Appendix I

Onshore Biodiversity Supporting Information

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

rps
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Energy for generations

ORIEL WIND FARM PROJECT

Natura Impact Statement

Appendix I: Onshore Biodiversity - Supporting Information

MDR1520B
NIS– Appendix I
A1 C01
March 2024

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1 ONSHORE BIODIVERSITY

1.1 Introduction

This report describes the potential impacts of the Oriel Wind Farm Project (hereafter referred to as 'the Project') on onshore biodiversity (terrestrial and freshwater). It considers the potential impact of the Project on ecological features above the High Water Mark (HWM) during the construction, operational and maintenance, and decommissioning phases. In addition, this report assesses the potential impacts on intertidal birds, i.e. birds occurring between the HWM and the Low Water Mark (LWM).

1.2 Purpose

The primary purpose of this report is to provide supporting information on the potential impacts of the Project on onshore biodiversity, which is used to inform the assessment of adverse effects in the NIS. In particular, this report:

- Identifies European sites which have relevant onshore biodiversity qualifying features and presents the existing environmental baseline established from desk studies, site-specific surveys and consultation (section 1.4 and section 3); and

- Identifies potential impacts, their magnitude and their sensitivity on relevant qualifying features, based on the information gathered (see section 6). An assessment of potential in-combination effects is provided in section 7.

1.3 Study Area

The Onshore Biodiversity Study Area (see Figure 1-1) encompasses the onshore cable route between the landfall location, south of Dunany point, and the onshore substation site in proximity to the 220 kV overhead lines, east of Ardee in Co. Louth. The Onshore Biodiversity Study Area passes through an area that is largely of agricultural and rural residential landuse, and utilises the existing roads (L2223, Togher Road, Drumcar/Castlethomas Road, L2226 and N33), with proposed trenchless crossings of the River Dee (Drumcar and Richardstown), the Salterstown Stream, the Port Stream at Togher (Ardballan/Port crossing), and the M1 motorway/Dublin-Belfast rail line.

The Onshore Biodiversity Study Area is determined by the Zone of Influence (ZoI) of the Project, which is described below.

The Onshore Biodiversity Study Area was also used to inform the Cumulative Impact Assessment (CIA) (see section 7).

1.3.1 Zone of Influence

The ZoI for a project (or 'spatial extent of the impact' as described in Annex III(3) of the EIA Directive) is the area over which ecological features may be subject to significant impacts as a result of the Project and associated activities.

The ZoI is likely to extend beyond the boundary of a development, for example where there are hydrological links extending beyond the site boundaries. Activities associated with the construction, operation and maintenance and decommissioning (and where applicable, restoration) phases should be separately identified (where relevant).

The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different ZoIs for different features. The features affected could include habitats, species, and the processes on which they depend. ZoIs are specified for different features, and types of potential impact.

It is also important to acknowledge, as per Environmental Protection Agency (EPA) guidance (EPA, 2022) '*that the absence of a designation or documented feature does not mean that no such feature exists within*

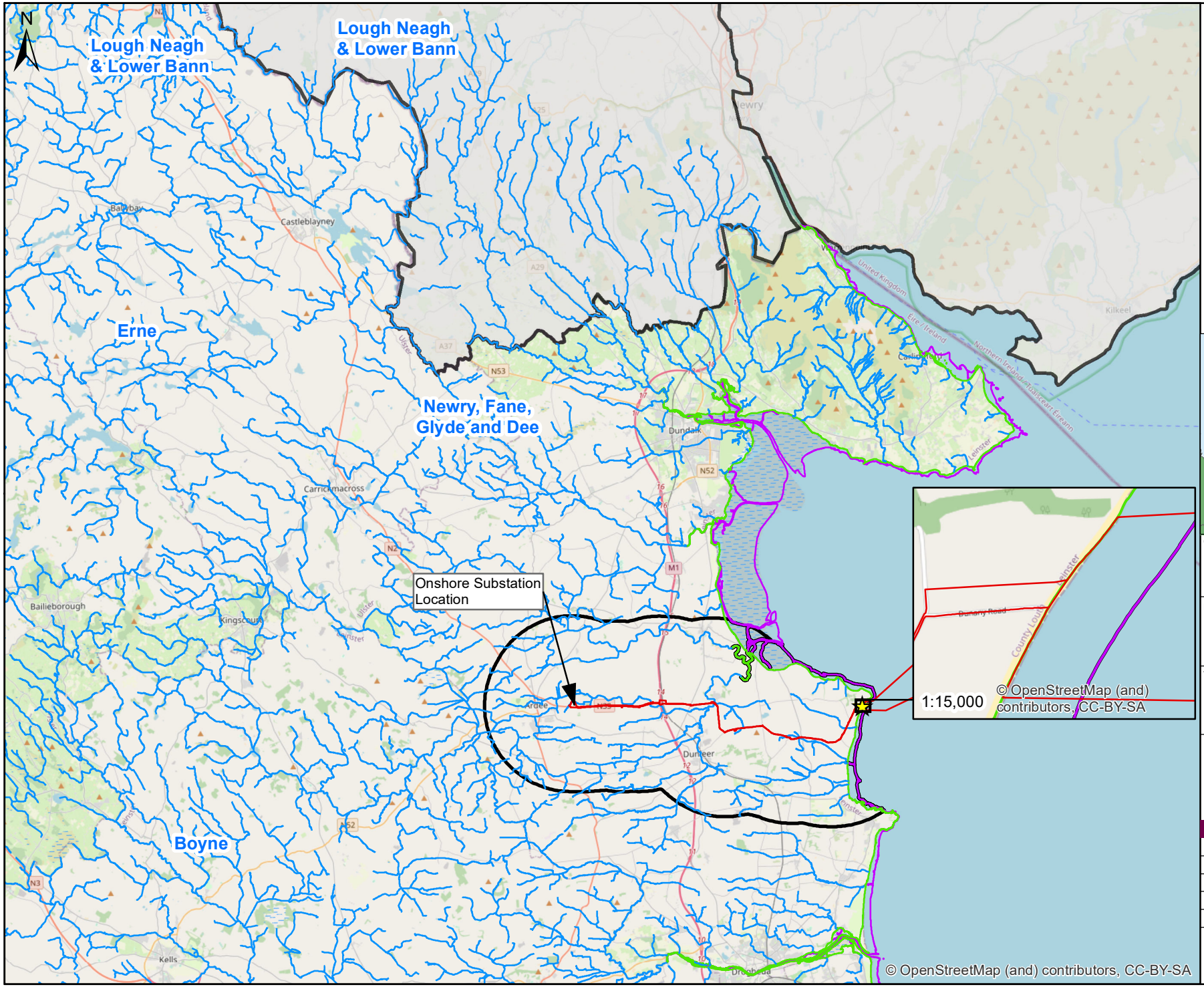
the site'. As such, a ZoI should be identified for all features potentially occurring within the Project site, in addition to any known to occur. As recommended by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018), professionally accredited or published studies were used to determine ZoI for this Project.

1.3.2 Onshore Biodiversity Study Area

Through the incorporation of relevant ZoIs for the Project, the Onshore Biodiversity Study Area is determined to extend outside of the footprint of the Project, to include the following:

- Catchment Management Unit for designated sites;
- 5 km for protected species data search;
- All downstream watercourses; and
- Adjoining lands for habitat and protected flora (including invasive alien plant species).

The Onshore Biodiversity Study Area is illustrated in Figure 1-1.

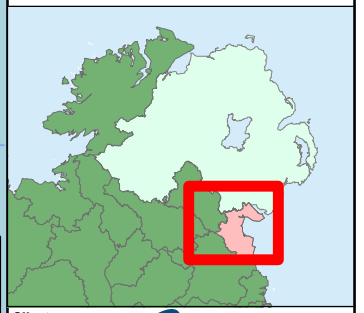


Legend

- Planning Application Boundary
- 5km Buffer
- Landfall Location
- High Water Mark
- Low Water Mark
- Rivers
- Catchment Management Unit

Note: 5km buffer includes all downstream rivers

Data Sources: OWL, EPA, OSi



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-1: Onshore Biodiversity Study Area

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Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3014A01
Approved By: CC	
Scale: 1:300,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 21/11/2023	

1.4 Consultation

Table 1-1 summarises the issues raised during consultation activities undertaken to date, together with how these issues have been considered in the production of this report.

