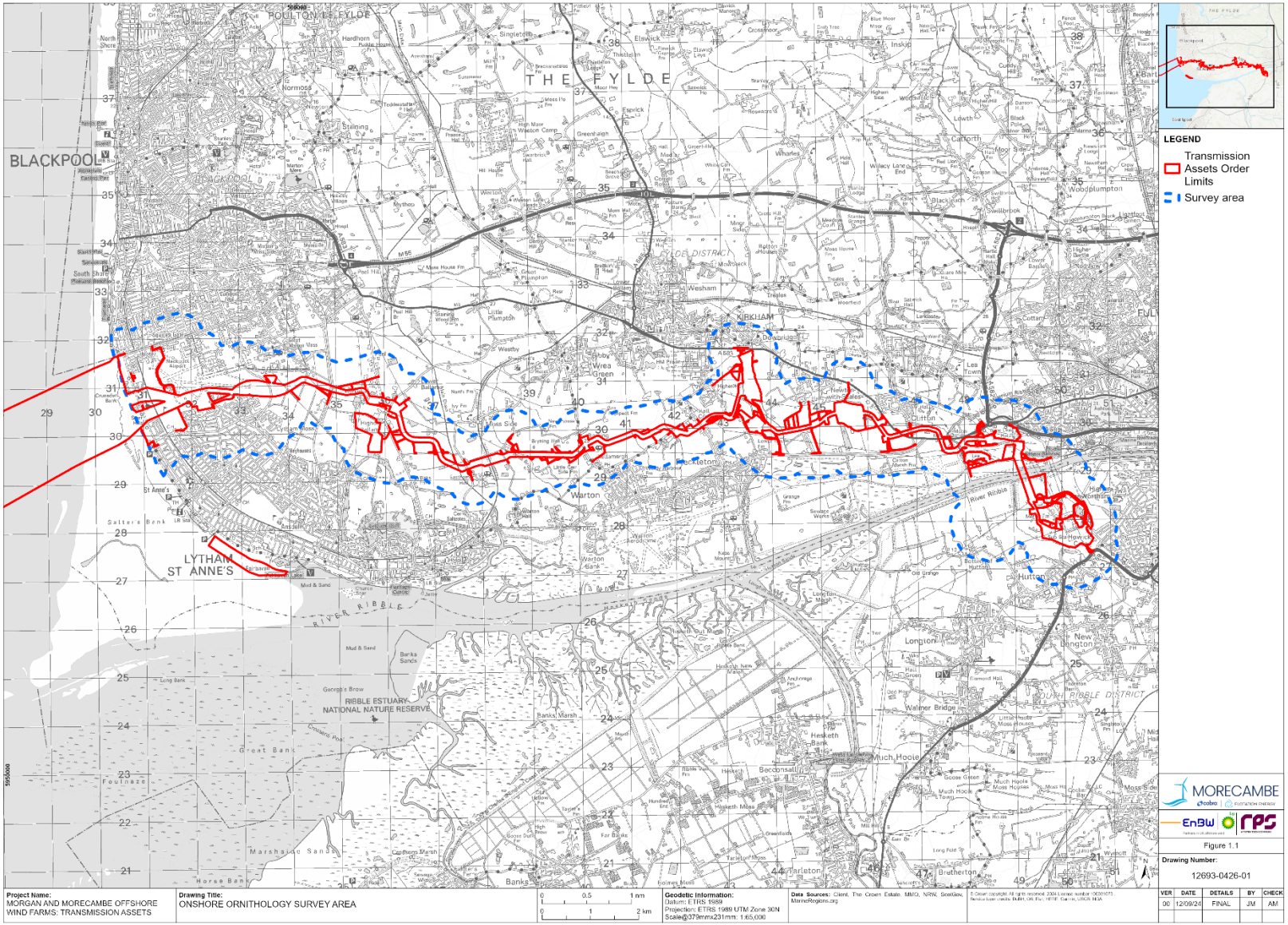

Figure 1.1: Onshore survey area

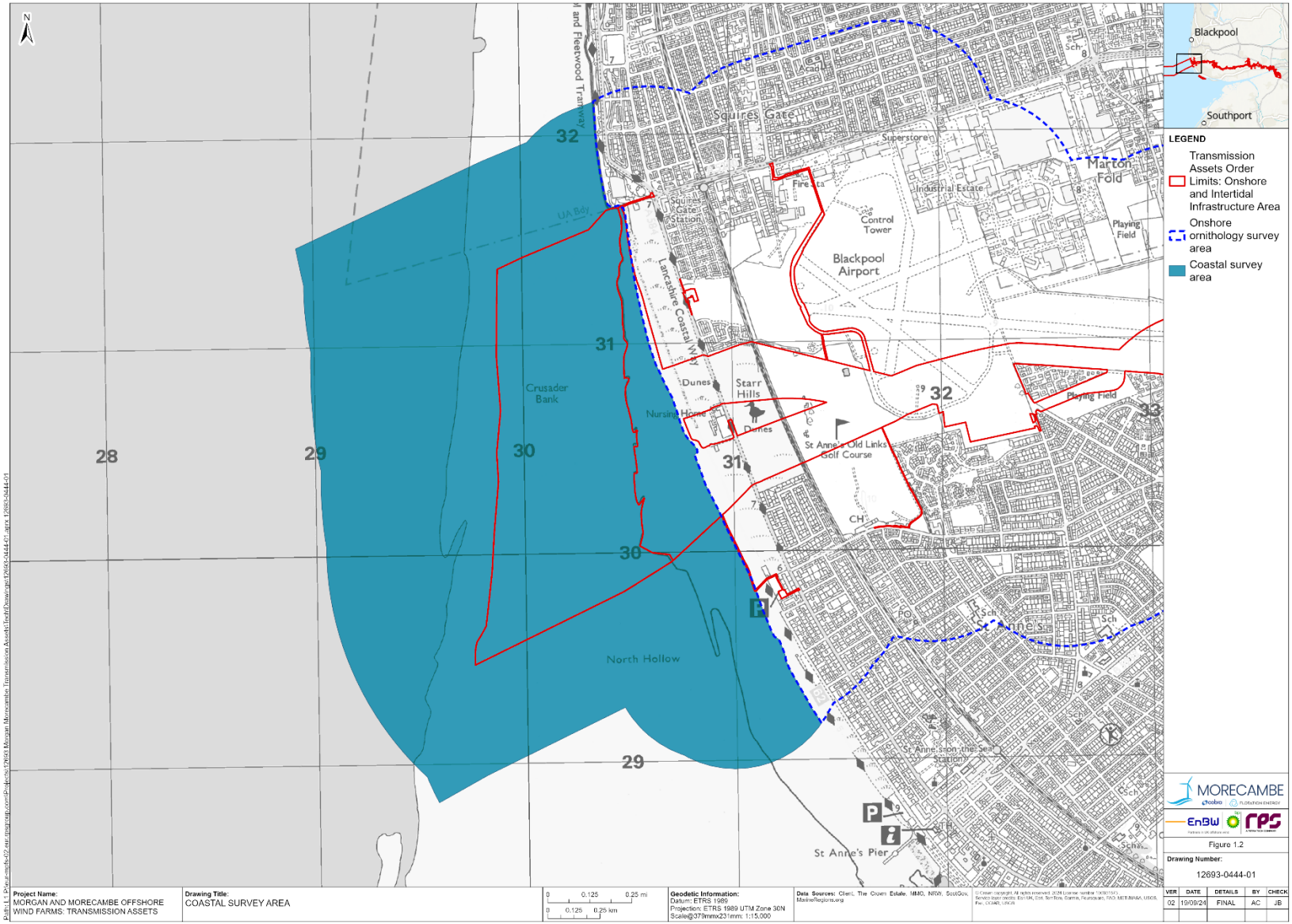