Table 1-1: Summary of key issues raised during consultation on onshore biodiversity.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this report
September 2019	Inland Fisheries Ireland (IFI) – response to scoping.	Raised the importance of ensuring that mitigation measures are put in place at all locations and stages of the Project to ensure the protection and conservation of the aquatic habitats located therein.	This has been incorporated as part of the measures included in the Project (section 4.2).
		Referral made to guidance document entitled 'Guidelines on the Protection of Fisheries during construction works in and adjacent to waters'.	Implementation of these guidelines form part of the measures included in the Project (section 4.2).
September 2019	Louth County Council (LCC) – response to scoping.	LCC raised that the coastline is of high intrinsic and special amenity value and is home to a variety of natural habitats, and that Special Areas of Conservation (SAC) and Special Protection Areas (SPA) designations cover much of the coastline. LCC also raised that the coastline is susceptible to pressure for development which has the potential to encroach on sensitive sites and cause pollution.	SAC's, SPA's, their habitats (inc. coastal) and other important ecological features occurring in the Republic of Ireland, Northern Ireland, and within the ZoI of the Project have been addressed in section 3.1 of this report and within the NIS provided under separate cover.
October 2019	DAERA Northern Ireland, Northern Ireland Environment Agency (NIEA) Natural Environment Division (NED) – response to scoping.	Raised that the Project is subject to the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended) (known as the Habitats Regulations).	The Northern Ireland Habitats Regulations are not applicable to this report, as the Regulations do not apply outside of the Northern Ireland. However, the equivalent Regulations in the Republic of Ireland (S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011, as amended) are and have been considered in this report and in the NIS provided under separate cover.
		NED raised that the closest SPA is Carlingford Lough and that they consider it unlikely that there will be any significant adverse impacts to the habitat features of this designated site due to the substation being located in the Stickillin area, east of Ardee.	Carlingford Lough SPA has been considered and addressed in in section 3 of this report and in the NIS.
		NED raised that they would request that Ornithological features of Northern Irelands Special Protection Areas	Ornithological features of SPAs and other important ecological features, occurring in Northern Ireland, and within the ZoI of the

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this report
		(SPA's) are considered, in relation to feeding areas. In particular NED would highlight potential impacts to: Shearwaters from the Copeland Islands; Terns from Carlingford Lough; and Whooper swan migration corridors.	Project have been addressed in section 3.1 of this report, and within the NIS.
		NED recommends that all survey works comply with British Standard, Biodiversity—Code of practice for planning and development (42020:2013).	BS42020:2013 is not applicable to this report, as the standard does not apply outside of the UK; however, in the absence of an Irish standard the principles outlined in the standard have been informally incorporated into this report (sections 2, 3, 4.2 and 6).
		NED recommends ecological baseline characterisation and surveys at an appropriate time of the year: • A habitat survey and identification of areas of high nature conservation value or particularly vulnerable to impact; • Flora and fauna; and • Breeding bird and protected species surveys. Surveys should highlight Northern Ireland and EU priority habitats and species.	Site-specific surveys have been undertaken for habitats, flora and fauna (including those identified as priority habitats and species), and the data collected is presented in annex 2: Onshore Biodiversity - Additional Information.
		Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.	Limitations in relation to data collection are detailed in the NIS. Variation in data (i.e. long term trends) between years and through seasons is bridged through the use of previous records such as desk based information. Desk study information is provided in annex 2: Onshore Biodiversity - Additional Information.
		Protected species surveys should be carried out to NED specifications. NED website should be checked immediately prior to commencement of surveys.	NED survey specifications are not applicable to this report as many do not apply outside the UK. However, many of the guidance documents cited under these specifications have been used for the surveys undertaken.
		Full survey reports should be included and all maps and diagrams should be of an appropriate scale.	Relevant survey information, mapping and reports have been provided in annex 2: Onshore Biodiversity - Additional Information; and annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports.
		NED reserve the right to determine whether the survey info submitted is adequate or when additional info is required.	As this application is outside the jurisdiction of NED, this recommendation does not apply to the Project.
October 2019	Irish Brent Goose Research Group	IBGRB raised the following: "*80-90% of the world population of East Canadian*	Vantage point bird surveys were completed at the landfall (intertidal) and along the cable route (onshore) to establish their

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this report
	(IBGRG) —response to scoping.	*High Arctic (ECHA) Brent head south from Strangford Lough to points S and SE from there (mostly S) in late October/November – whether they follow a coastal route or a direct route is currently unknown. A significant proportion of the population also move along this coast northward in March and April during spring migration. I assume you are aware of this and the significant gap in information that exists?*"	presence in relation to the Project (see annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports). A brent geese survey was) also undertaken to support the offshore ornithology report (see annex 3 of appendix H : Offshore Ornithology – Supporting Information).
October 2019	BirdWatch Ireland – response to scoping.	Advised that there are a couple of small Black Guillemot colonies, one at the north side of Dundalk Bay (Giles Quay) and one to the south, at Clogher Head.	Vantage point bird surveys were completed at the landfall (intertidal) and along the cable route (onshore) to establish their presence in relation to the Project (see annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports).
September 2023	Department of Agriculture, Environment and Rural Affairs (DAERA), Northern Ireland – response to transboundary consultation.	Raised that the Project is located in proximity to Carlingford Lough Special Protection Area (SPA)/Area of Special Scientific Interest (ASSI)/RAMSAR site which is designated for a number of breeding and wintering birds.	Ornithological features of SPA sites occurring in Northern Ireland, and within the ZoI of the Project have been addressed in section 3.1 of this report, and within the Natura Impact Statement (NIS).
March 2021	Inland Fisheries Ireland (IFI) – online meeting.	Queried if proposed Horizontal Directional Drilling (HDD) crossings of the River Dee can be seasonally restricted to avoid peak movement periods of fish.	Measures have been included section 4.2.5 to ensure HDD activities are restricted so as to avoid periods of smolt emigration and adult spawning.

2 METHODOLOGY TO INFORM THE BASELINE

2.1 Identification of Relevant European sites and features (species and habitats)

All European sites within the Onshore Biodiversity Study Area and qualifying features that could be affected by the construction, operational and maintenance, and decommissioning of the Project were identified using the three-step process described below:

- Step 1: All European sites within the Onshore Biodiversity Study Area were identified using a number of sources. These included:
  - European Environment Agency Natura 2000 Network Viewer[1]
  - NPWS Designations Viewer[2] for sites in the Republic of Ireland
  - Northern Ireland Environment Agency (NIEA) Natural Environment Map Viewer[3]
- Step 2: Information was compiled on the relevant qualifying features for each of these sites as follows:
  - NPWS protected sites database for sites in the Republic of Ireland
  - Joint Nature Conservation Council (JNCC) for sites in Northern Ireland
- Step 3: Using the above information and expert judgement, sites were included for further consideration if:
  - A designated site directly overlaps or adjoins with the Project;
  - Sites and associated features were located within the potential Zone of Influence (ZoI) for impacts associated with the Oriel Wind Farm Project;
  - Consultation responses specifically mentioned sites to be included in the assessment.

2.2 Desktop study

The key sources (i.e. data and reports) used to inform the baseline characterisation of the Onshore Biodiversity Study Area are summarised in Table 2-1 below. These sources provide the most up to date data for this report.

Table 2-1: Summary of key desktop sources.

Title	Source	Year	Author
GeoHive Map Viewer	Online interactive mapping tools	2024	Ordnance Survey Ireland, https://webapps.geohive.ie/mapviewer/index.html. Last accessed January 2024.
Map of Irish Wetlands	Online interactive mapping tool	2023	Wetlands of Ireland, http://www.wetlandsurveysireland.

[1] Available online at: https://natura2000.eea.europa.eu/. Accessed January 2024.

[2] Available online at: https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba. Accessed January 2024.

[3] Available online at: https://appsd.daera-ni.gov.uk/nedmapviewer/. Accessed January 2024.

Title	Source	Year	Author
			com/wetlands/map-of-irish-wetlands--/map-of-irish-wetlands---map/. Last accessed November 2023.
Surface and ground water quality status, and river catchment boundaries	Online interactive mapping tool	2022	Environmental Protection Agency (EPA), https://gis.epa.ie/EPAMaps/default. Last accessed November 2023.
National Parks and Wildlife Service (NPWS) designated area spatial data	Website	2024	NPWS, *https://www.npws.ie/maps-and-data/designated-site-data*. Last accessed January 2024.
Distribution records for protected species, habitats, and invasive species held online by the National Biodiversity Data Centre (NBDC), NPWS, and Heritage Council.	Online interactive mapping tools	2023	NBDC https://maps.biodiversityireland.ie/Map, Accessed December 2022. NPWS, https://www.npws.ie/maps-and-data/flora-protection-order-map-viewer-bryophytes. Accessed December 2022. Heritage Council, https://heritagemaps.ie/WebApps/HeritageMaps/index.html. Last accessed November 2023.
Local Biodiversity Action Plan for County Louth (2021-2026)	Local Biodiversity Action Plan	2021	Louth County Council
Intertidal bird surveys for proposed landfall, Dunany point, Co. Louth	Report	2020	Aquafact
Checklists of protected and threatened species in Ireland	Report	2019a 2019b 2019c	Nelson et al.
Status of EU Protected Habitats and Species in Ireland, Volume 1, 2, and 3	Report	2019	National Parks & Wildlife Service (NPWS)
Biodiversity Impact Assessment for the Onshore Element of the Oriel Wind Farm	Report	2018	TOBINS
National Biodiversity Action Plan 2023-2030	Report	2023	Government of Ireland
Louth County Development Plan 2021-2027	Report	2021	Louth County Council (LCC)
County Louth Wetland Survey III	Report	2014	Foss *et al.*
County Louth Hedgerow Survey	Report	2014	Giorria Environmental Services
Bird Atlas 2007–11	Book	2013	Balmer *et al.*
Raptors: A field guide for surveys and monitoring	Book	2013	Hardey *et al.*
County Louth Wetland Survey II and III	Report	2012 2014	Foss *et al.*
Louth Wetland Identification Survey	Report	2011	Foss *et al.*
Bat habitat suitability index	Online interactive mapping tools	2011	Lundy *et al.* (2011). Available via NBDC https://maps.biodiversityireland.ie/Map, Assessed January 2021.

Title	Source	Year	Author
National and regional surveys of semi-natural habitats	Reports	2008-2015	Grasslands (O'Neill *et al.,* 2013), saltmarsh (McCorry and Ryle, 2009; Devaney and Perrin, 2015), shingle beach (Moore and Wilson, 1999) and woodland (Perrin *et al.,* 2008).
Louth Heritage Plan 2007-2011 and Draft Louth Heritage Plan 2021-2026	Report	2007 and 2021c	LCC
Various Irish red data lists for species	Reports	2006-2020	Nelson *et al.* (2019) for overview; Fitzpatrick *et al.* (2006) for bees; Byrne *et al.* (2009) for non-marine molluscs; Foster *et al.* (2009) for water beetles; Regan *et al.* (2010) for butterflies; King *et al.* (2011) for fish, amphibians and reptiles; Nelson *et al.* (2011) for Damselflies & Dragonflies; Kelly-Quinn & Regan (2012) for Mayflies; Lockhart *et al.* (2012) for bryophytes; Allen (2016) for macro-moths; Wyse Jackson *et al.* (2016) for vascular plants; Clarke *et al.* (2016) for cartilaginous fish; Marnell *et al.* (2019) for mammals, and Feeley et al. (2020) for stoneflies.

2.3 Site-specific surveys

In order to inform potential impacts, site-specific surveys were undertaken. A summary of the surveys undertaken to inform potential impacts is outlined in Table 2-2, with full detailed methodologies outlined in annex 2: Onshore Biodiversity - Additional Information. The following guidance was considered in the preparation of onshore biodiversity field surveys: the NRA's Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009), which provides useful information on appropriate survey seasons and methods for many of Ireland's protected species.

Table 2-2: Summary of site-specific survey data.

Title	Extent of survey	Overview of survey	Survey contractor	Date
Habitats	Onshore substation site, onshore cable route, fibre optic cable connection and landfall.	Habitat classification to Fossitt (2000).	RPS	February, July, and October 2019; September 2020; July and November 2022; and April 2023.
Protected Flora	Onshore substation site, onshore cable route, fibre optic cable connection and landfall.	Identification of species listed in Flora Protection Order and Red Lists (Wyse *et al.,* 2016; Lockhart *et al.,* 2012).	RPS	As for habitats.
Invasive alien plants and animals	Onshore substation site, onshore cable route, fibre optic cable connection and landfall.	Identification of Third Scheduled species of European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).	RPS	As for habitats.
Otter	Watercourses crossed by onshore cable route.	Identification of holts and field signs.	RPS	October and December 2019; February 2021; July 2022 and April 2023.
Birds	Onshore cable route.	Counts, location and activity of breeding birds within suitable breeding bird habitat located within the	RPS	Monthly between April and July 2023.

Title	Extent of survey	Overview of survey	Survey contractor	Date
		planning application boundary.		
	Landfall location.	Peak counts within 300 m of the landfall location including species, behaviour, and location.	RPS	April to August 2023.
	Onshore cable route.	Point count with transect sections.	Aquafact	Monthly between October 2018 and December 2019.
	Landfall location and Dunany north.	Vantage point counts and behaviour within intertidal habitat.	Aquafact	December 2017-December 2019; September 2018-March 2019.
Amphibian and reptiles	Onshore substation site, onshore cable route, landfall, and watercourses crossed by onshore cable route.	Identification of field signs.	RPS	During all other site surveys.
Invertebrates	Onshore substation site and watercourses crossed by onshore cable route.	Aquatic survey (rivers and streams)	RPS	October 2019, July 2023.
Fish	Watercourses crossed by onshore cable route.	Aquatic assessment survey (rivers and streams)	RPS	October 2019, July 2023.

3 BASELINE ENVIRONMENT

3.1 Relevant European sites

European sites which have relevant qualifying features are described in Table 3-1 and illustrated in Figure 3-1. The review of European sites considered sites within the ZoI. The lands in which the onshore components are located have no formal designations in relation to onshore biodiversity.

The closest European site (i.e. SAC, cSAC, SPA, pSPA, cSPA) to the Project is the North-west Irish Sea cSPA (site code: IE004236)[4] (hereafter referred to as "North-west Irish Sea SPA"), which intersects the Onshore Biodiversity Study Area between the HWM and the LWM. The next closest site is Dundalk Bay SPA (site code (IE0004026), which is located c. 0.6 km to the north of the onshore cable route.

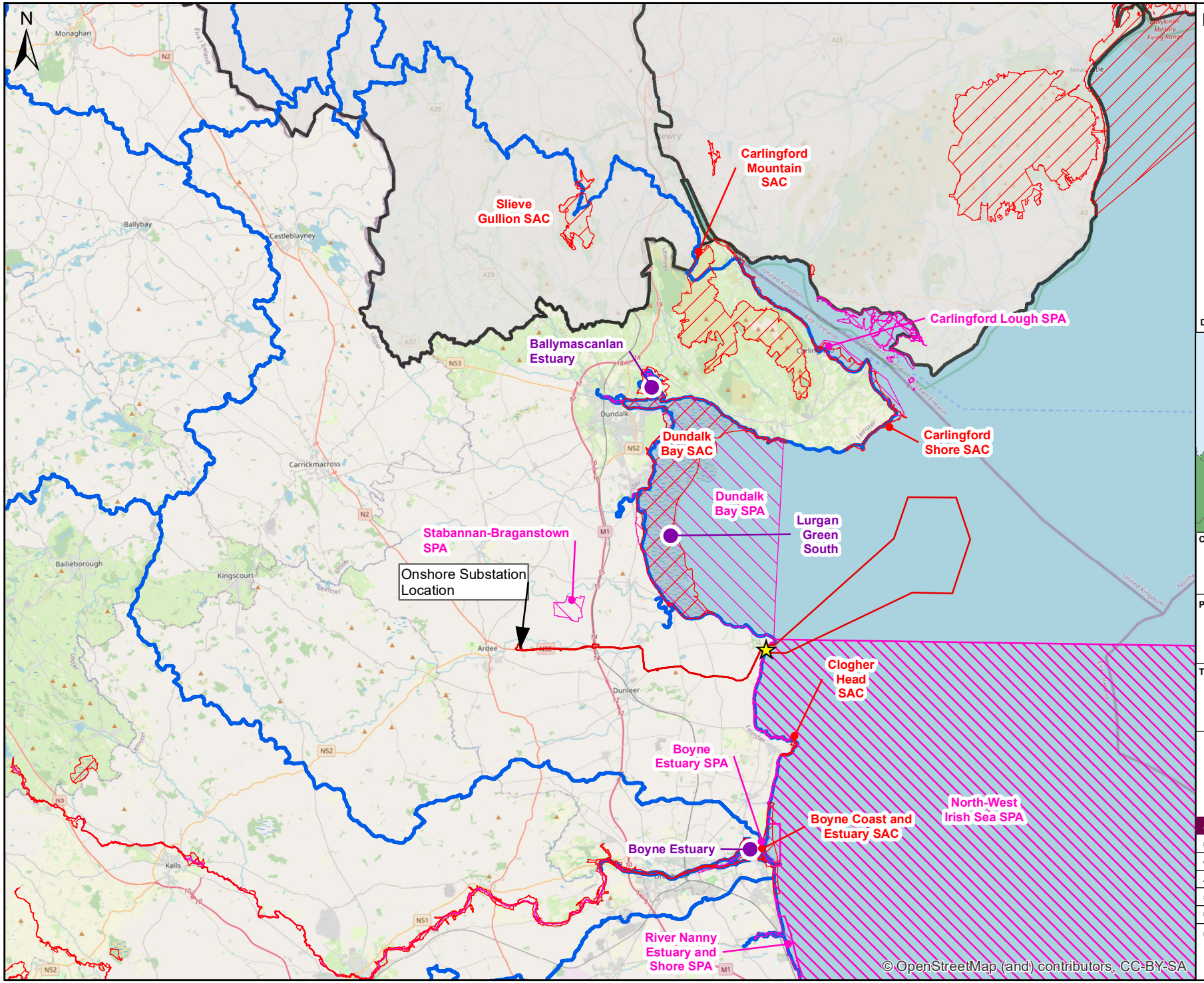
Table 3-1: Relevant European sites and qualifying features for onshore biodiversity.

Designated Site (code)	Closest Distance (km) to proposed substation / cable route / Landfall	Relevant Qualifying Feature
North-west Irish Sea SPA (IE004236)	Intersects the Project	• Red-throated Diver (*Gavia stellata*) [A001] • Great Northern Diver (*Gavia immer*) [A003] • Fulmar (*Fulmarus glacialis*) [A009] • Manx Shearwater (*Puffinus puffinus*) [A013] • Cormorant (*Phalacrocorax carbo*) [A017] • Shag (*Phalacrocorax aristotelis*) [A018] • Common Scoter (*Melanitta nigra*) [A065] • Little Gull (*Larus minutus*) [A177] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull (*Larus canus*) [A182] • Lesser Black-backed Gull (*Larus fuscus*) [A183] • Herring Gull (*Larus argentatus*) [A184] • Great Black-backed Gull (*Larus marinus*) [A187] • Kittiwake (*Rissa tridactyla*) [A188] • Roseate Tern (*Sterna dougallii*) [A192] • Common Tern (*Sterna hirundo*) [A193] • Arctic Tern (*Sterna paradisaea*) [A194] • Little Tern (*Sterna albifrons*) [A195] • Guillemot (*Uria aalge*) [A199] • Razorbill (*Alca torda*) [A200] • Puffin (*Fratercula arctica*) [A204]
Dundalk Bay SPA (IE0004026)	10.1/0.6/0.8	• Great Crested Grebe (*Podiceps cristatus*) [A005] • Greylag Goose (*Anser anser*) [A043] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Teal (*Anas crecca*) [A052] • Mallard (*Anas platyrhynchos*) [A053] • Pintail (*Anas acuta*) [A054] • Common Scoter (*Melanitta nigra*) [A065] • Red-breasted Merganser (*Mergus serrator*) [A069]

[4] The North-West Irish Sea cSPA was notified in July 2023, for which conservation objectives were published in October 2023.