Figure 1.2: Coastal survey area

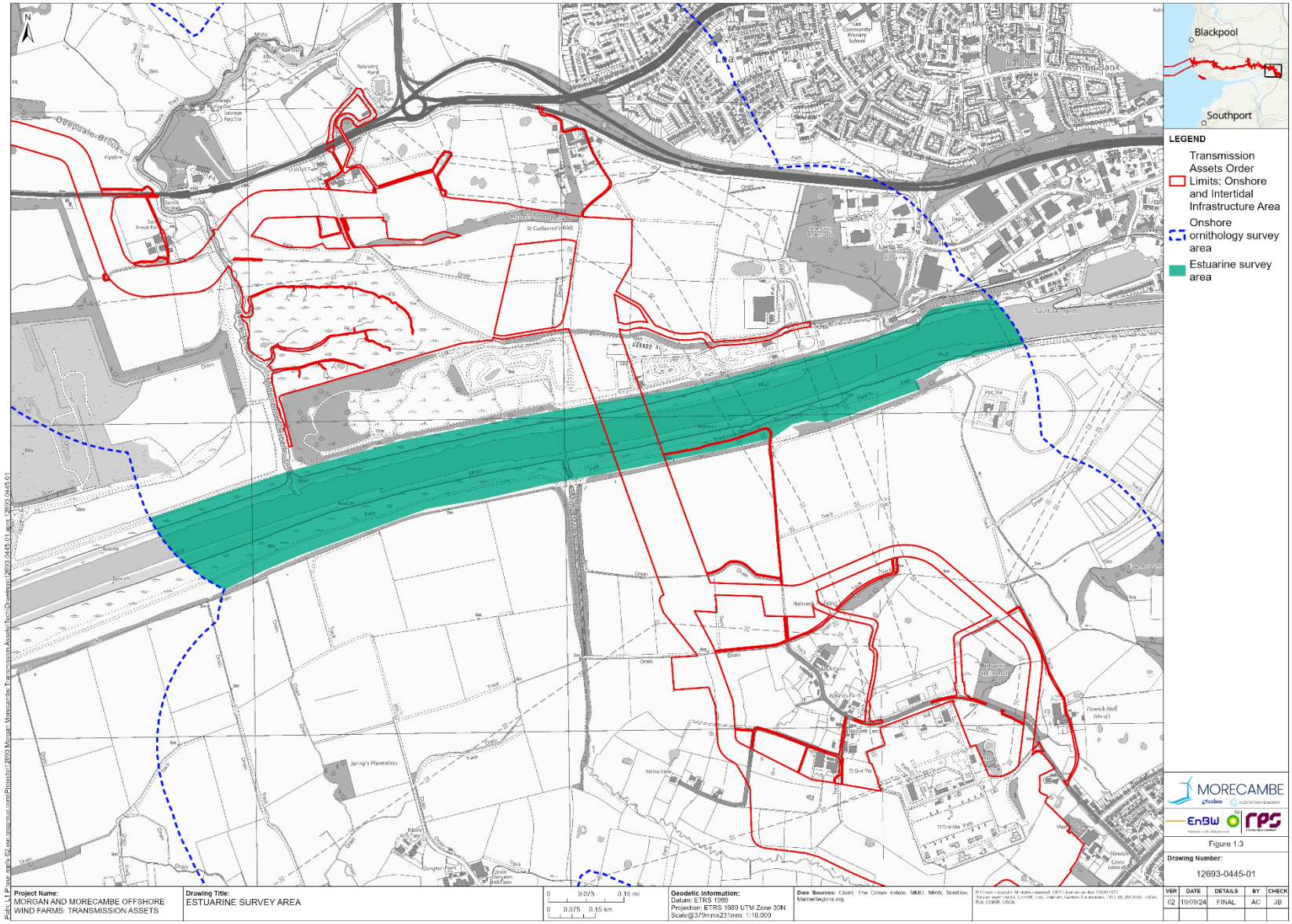