Designated Site (code)	Closest Distance (km) to proposed substation / cable route / Landfall	Relevant Qualifying Feature
		• Oystercatcher (*Haematopus ostralegus*) [A130] • Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Common Gull (*Larus canus*) [A182] • Herring Gull (*Larus argentatus*) [A184] • Wetland and Waterbirds [A999]
Stabannan-Braganstown SPA (IE0004091)	3.1/1.8/12.9	• Greylag Goose (*Anser anser*) [A043]
Dundalk Bay SAC (IE0000455)	10.1/3.3/4.4	• Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Perennial vegetation of stony banks [1220] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
Clogher Head SAC (IE00145);	19.4/5.3/6.5	• Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • European dry heaths [4030]
Boyne Coast and Estuary SAC (IE001957)	10.5/8.6/20.3	• Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]*
Boyne Estuary SPA (IE004080)	21.8/10.1/12.1	• Shelduck (*Tadorna tadorna*) [A048] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Knot (*Calidris canutus*) [A143] • Sanderling (*Calidris alba*) [A144] • Black-tailed Godwit (*Limosa limosa*) [A156] • Redshank (*Tringa totanus*) [A162] • Turnstone (*Arenaria interpres*) [A169] • Little Tern (*Sterna albifrons*) [A195] • Wetlands [A999]

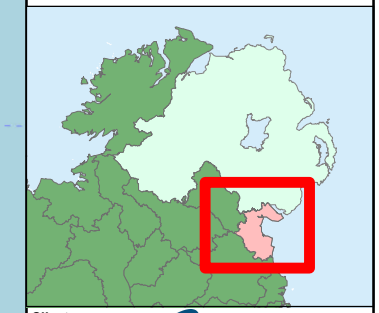
Designated Site (code)	Closest Distance (km) to proposed substation / cable route / Landfall	Relevant Qualifying Feature
Carlingford Shore SAC (IE002306)	26.3/14.6/14.8	• Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220]
Carlingford Mountain SAC (IE000543)	22.9/17.3/14.7	• Northern Atlantic wet heaths with *Erica tetralix* [4010] • European dry heaths [4030] • Alpine and Boreal heaths [4060] • Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] • Transition mires and quaking bogs [7140] • Alkaline fens [7230] • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] • Calcareous rocky slopes with chasmophytic vegetation [8210] • Siliceous rocky slopes with chasmophytic vegetation [8220]
River Nanny Estuary and Shore SPA (IE004158)	25.6/16.6/18.6	• Oystercatcher (*Haematopus ostralegus*) [A130] • Ringed Plover (*Charadrius hiaticula*) [A137] • Golden Plover (*Pluvialis apricaria*) [A140] • Knot (*Calidris canutus*) [A143] • Sanderling (*Calidris alba*) [A144] • Herring Gull (*Larus argentatus*) [A184] • Wetland and Waterbirds [A999]
Carlingford Lough SPA (IE004078)	29.3/18.2/18.5	• Light-bellied Brent Goose (Branta bernicla hrota) [A046] • Wetland and Waterbirds [A999]
Carlingford Lough SPA (UK9020161)	31.5/20.4/20.7	• Common Tern (Sterna hirundo) • Sandwich Tern (Sterna sandvicensis), • Light-bellied Brent Goose (Branta bernicla hrota)
Slieve Gullion SAC (UK0030277)	27.8/27.4/30.5	• European dry heaths [4030]



Legend

- Planning Application Boundary
- Landfall Location
- Catchment Management Unit
- Wildfowl Sanctuaries
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Data Sources: OWL, EPA, OSi, Ramsar



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 3-1: European sites

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Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3015F02
Approved By: CC	
Scale: 1:350,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 20/03/2024	

3.2 Relevant qualifying features

3.2.1 Habitats and protected flora

For onshore habitats (terrestrial and freshwater), a summary of each habitat is provided within Table 3-2 below.

Table 3-2: Summary of onshore habitats, and their potential relationship and affinity to Annex I habitat.

Fossit (2000) habitat (code)	Potential relationship to Annex I habitats	Likelihood of affinity
Depositing/lowland rivers (FW2)	3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-*Batrachion* vegetation	Likely
Drainage ditches (FW4)	None	-
Improved agricultural grassland (GA1)	None	-
Dry neutral grassland (GS1)	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (*important orchid sites) (6210) Juniperus communis formations on heaths or calcareous grasslands (5130) Calaminarian grasslands of the Violetalia calaminariae (6130)	None
Dry meadow and grassy verges (GS2)	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510)	None
Arable crops (BC1)	None	-
Sedimentary sea cliffs (CS3)	Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)	None
Shingle and gravel banks (CB1)	Perennial vegetation of stony banks (1220)	None
Oak-ash-hazel woodland (WN2)	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0)	None
(Mixed) broadleaved woodland (WD1)	None	-
Mixed broadleaved/conifer woodland (WD2)	None	-
Scrub (WS1)	Juniperus communis formations on heaths or calcareous grasslands (5130)	None
Immature Woodland (WS2)	None	-
Hedgerows (WL1)	None	-
Treelines (WL2)	None	-

3.2.1.1 Depositing/lowland rivers

Depositing/lowland rivers were recorded crossing and within the ZoI of the Project. Six named rivers were identified, with two of these rivers being crossed twice each (i.e. the River Dee and the Port Stream). Lowland rivers and streams identified (Common name; EPA name) within the ZoI of the Project include:

- Rock Stream (Rock 06);

- River Dee (Dee) (crossed twice);
- Newhall Stream (Newhall 06);
- Salterstown Stream (Salterstown);
- Port Stream (Port 06) (crossed twice); and
- Broadlough Stream (Broadlough).

Freshwater habitat descriptions from surveys undertaken in 2023 at eight sites (see annex 2: Onshore Biodiversity – Additional Information) from the above watercourses are detailed in Table 3-3. The River Dee showed the strongest affinity to the Annex II habitat 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)'. This is a widespread habitat in Ireland, covering the entire county for distribution and range (NPWS, 2019a,c).

Table 3-3: Freshwater Habitat Descriptions.

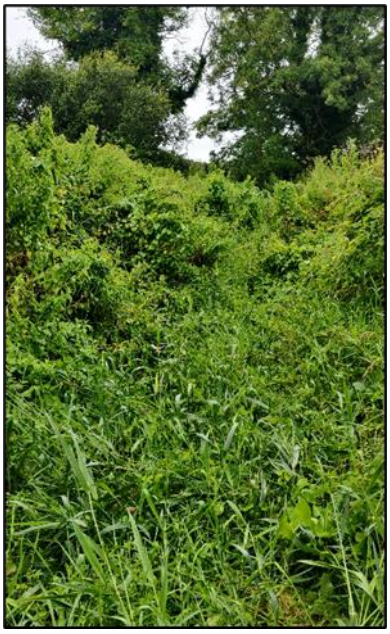
Site code/ name	Freshwater aquatic habitat results
A-1 / Rock 06 Stream	**Survey Results** This site comprised a small headwater stream which was accessed from the N33. Bankfull width was 2 m, whereas wetted width was 1.2 m. Water depth was 0.15 m. A thick layer of silt was noted within the channel, which was measured at approximately 0.5 m in depth. The substrate comprised 100% silt and a high plume was generated when disturbed. The channel was choked with vegetation, with fool's-water-cress *Apium nodiflorum* and *Phalaris* recorded. The river habitat comprised approximately 80% pool and 20% glide. Velocity was slow and flow discharge was low. The channel has been historically channelised and straightened. Surrounding landuse comprised improved pasture and scrub. The riparian buffer comprised woodland/scrub on the left bank and scrub on the right bank. Bankside vegetation included willow *salix* sp., hawthorn *Crataegus monogyna*, ivy *Hedera helix*, nettles *Urtica dioica*, ash *Fraxinus excelsior* and soft shield fern *Polystichum setiferum*. Two pipes (approximately 30 cm diameter) underneath the N33 convey the stream from its source directly upstream. There was a very shallow flow present within the pipes with a maximum depth of 5 cm.  Site A1 looking downstream.  Site A1 looking upstream. Photographs taken 19 July 2023.
A-2 / River Dee at N33 bridge crossing	**Survey Results** The channel of the River Dee has been historically dredged as part of arterial drainage schemes and this is reflected in the high banks, widened and straightened profile and deep flow that characterised this section of the river. A groyne/deflector was noted on

	the left bank at the N33 bridge. Flow discharge was high and turbidity moderate which affected visibilty of the riverbed from the N33 bridge. It was not possible to enter the river due to high flow and deep water depths (assumed to be >0.6 m in places). Instream habitat consisted of 100% glide. Cobbles, gravel and boulders were visible within parts of the channel, with cobble dominating the substrate. The riparian buffer comprised trees and shrubs, and was estimated at being between 2 and 5 m in width. Riparian vegetation consisted of dogwood *Cornus sanguinea*, hazel *Corylus avellana*, willow, ash, ivy, brambles *Rubus fruticosus*, sycamore *Acer pseudoplatanus*, rose *Rosa* sp., cypress *Cupressus* sp, birch, alder *Alnus glutinosa* and hawthorn. Land use was dominated by tillage and improved pasture with industry yards on both banks downstream.   Site A2 looking upstream Site A2 looking downstream Photographs taken 19 July 2023.
A-3 / River Dee at Drumcar Bridge	**Survey Results** Bankfull width of the River Dee was measured at approximately 10-12 m, whereas wetted width was measured at between 8 and 10 m. The channel was considerably wider at the bridge (approximately 20 m). Bank reinforcement was noted in places. Visibility of the river bed was poor due to moderate colour and turbidity. However, where the riverbed was visible, it was comprised of boulder (c. 5%), sand (c.10%), cobble (c. 35%), coarse gravel (c. 25%) and fine gravel (c. 25%). Water depth was estimated at 0.5-1 m and bank height at 2 m. Siltation was low, and when the substrate was kicked a low plume was generated. Cattle access was noted upstream and downstream of the survey location. Bank erosion was moderate where cattle had access to the river. The dominant river habtiats were riffle (c. 40%), glide (c. 30%) and pool (30%). Reeds *Phragmites*, water-crowfoot *Ranunculus* sp., *Fontinalis* and *filamentous algae* were noted in the channel. The riparian buffer was approximately 1-2 m in width, and included ash, sycamore, bramble, snowberry *Symphoricarpos albus*, bindweed *Convolvulus* sp., common hogweed *Heracleum sphondylium*, nettle, alder, common ragwort *Jacobaea vulgaris* and hawthorn. Trees were sparsely distributed on the left bank with grazing of the understorey noted. Vegetation on the right bank was considerably more scrubby and dense. A lamprey *Lampetra* sp.was captured in the macroinvertebrate kick sample collected at the site.

	  Site A3 looking downstream Site A3 looking upstream Photographs taken 18 July 2023.
A-4 / Newhall 06 Stream	**Survey Results** This stream was surveyed at a point where it flowed parallel to a rural road. Bankfull width was measured at 2 m whereas wetted width was measured at 1.5 m. Water depth was 0.2 m. The channel has been straightened. Siltation was moderate and a moderate plume of silt was generated when the substrate was disturbed. Visibility of the stream bed was poor due to high turbidity and high flow discharge. Velocity was fast. River habitat comprised 50% riffle and 50% glide. The substrate comprised c. 60% cobble, c. 30% coarse gravel and c. 10% fine gravel. The riparian buffer was between 2 and 2.5 m in width, and comprised unmanaged scrub. Species recorded included great willowherb *Epilobium hirsutum*, hedge bindweed *Calystegia sepium*, ash, dock *Rumex* spp., cleavers *Galium aparine*, meadowsweet *Filipendula ulmaria*, hawthorn, nettle, bramble, common hogweed, soft shield fern and ivy. Surrounding landuse comprised tilage, scrub and the roadside.   Site A4 looking downstream Site A4 looking upstream Photographs taken 18 July 2023.
A-8 / Salterstown Stream downstream Site 6	**Survey Results** The stream at Site 8 was approximately 1.7 m in width (bankfull and wetted width), and 0.15 m in depth. The stream was slightly wider at the bridge. The stream appears to have been historically straightened and was reinforced with stone on the right bank. Some light erosion was noted on the right bank. The bridge itself was not deemed to be

	a barrier to fish migration. Siltation within the channel was moderate and a high silt plume was noted when the bed was disturbed. The substrate comprised boulder (5%), cobble (60%), coarse gravel (20%) and fine gravel (15%). Flow discharge was normal on the day of survey, with fast velocity and low turbidity noted. Shading was heavy. River habitat comprised riffle, pool and glide sequence. The invasive Japanese knotweed *Reynoutria japonica* was recorded on the right bank by the bridge. Riparian vegetation comprised sycamore, elm *Ulmus* sp., brambles, ivy, elder, nettles, soft shield fern and cleavers. The riparian buffer was a narrow treeline on both banks, with gardens recorded behind the treelines on both the left and right bank. Two elvers (juvenile eels) were captured within the macroinvertebrate kick-sample collected at the site.   Site A8 looking downstream Site A8 looking upstream Photographs taken 19 July 2023.
A-9 / Port 06 Stream	**Survey Results** This stream is approximately 1.5 m wide (wetted and bankfull width). Water depth was approximately 0.3 m. The stream appears to have been historically straightened. Two other tributaries enter the stream at this site (Ardballan Stream and Wyanstown Stream). The channel was choked with aquatic vegetation comprising *Phalaris*, great willowherb, and manna grass *Glyceria sp*. Where visible, the substrate consisted of 100% silt, and a silt layer approximately 0.15 m deep was recorded in the channel. Velocity was slow, and flow discharge was normal. The river habitat consisted of 100% glide. Shading was moderate. The riparian buffer was between 3 and 5 m in width and was dominated by herbs and grasses including hedge bindweed, great willowherb, nettle, creeping thistle *Cirsium arvense*, meadowsweet, yorkshire fog *Holcus lanatus*, false oat grass *Arrhenatherum elatius*, herb robert *Geranium robertianum* and bush vetch *Vicia sepium*. Woody vegetation comprised elder, hawthorn and sycamore. The dominant landuse comprised rough pasture.

Site A9 looking downstream



Site A9 looking upstream

Photographs taken 18 July 2023.

A-10 / Port 06 Stream upstream Site 9	**Survey Results** This site is located upstream of Site 9. The stream was straightened and choked with vegetation. Bankfull width was 3 m, whereas wetted width was approximately 1.2 m. Water depth was estimated at 0.5 m. The substrate was not visible but is likely to have been dominated by silt. Flow discharge was low and velocity was stagnant. River habitat was 100% pool with no perceptible flow. Instrem vegetation consisted of flag iris *Iris pseudacorus*, water mint *Mentha aquatica*, lesser duckweed *Lemna minor*, *Phalaris*, fool's-water-cress and water cress *Nasturtium* sp. The riparian buffer was narrow, with grazing noted up to the banktop. Riparian vegetation consisted of rushes *Juncus* sp., gorse *Ulex europaeus*, bramble, creeping thiste, great willowherb and meadowsweet.

Site A10 looking upstream

Site A10 looking downstream

Photographs taken 18 July 2023.

A-11 / Broadlough Stream	**Survey Results** The Broadlough stream has been modified into a drainage ditch. Bankfull width and wetted width was measured at 2 m. Bank height was 1.8 m. Water depth was 0.15 m, and a deep layer of silt (c. 0.5 m) was noted within the channel. The substrate comprised 100% silt. Flow discharge was low, and velocity was slow and stagnant in places. Shading was moderate. River habitat comprised 100% pool. Instream

vegetation was dense and comprised fat duckweed *Lemna gibba*, fool's-water-cress and the third schedule invasive water fern *Azolla filiculoides*. The riparian buffer comprised a treeline on the left bank and tillage and woodland on the right bank. Bankside vegetation comprised hawthorn, ivy, bindweed, ash, nettle, hoary willowherb *Epilobium parviflorum*, brambles, spear thistle *Cirsium vulgare*, lime *Tilia* sp., great willow herb and willow.

Site A11 looking upstream

Site A11 looking downstream

Photographs taken 19 July 2023.

3.2.1.2 Annex II flora

No plants listed under Annex II of the Habitats Directive were recorded during the field study.

3.2.2 Invasive alien plants and animals

Two 'scheduled' invasive species were recorded within the ZoI of the Project during the field study. The species, location, and description of these occurrences are detailed in Table 3-4.

Table 3-4: Locations of Invasive Plant and Animal Species Recorded during the field study.

Map code	Species	Description and location (ITM)
IAPS-1	Japanese knotweed *Reynoutria japonica*	Patch identified on the south bank to the east of the bridge. No signage or evidence of previous treatment (714393-789621).
IAPS-2	Japanese knotweed *Reynoutria japonica*	North side of road 20 m x 10 m patch, south side of road 20 m x 5 m patch. Signage present and evidence of previous treatment (712927-791354).
IAPS-3	Japanese knotweed *Reynoutria japonica*	North side of road at junction with local road, 12 m x 4 m patch. No signage or evidence of previous treatment (712700-788995).
IAPS-4	Japanese knotweed *Reynoutria japonica*	North side of road, two patches 7 m x 1 m and 10 m x 2.5 m. No signage but treatment evident. Dead branches buried under soil and new sprouting showing (712244-789036).
IAPS-5	Japanese knotweed *Reynoutria japonica*	South side of road, one patch 8 m x 3 m. No signage but management (cut and sprayed) (710189-789263).
IAPS-6	Japanese knotweed *Reynoutria japonica*	Within Drumcar woodland, single stand 1 m x 1 m. No signage or evidence of previous management (706539-791130).
IAPS-7	Water fern *Azolla filiculoides*	Within watercourse on northeast boundary of field containing proposed onshore substation (698199- 791250).

The desk study assessment returned four third scheduled invasive alien plants and three invasive alien animals with the search area (Table 3-5).

Table 3-5: Third Scheduled Invasive alien species returned from the NBDC desk study search within 5 km of the Project.

Species Name	Record Count	Date of Last Record	Habitat Preferences[+]
Invasive alien flora			
Giant Hogweed *Heracleum mantegazzianum*	2	28/06/2009	Mires, bogs & fens; Grasslands and landscapes dominated by forbs, mosses or lichens; Woodland, forest and other wooded land; Constructed, industrial or other artificial habitats; Regularly or recently cultivated agricultural, horticultural or domestic habitat.
Japanese knotweed *Reynoutria japonica*	4	16/05/2016	Found in a wide variety of habitats though particular established and persistent on urban waste ground, roadsides and river banks (Preston et al., 2004; Reynolds, 2002).
Salmonberry *Rubus spectabilis*	1	21/04/2018	Favours moist conditions and open sites. Moderately shade tolerant. Naturalised in many areas such as parks, riverbanks, demesnes, broadleaved and coniferous woodland
Water Fern *Azolla filiculoides*	1	27/02/2019	Inland surface waters.
Invasive alien animals			
Eastern Grey Squirrel *Sciurus carolinensis*	2	31/12/2012	Woodland, forest and other wooded land; Constructed, industrial or other artificial habitats; Regularly or recently cultivated agricultural, horticultural or domestic habitat; Miscellaneous.
Greylag Goose *Anser anser*	6	31/12/2011	Lakes and reservoirs, occurring mostly at coastal sites.
Ruddy Duck *Oxyura jamaicensis*	1	31/12/2011	Inland surface waters.