Figure 1.3: Estuarine survey area

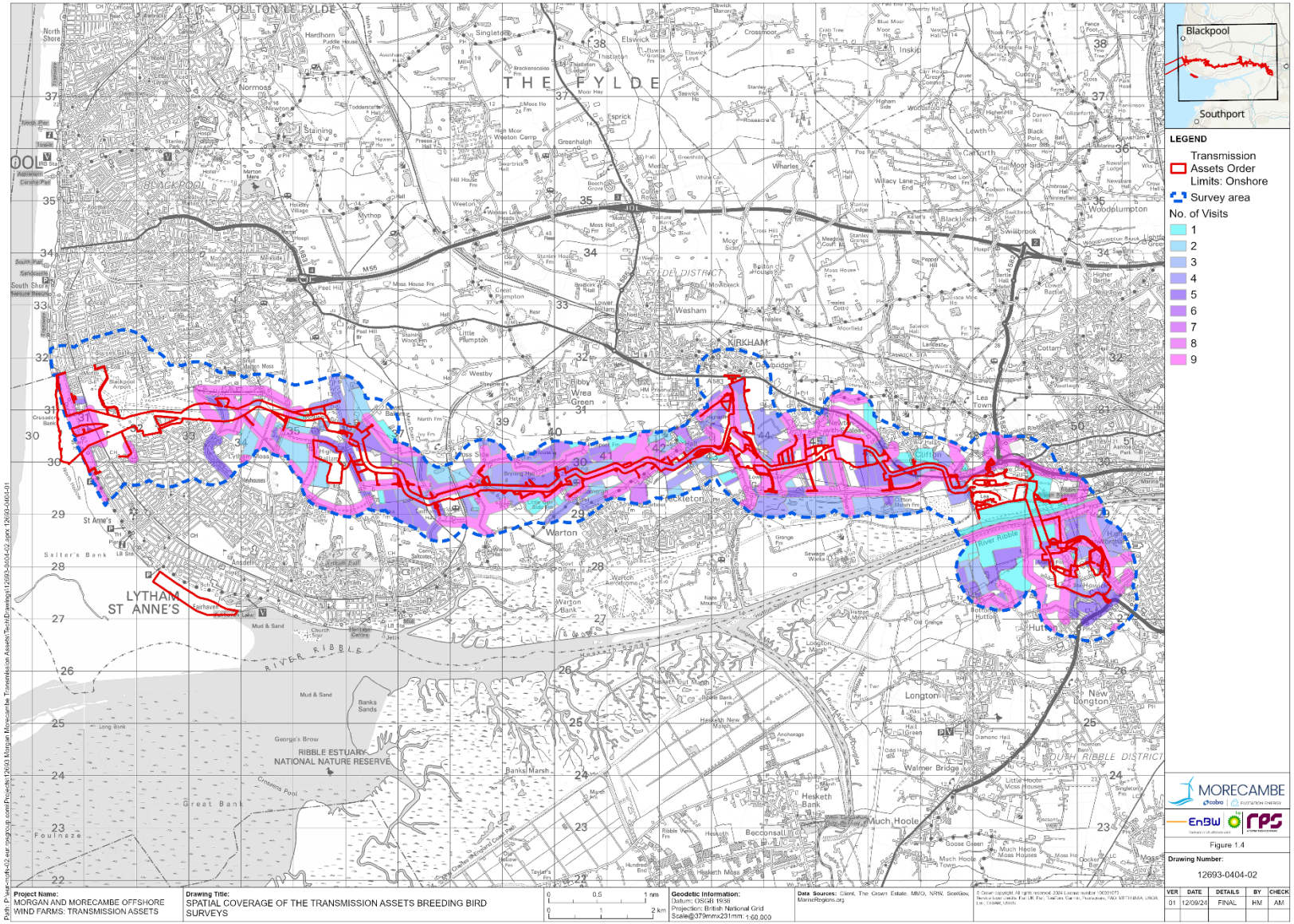

Figure 1.4: Coverage