3.2.3 Otter

A single sighting of otter was noted 100 m north of the N33 bridge crossing with the River Dee in February 2021. However, no other evidence of otter was found within the Project site or wider area along the River Dee. This widespread species is nevertheless presumed to forage and/or commute along the downstream river network.

Five otter records were returned from the NBDC desk study search within 5 km of the Project, the most recent of which was 2013.

3.2.4 Birds

Onshore birds

2018/2019 onshore bird survey

The onshore birds survey returned a total of 53 bird species records (see annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports), 22 of which are Red (8 species) and Amber (14 species) listed birds of conservation concern. The survey results for the 22 Red and Amber listed birds of conservation concern are summarised in annex 2: Onshore Biodiversity – Additional Information.

Of the 22 bird species listed, one was an Annex I (Birds Directive) species, namely whooper swan, and seven were Special Conservation Interest (SCI), including curlew, lapwing, mallard, cormorant, whooper swan, black headed-gull, and herring gull.

2023 breeding bird survey

The onshore breeding bird surveys conducted in 2023 returned a total of 48 bird species records, 16 of which are Red (3 species) and Amber (13 species) listed birds of conservation concern (Gilbert *et al*., 2021). The survey results for the 16 Red and Amber listed birds of conservation concern are provided in annex 2: Onshore Biodiversity – Additional Information. Nine species were observed showing behaviour which led them to being recorded as "possible", "probable" or "confirmed" breeding.

Of the 48 bird species recorded, one was an Annex I (Birds Directive) species, namely kingfisher, which was recorded flying up and down the River Dee at Drumcar Bridge. It was noted that there may have been a nest in the area given the frequency with which the bird was flying back and forth during their survey. However, surveys along the River Dee did not find any suitable nesting habitat for kingfisher. Kingfisher territory is known to range from 2 km to 3 km of river (Musseau *et al.,* 2021), but can reach 5 km depending on availability of food sources[5] meaning it is possible for the observed bird to be nesting outside the planning application boundary or ZoI of the Project but foraging within it.

Four of the species listed were species of Special Conservation Interest (SCI), including black-headed gull, cormorant, herring gull and the kingfisher mentioned above.

[5] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/ Accessed August 2023.

Intertidal birds

2017 - 2019 intertidal bird surveys

The peak and mean bird abundances for 2019 and 2020 at the landfall location are summarised in annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports. The intertidal survey at Dunany South yielded a total of 23 species compromising 718 individuals. The most commonly occurring species were Oystercatcher, Herring Gull and Cormorant while the Oystercatcher and Herring Gull were recorded in highest abundance in the months of August to November. The Dunany South landfall was dominated by gulls as opposed to waders unlike the Dunany North landfall however, Oystercatchers were the most abundant wading bird species.

The intertidal survey at Dunany North yielded a total of 33 species compromising 4621 individuals. The most commonly occurring species were Oystercatcher, Herring Gull, Great Black-backed Gull; while the Oystercatcher, Herring Gull and Brent Goose were recorded in highest abundance in the months of December to March. Species abundances were dominated by the influx of over-wintering wading birds, followed by Gulls.

During an unrelated field survey in December 2019, 14 Brent goose individuals were recorded feeding at low tide c. 200 m northeast of the landfall at the edge of a rocky outcrop.

2023 intertidal bird surveys

The monthly intertidal bird surveys conducted from April to August 2023 focused on Dunany South and surveyed all birds within a 300 m buffer of the transition joint bay. These surveys returned a total of 37 bird species recorded, compromising 607 individuals. Of these observations, 22 were Red (5 species) and Amber (22 species) listed birds of conservation concern (Gilbert, Standbury and Lewis, 2021). The survey results for the 22 Red and Amber listed birds of conservation concern are provided in annex 2: Onshore Biodiversity – Additional Information. Five of the birds observed onsite were Annex I (Birds Directive) species and 18 birds observed onsite were SCI species. These results are summarised in annex 2: Onshore Biodiversity – Additional Information along with their peak counts compared to national and international populations where applicable. The most commonly occurring species were oystercatcher and herring gull which were recorded onsite every month.

While none of the peak counts recorded within the 300 m buffer of the transition joint bay exceeded any national and international population thresholds, it should be noted that in July 2023, six red-breasted mergansers were recorded within the survey buffer, with a further 43 approximately 80 m north of the survey buffer. These birds were drifting down towards the survey buffer zone but appeared to be actively avoiding coming any closer to the surveyor onsite. As such, it is believed that they would have been present within the survey buffer had the surveyor not acted as a source of disturbance.

Two species were recorded just outside the survey buffer which were not recorded within the survey buffer during the April – August 2023 surveys, namely; sand martin *Riparia riparia* which were noted as possibly nesting in the sand cliffs approx. 400 m north of the transition joint bay and grey plover *Pluvialis squatarola*. Grey plover were recorded at Dunany point, approx. 800 m north of the transition joint bay, within a flock of about 300 roosting birds roosting on rocks at high tide. The flock included oystercatcher, curlew, whimbrel *Numenius phaeopus*, great black-backed gull, Sandwich tern, roseate tern and common tern.

SCI bird species returned from the desk study within a 5 km radius of the Project are detailed in Table 3-6.

Table 3-6: SCI bird species returned from the NBDC desk study search within 5 km of the Project.

Species Name	Record Count	Date of Last Record	Habitat Preferences[+]
Barnacle Goose *Branta leucopsis*	4	31/12/2011	Local winter visitor from Greenland, occurring in Ireland between October & April. Mostly on remote islands in the northwest Ireland where it is relatively free from disturbance. Highly gregarious.
Bar-tailed Godwit *Limosa lapponica*	9	31/12/2011	Winter visitor to coastal estuaries from October to April wintering in estuaries. Feed along the tidal edge, or in shallow water (up to 15 cm depth).
Bewick's Swan *Cygnus columbianus subsp. bewickii*	1	31/12/2011	Low-lying wet pasture, lakes, ponds and stubble. The majority of the European population winters in Germany, the Netherlands and Britain. One of the potential reasons that the species has declined in Ireland is that Bewick's Swans find suitable sites in these countries and no longer need to fly as far west as Ireland
Brent Goose *Branta bernicla*	1	31/12/2011	Winter migrant from high-Arctic Canada. Most occur in Ireland between October and April. This population winters almost entirely in Ireland, with small numbers in parts of Britain and France. Mostly found on coastal estuaries during the autumn and early winter, and also on grasslands from mid-winter, until departure for the breeding grounds begins in late April.
Black-headed Gull *Larus ridibundus*	23	31/12/2011	Resident along all Irish coasts, wintering inland also. Breading nests on the ground in wetland areas, i.e. bogs, marshes, man-made lakes. Widespread across agricultural fields, and urban areas.
Black-legged Kittiwake *Rissa tridactyla*	4	31/12/2011	Summer visitor to steep coastal cliffs along all Irish coasts. Disperses to the open ocean in winter and less frequently seen. Breeds on steep sea cliffs where it builds a nesting platform on the most vertical and sometimes improbably steep areas. Will occasionally use man-made structures such as old buildings.
Black-tailed Godwit *Limosa limosa*	1	31/12/2011	Winter visitor to both inland and coastal estuarine habitats. Rare Irish breeding sites in lowland wet grassland and marshes.
Black-throated Diver *Gavia arctica*	2	31/12/2011	A scarce winter visitor to western and northern coasts from October to April to feed in Irish Waters
Common Guillemot *Uria aalge*	6	31/12/2011	Resident to Irish coastal waters. Comes ashore to nest on cliff edges from May onwards
Common Coot *Fulica atra*	12	31/12/2011	Resident at ponds and lakes throughout Ireland. Wintering in lakes, coastal estuaries and river systems
Common Goldeneye *Bucephala clangula*	3	31/12/2011	Winter visitor between November and April on coastal estuaries and inland lakes.
Common Greenshank *Tringa nebularia*	2	31/12/2011	Winter visitor to estuaries from September to April
Common Kingfisher *Alcedo atthis*	19	31/12/2011	Resident on Irish streams, rivers and canals. Wintering in lakes and coasts during extended periods of poor weather
Common Redshank *Tringa totanus*	5	31/12/2011	Resident and visitor populations. A common wader of wetlands throughout the country, though mainly coastal estuaries in winter. Nests in grassy tussock, in wet, marshy areas and occasionally heather. Breeds mainly in midlands
Common Scoter *Melanitta nigra*	1	31/12/2011	Resident and winter visitor to all Irish coasts, congregating in large flocks on shallow seas with sandy bottoms. Nest on islands with dense covering of scrub and tree cover.
Common Shelduck *Tadorna tadorna*	5	31/12/2011	Resident and winter migrant to sheltered estuaries or tidal mudflats. Breeds in open areas along seashores, larger lakes and rivers. Nest in holes in banks, trees, occasionally strawstacks or buildings. Increasing displacement to inland sites
Dunlin *Calidris alpina*	2	31/12/2011	Summer and winter visitor to coastal areas, tidal mudflats and estuaries are preferred. Breeding in machair habitats