of the Transmission Assets breeding bird surveys

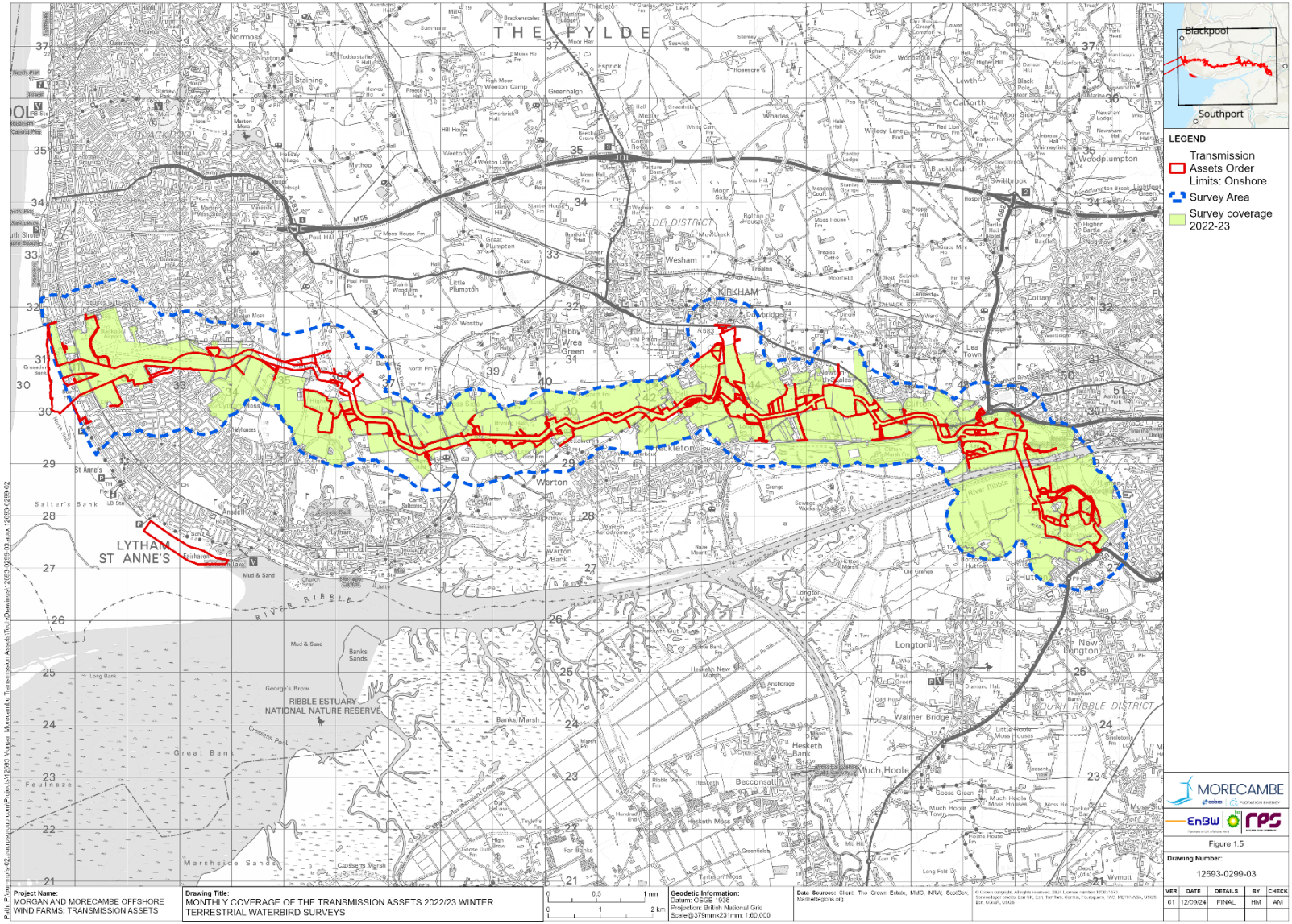

Figure 1.5: Monthly coverage of the Transmission Assets 2022/23 winter terrestrial waterbird surveys