Species Name	Record Count	Date of Last Record	Habitat Preferences[+]
Eurasian Curlew *Numenius arquata*	21	31/12/2011	Winter visitor to Irish wetlands. Breeding throughout Ireland in floodplains, boglands, meadows, rough pasture and heather
Eurasian Oystercatcher *Haematopus ostralegus*	5	31/12/2011	Resident & winter visitor to all coastal habitats, and particularly favour open sandy coasts. Nests principally on shingle beaches, dunes, salt marshes and rocky shores around the coast.
Eurasian Teal *Anas crecca*	9	31/12/2011	Resident & winter migrant. Wetland preferences in covered freshwater lakes, pools and small upland streams away from the coast. Wintering in coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs.
Eurasian Wigeon *Anas penelope*	5	31/12/2011	Fairly widespread and common winter visitor. Can be found in flocks up to and over 1000 birds on large wetlands and waterbodies. Non-breeding in Ireland.
European Golden Plover *Pluvialis apricaria*	9	31/12/2011	Widespread distribution during wintering in coastal and inland habitats. Summer populations restricted to uplands in NW Ireland with heather moors, blanket bogs, and acidic grasslands.
European Shag *Phalacrocorax aristotelis*	1	31/12/2011	Breeds all around the coast of Ireland wherever suitable cliffs exist. Nests on ledges, in crevices, in caves or under boulders. A colonial nester in loose colonies with prolonged breeding season. More plentiful on the west and south coasts but with notable concentrations in Co. Dublin.
Gadwall *Anas strepera*	2	31/12/2011	Localised wintering distribution at a variety of inland and coastal sites. Nest on a variety of freshwater and brackish wetlands, especially shallow lakes with abundant emergent vegetation, slow moving rivers and marshes.
Great Cormorant *Phalacrocorax carbo*	6	01/12/2016	Resident, some immigration during the winter. Breeds in colonies mainly around the coast of Ireland, with some birds breeding inland. Most of the larger coastal colonies in Ireland are on the south and north west coasts with big colonies also in Co. Dublin. Birds on the coast breed on cliffs whilst those inland, in trees. Winters at sea and inland.
Great Crested Grebe *Podiceps cristatus*	5	31/12/2011	Winter distribution is widespread with greatest concentration in the north midlands and northeast and birds from the continent join the resident population. Outside the breeding season are often solitary with some birds moving to the coast through the winter. Breed on large, shallow eutrophic loughs, and along canals and slow flowing rivers – wetlands with emergent vegetation bordered by open water are generally selected.
Great Northern Diver *Gavia immer*	2	31/12/2011	Great Northern Divers occur along the Irish coastline between September and April and are usually observed as single birds or small groups. They are the most numerous of the divers occurring in Ireland and are particularly abundant off the south, west and northwest coasts over the winter. Do not breed in Ireland.
Greenland White-fronted Goose *Anser albifrons subsp. flavirostris*	1	31/12/2011	Greenland race (*Anser albifrons flavirostris*). Winters in Ireland and Scotland. Highly gregarious. Traditionally occurred in peatland areas, though now mostly seen feeding on intensively managed grasslands. Scarce winter visitor to wetlands in Wexford and western Ireland from October to April.
Grey Plover *Pluvialis squatarola*	2	31/12/2011	Distribution in Ireland is widespread, but exclusively coastal. They occur mostly along eastern and southern coasts, most often on large muddy estuaries. They regularly roost among dense flocks during high tide, while their distribution is more scattered while feeding.
Greylag Goose *Anser anser*	6	31/12/2011	Winter migrant between November & April wintering mostly at coastal sites near estuaries and grasslands for feeding. Feral birds are present year round. Breeds by lakes and reservoirs, with the nest site often close to water and hidden in reeds or other waterside vegetation.

Species Name	Record Count	Date of Last Record	Habitat Preferences[+]
Hen Harrier *Circus cyaneus*	3	31/12/2011	Winter visitor to low-lying countryside along the coast. Breeding in upland areas and bogs confined to heather moorland and young forestry plantations.
Herring Gull *Larus argentatus*	8	31/12/2011	Resident along all Irish coasts, breeding inland also. Widespread distribution.
Lesser Black-backed Gull *Larus fuscus*	2	31/12/2011	Summer populations are distributed across the Irish coastline including off shore islands, islands in inland lakes, sand dunes and coastal cliffs. Winter visitors to more inland lakes.
Little Grebe *Tachybaptus ruficollis*	16	31/12/2011	Resident on vegetated ponds and lakes throughout Ireland. Wintering habitat extends to include ephemeral wetlands and are often encountered on sheltered coasts, estuaries and coastal lakes and lagoons.
Little Tern *Sternula albifrons*	1	17/09/2016	Rare summer visitor from April to late August to shingle or sandy beaches, mainly on the east and west coasts.
Mallard Anas *platyrhynchos*	50	31/12/2011	Widespread in almost all available wetland habitats in Ireland. Nest sites vary, mostly in ground where hidden in vegetation.
Merlin *Falco columbarius*	5	31/12/2011	Favours upland habitats in summer and lowland and coastal sites October-April. Nesting on the ground on moorland, mountain and blanket bog. Also nests in woodland and has taken to nesting in forestry plantations adjacent to moorland.
Northern Fulmar *Fulmarus glacialis*	4	31/12/2011	Can be seen in Irish waters throughout the year, but winters at sea. Mainly breeds on sea cliffs, but will nest on level ground, on buildings and in burrows and crevasses.
Northern Gannet *Morus bassanus*	1	31/12/2011	Resident along all Irish coasts, wintering at sea, but can be seen in Irish waters throughout the year. Breeds in colonies on islands off the coast. Three main Gannet colonies are located off the coast of Wexford. Cork and Kerry. A small colony is also found on Irelands Eye, Co. Dublin.
Northern Lapwing *Vanellus vanellus*	25	31/12/2011	Irish resident and summer visitor across wetlands, pasture and rough land adjacent to bogs. Breed on open farmland and bare fields.
Northern Pintail *Anas acuta*	1	31/12/2011	Local winter visitor to wetlands throughout Ireland from October to March. In winter, they form large flocks on brackish coastal lagoons, in estuaries and on large inland lakes.
Northern Shoveler *Anas clypeata*	2	31/12/2011	Resident & winter migrant. Most occur between October and March. Prefer shallow eutrophic waters rich in plankton, and occur on a variety of habitats while wintering in Ireland, including coastal estuaries, lagoons and inland lakes and callows.
Pale-bellied Brent Goose *Branta bernicla subsp. Hrota*	1	31/12/2011	Winter migrant. Most occur in Ireland between October and April. This population winters almost entirely in Ireland, with small numbers in parts of Britain and France. Mostly found on coastal estuaries during the autumn and early winter, and also on grasslands from mid-winter.
Peregrine Falcon *Falco peregrinus*	8	31/12/2011	Widespread resident in Ireland favouring coastal sites and cities with high vantage points.
Purple Sandpiper *Calidris maritima*	3	31/12/2011	Winter visitor to Irish coasts between September & April. Favour rocky shorelines, headlands, islands and harbours, also occur on sandy shorelines where rotting seaweed is piled up.
Razorbill *Alca torda*	3	31/12/2011	Resident, though occur inshore/ land during the breeding season, March/April to August/September. Winters at sea. Nests on sea cliffs. Will also use more secluded nest sites, fissures in the cliffs and also in screes.
Red Knot *Calidris canutus*	1	31/12/2011	Winter visitor to Irish coasts between October & February. The preferred habitat mostly includes estuarine sites with extensive areas of muddy sand. They occur mostly in large flocks and on fewer estuaries than other wader species. Breed at low density, and often

Species Name	Record Count	Date of Last Record	Habitat Preferences[+]
			close to the coast, nesting on well concealed and sparsely vegetated gravel and rocky slopes.
Red-breasted Merganser *Mergus serrator*	2	31/12/2011	Resident and winter visitor to brackish and marine waters, particularly in shallow protected estuaries and bays and lagoons, and also offshore. Nest on sheltered lakes and large rivers throughout the west and north of the country, though they are largely absent from Clare and a few pairs have been recorded in Wexford.
Red-throated Diver *Gavia stellata*	1	31/12/2011	Winter visitor to all Irish coasts from September to April. There is a very small breeding population in County Donegal. During the winter they are well distributed around the Irish coastline and are typically associated with shallow sandy bays. In Ireland they breed on small fresh water loughs. Ireland is the most southerly breeding location in the species' range.
Ringed Plover *Charadrius hiaticula*	4	31/12/2011	Resident & winter visitor. Peak numbers between August and early October. Winter around the entire coastline but are quite sparse along the north and southeast coasts. Mostly recorded along sandy stretches or along the upper shores of estuaries and non-estuarine coastline.
Roseate Tern *Sterna dougallii*	1	17/09/2016	Rare summer visitor from April to October, the majority breeding at two sites in the Irish Sea, with another colony in Wexford. Birds have bred at other sites recently, for example on Dalkey Island, Co. Dublin and on the Blasket Islands Co. Kerry. Rockabill holds the most important colony in Europe with up to 1,200 pairs of birds. The colony at Lady's Island is much smaller with around a hundred pairs.
Ruddy Turnstone *Arenaria interpres*	2	31/12/2011	Winter visitor, occurs late July to late April. Winters all around the Irish coast, particularly on rocky shores, headlands, islands and piers. Does not breed in Ireland.
Sanderling *Calidris alba*	2	31/12/2011	First seen along the Irish coastline in July or August, though most arrive in Ireland between September & April. Found along sandy coastlines, especially non-estuarine.
Sandwich Tern *Sterna sandvicensis*	4	18/06/2016	Summer visitor to all Irish coasts from March to September. Nest colonially on the ground, mainly on the coast but with some colonies inland. Nests on islands, shingle spits and sand dunes. Winters in small numbers in Galway Bay and Strangford Lough.
Whooper Swan *Cygnus cygnus*	8	31/12/2011	Winter visitor to wetlands and nearby open farmland throughout Ireland. Breeding in open shallow water, by coastal inlets, estuaries and rivers

[+]Habitat preferences: Birdwatch Ireland (https://birdwatchireland.ie/irelands-birds-birdwatch-ireland, accessed March and November 2019) and NBDC (https://species.biodiversityireland.ie/, accessed November 2023).