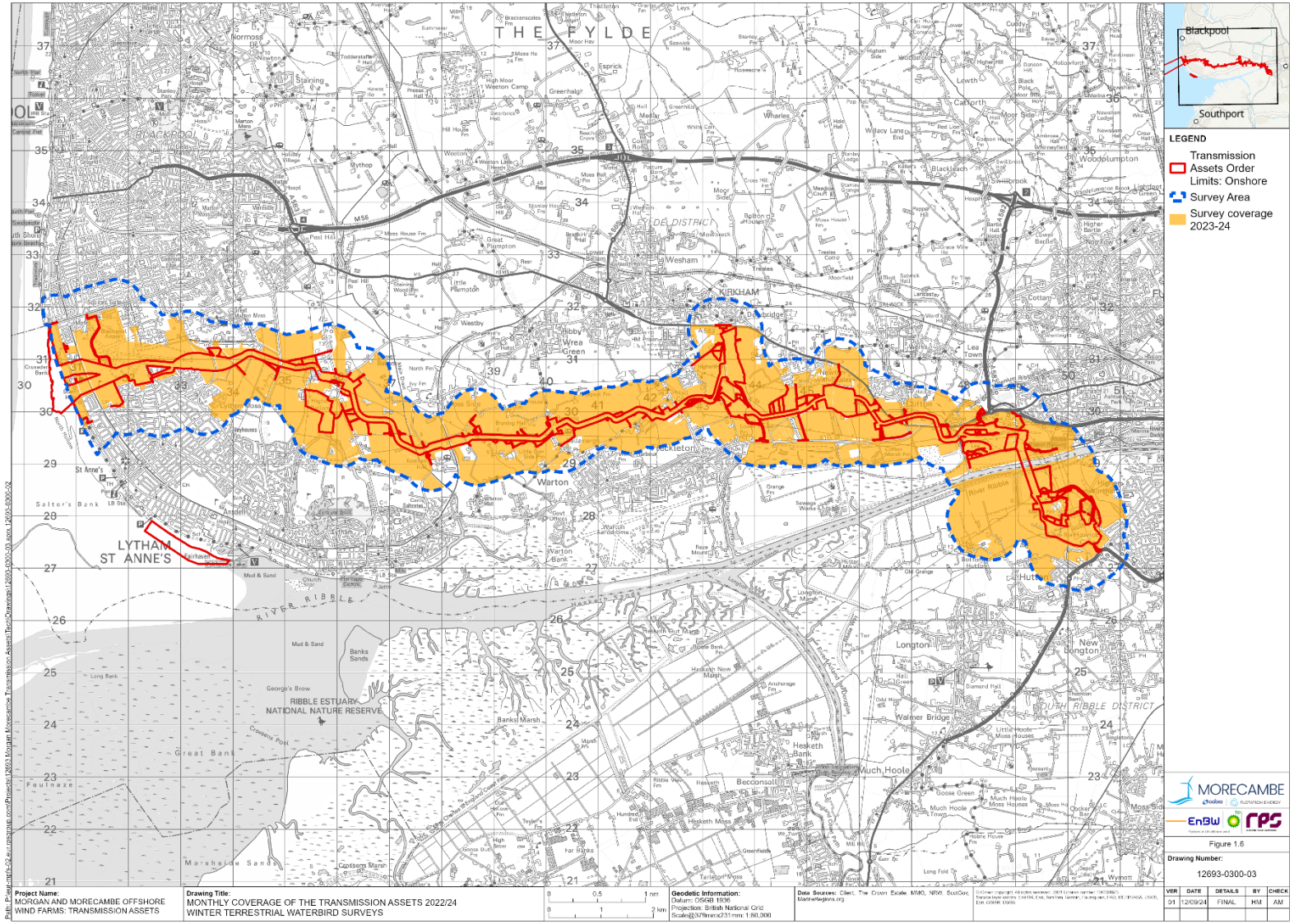

Figure 1.6: Monthly coverage of the Transmission Assets 2023/24 winter terrestrial waterbird surveys

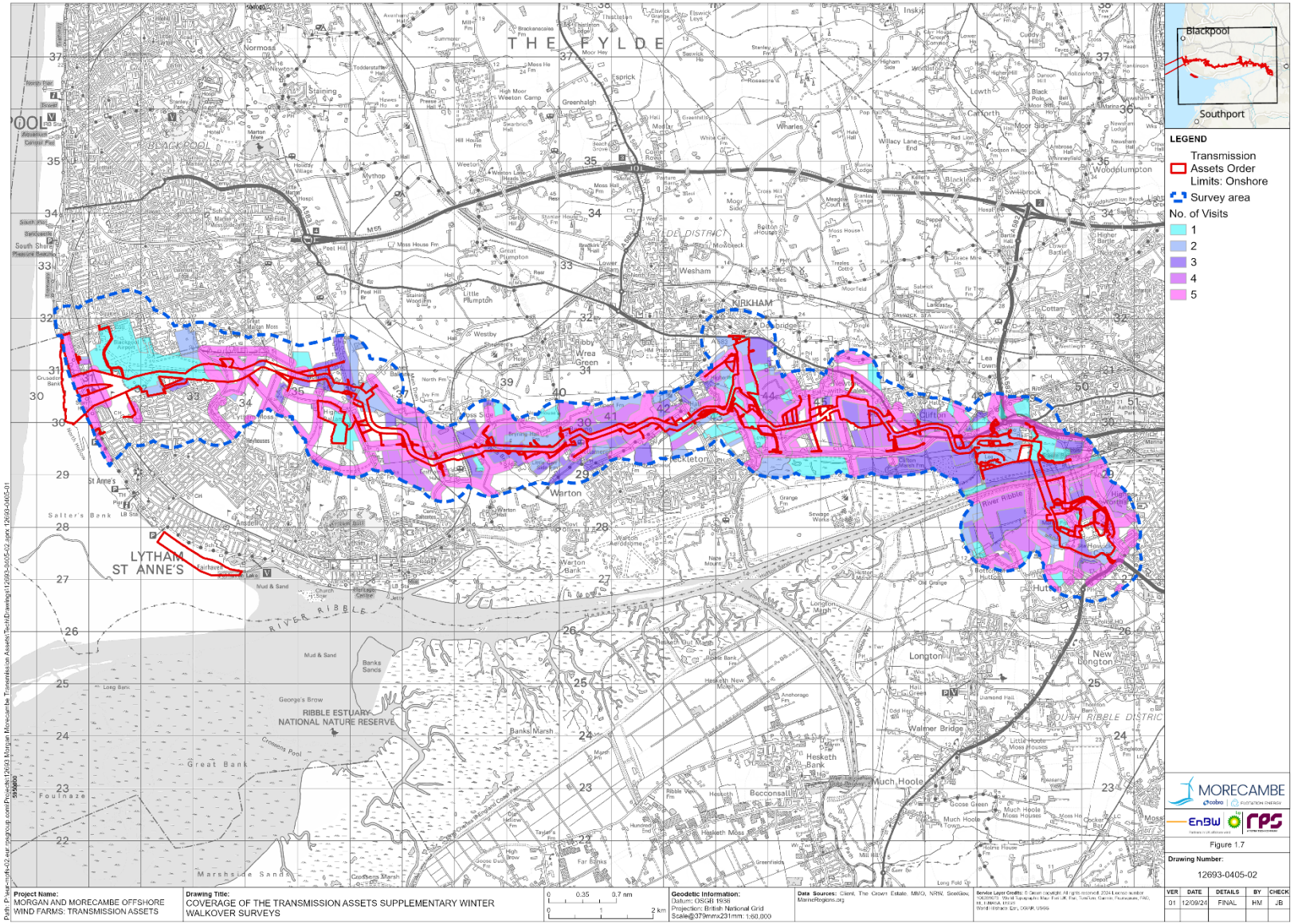

Figure 1.7: Coverage of the Transmission Assets supplementary winter walkover surveys

Table 1.3: Survey coverage as a percentage of the Onshore Order Limits and onshore survey area

Survey type	Overlap area	Percentage overlap with survey visits (1-9)									
		1	2	3	4	5	6	7	8	9	% of land with at least one visit
Breeding bird surveys	Onshore survey area	5.76	2.86	3.41	7.50	10.11	1.44	0.67	0.80	28.49	**61.04**
	Onshore survey area without urban and airport	7.10	3.52	4.20	9.23	11.50	1.78	0.83	0.99	32.37	**71.51**
	Onshore Infrastructure Area	4.40	0.00	1.87	9.36	10.96	2.91	0.55	1.02	31.40	**62.47**
	Onshore Infrastructure Area without urban or airport	5.33	0.00	2.27	11.34	13.12	3.52	0.66	1.23	37.77	**75.23**
Supplementary winter walkover surveys	Onshore survey area	6.29	7.14	12.41	9.78	33.29					**68.92**
	Onshore survey area without urban and airport*	7.69	8.76	15.02	12.07	37.34					**80.88**
	Onshore Infrastructure Area	4.76	10.76	12.33	10.96	36.60					**75.42**
	Onshore Infrastructure Area without urban or airport*	5.76	13.03	14.26	13.27	43.91					**90.24**
Terrestrial waterbirds 2022/23	Onshore survey area							59.92			**59.92**
	Onshore survey area without urban*							69.37			**69.37**
	Onshore Infrastructure Area							87.31			**87.31**
	Onshore Infrastructure Area without urban**							89.23			**89.23**
Terrestrial waterbirds 2023/24	Onshore survey area							71.42			**71.42**

Survey type	Overlap area	Percentage overlap with survey visits (1-9)									
		1	2	3	4	5	6	7	8	9	% of land with at least one visit
	Onshore survey area without urban*							82.70			**82.70**
	Onshore Infrastructure Area							93.60			**93.60**
	Onshore Infrastructure Area without urban**							94.89			**94.89**

*Although surveyors managed to walk as much of the perimeter as possible, actual access to the airport was not gained and this has therefore been removed from this analysis. **The waterbird surveys managed to scan the airport and check for waterbirds from public access; therefore this has not been removed.

All intertidal surveys had 100% spatial coverage and have therefore not been included within this table.

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