3.2.5 White-clawed crayfish

A total of 8 sites were assessed for white-clawed crayfish. No evidence was found for the species being present. A review of desk study records indicates that the nearest record for white clawed crayfish is from the third order River Dee, c. 18.5 km upstream of the onshore substation site and cable corridor. Table 3-7 summarises the freshwater aquatic invertebrate results for these sites.

Table 3-7: Freshwater aquatic invertebrate results.

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-1 / Rock 06 Stream	**Survey Results** A 2 minute pond sweep revealed the stream was dominated by pollution tolerant species including Gammarus *Gammarus* sp. which dominated the sample, meniscus midges *Dixa* sp., and riffle bugs - Vellidae which were common, and water-hog louse *Asellus aquaticus*, aquatic worm - Lumbriculidae, New Zealand mud snail *Potamopyrgus antipodarum*, non-biting midges - Chironomidae, biting midges - Ceratopogonidae, river limpet *Ancylus fluviatilis*, marsh beetle - Scirtidae and flatworm - Platyhelminthes which were few. A single cased caddis fly of the family Limnephilidae was also recorded. Dense instream vegetation would indicate nutrient enrichment. A bio-index assessment and SSRS were not calculated due to the absence of relatively fast flowing habitat in the stream. Dissolved oxygen was measured at 91.8% and 9.64 mg/l. Temperature was 13.3°C, pH was 7.4 and conductivity was relatively high at 905 µS/cm. Crayfish habitat suitability was rated as 'none' due to the silty substrate with no gravels or boulders, very low depth of water and very dense vegetation choking the stream.	Q4 (Good); Year= 2020; Station= 150 m d/s old Rly Br (LHS).
A-2 / River Dee at N33 bridge crossing	**Survey Results** A macroinvertebrate sample was not collected as the River Dee could not be entered at this location due to fast flow and water depth. Physiochemical parameters were recorded using field probes 370 m downstream. Dissolved oxygen was measured at 89.5% and 8.8 mg/l. Temperature was 16.5°C, pH was 7.99 and conductivity was 513 µS/cm. Visibilty was poor due to turbidity, however crayfish habitat suitability was estimated to be 'good' due to the presence of deep water, overhanging vegetation and the presence of coarse substrate within the river.	Q3-4 (Moderate); Year= 2006; Station= DEE New Br u/s Drumgoolestown Br.
A-3 / River Dee at Drumcar Bridge	**Survey Results** The macroinvertebrate sample recorded 25 taxa in total, with Group C (pollution tolerant) taxa forming most of the sample. Two Group A (pollution sensitive) taxa were present in few numbers – the flat-bodied mayflies *Ecdyonurus* sp. and *Heptagenia* sp.. Three Group B (less pollution sensitive) taxa were few, namely the cased caddis flies *Lepidostoma hirtum* and *Sericostoma personatum* and the mayfly *Alainites muticus*. The Group C taxon black fly - Simuliidae dominated the sample, whereas the Group C mayfly taxon *Seratella ignita* was common. It must be noted that water levels were elevated at the time of sampling. The bio-index species composition inferred a Q-value of 3-4 (moderate status). Dissolved oxygen was measured at 92.7% and 8.95 mg/l. Temperature was 17.2 °C, pH was 8.02 and conductivity was 502 µS/cm. High coloured water and turbidity made substrate difficult to assess. However, a review of aerial imagery indicates there are areas of gravels present downstream of the bridge. Where the macroinvertebrate sample was taken the substrate was cobble/coarse gravel dominated. No crayfish were present in the kick-sample. Due to the presence of soft banks, overhanging vegetation, aquatic vegetation, submerged tree roots and coarse substrate, a habitat rating of 'very good' was assigned for crayfish.	4 (Good); Year= 2020; Station = Br. At Drumcar.

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-4 / Newhall 06 Stream	**Survey Results** The macroinvertebrate sample recorded 15 taxa in total, with Group C (pollution tolerant) taxa forming most of the sample. No Group A (pollution sensitive) taxa were recorded. Three Group B (less pollution sensitive) taxa were recorded in small numbers, namely the cased caddis flies of the families Limnephilidae and Glossosomatidae, and the species *Sericostoma personatum*. The Group C taxon *Gammarus* sp. was recorded in excessive numbers. The Group D (very pollution tolerant) taxon *Asellus aquaticus* was numerous. The Group C taxa mayflies *Baetis rhodani/atlanticus*, riffe beetles *Elmis aenea* and Chironomidae were common. A bio-index assessment was not appropriate in this small 1st order stream and therefore an SSRS was deemed more suitable. A score of 3.2 was calculated indicating that the stream is “At Risk”. Dissolved oxygen was measured at 102.8% and 10.3 mg/l. Temperature was 15.1°C, pH was 7.64 and conductivity was 632 µS/cm. No crayfish were collected in the kick-sample. Based on the moderate siltation, high turbidity, presence of coarse substrate and overhanging vegetation a crayfish habitat appraisal rating of ’poor’ was assigned.	4 (Good); Year= 2020; Station = Br. At Drumcar.
A-8 / Salterstown Stream downstream Site 6	**Survey Results** The macroinvertebrate sample recorded 14 taxa in total, with Group C taxa dominating the sample. No Group A taxa were recorded. Three Group B (less pollution sensitive) taxa were recorded in small numbers, namely the cased caddis flies Limnephilidae and *Sericostoma personatum* and the mayfly *Alainites muticus*. The Group C taxon *Gammarus* sp. was recorded in excessive numbers. An SSRS of 5.6 was calculated, indicating that the stream is ”At Risk”. Dissolved oxygen was measured at 83% and 8.66 mg/l. Temperature was 13.6°C, pH was 7.70 and conductivity was 621 µS/cm. No crayfish were present within the kick sample. Suitable habitat in the form of tree roots, boulders and cobbles were recorded in the channel, however siltation was evident. Crayfish habitat was rated as ’good’.	No monitoring station connected to this stream.
A-9 / Port 06 Stream	**Survey Results** A 3 minute pond sweep revealed the stream was dominated by pollution tolerant species including *Asellus aquaticus* which was numerous, and *Gammarus* sp., *Potamopyrgus antipodarum*, bivalve molluscs - Sphaeriidae and water mites - Hydracarina which were common. the cased caddis flies Limnephilidae (Group B) were few. Dissolved oxygen was measured at 75.9% and 7.76 mg/l. Temperature was 13.8°C, pH was 7.55 and conductivity was 667 µS/cm.The stream was not suitable for aquatic bio-index assessment, however as glide habitat was recorded within the stream an SSRS was calculated. A score of 0.8 was calculated indicating that the stream is “At Risk”. Given the absence of riffle habtiat sampled (where sensitive taxa are likely to be found), this score should be interpreted with caution. Notwithstanding this limitation, based on satellite imagery the Port Stream appears to be slow-flowing and drain-like throughout it’s length, and therefore the habitat surveyed at this site is likely to be representative of the habitat throughout the system. Crayfish habitat was assigned a rating of ’poor’ due to the presence of soft banks and rooted aquatic vegetation, which could provide some limited habitat.	No monitoring station connected to this stream.
A-10 / Port 06 Stream upstream Site 9	**Survey Results** A macroinvertebrate survey was not collected due to the overgrown channel vegetation, extremely soft silted substrate and stagnant flow recorded. Dissolved oxygen was measured at 56.6% and 5.61 mg/l. Temperature was 15.5°C, pH was 7.04 and conductivity was relatively high at 929 µS/cm.Crayfish habitat was assigned a rating of none.	No monitoring station connected to this stream.

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-11 / Broadlough Stream	**Survey Results** A 2 minute pond sweep of the drain, where accessible, revealed the macroinvertebrate community was dominated by pollution tolerant species including *Gammarus* sp., *Asellus aquaticus*, Chironomidae and Platyhelminthes. A total of 10 taxa were recorded. An aquatic bio-index assessment and SSRS were not calculated due to the absence of relatively fast flowing habitat in the stream. Dissolved oxygen was measured at 79.8% and 8.21 mg/l. Temperature was 14.2°C, pH was 7.56 and conductivity was relatively high at 1001 µS/cm. Crayfish habitat was assigned a rating of none.	Q4 (Good); Year= 2020; Station= 150 m d/s old Rly Br (LHS).

* Crayfish Plague Outbreaks Update August 2019. National Parks and Wildlife & the Marine Institute. Available from http://www.biodiversityireland.ie/wordpress/wp-content/uploads/CRAYFISH-PLAGUE-NPWS-UPDATE-Number-5_August-2019.pdf. Accessed February 2020.

3.2.6 Fish

A total of 8 sites were assessed for salmonid fish potential. The site code, watercourse name (EPA), and salmonid fish assessment results are detailed in Table 3-8.

Table 3-8: Salmonid fish assessment results.

Site code / name	Salmonid fish assessment results
A-1 / Rock 06 Stream	**Survey Results** Good spawning substrates were not present. Salmonid and lamprey spawning habitat was rated as 'None' due to high siltation, no riffle/ glide /pool habitat sequence present and no gravels. The stream has been modified into a drainage ditch with no habitat characteristics suitable for adult salmonid or lamprey spawning. For juvenile salmonids there was no overhanging vegetation, no coarse substrate and flow was slow. The substrate consisted of 100% silt. These conditions are not representative of juvenile salmonid habitat and a rating of 'None' was assigned. Lamprey nursery habitat was rated as 'Fair'. Shallow slow flowing water with silted areas were present. Dense aquatic vegetation in sections are indicative of nutrient enrichment. There are limited unvegetated silted areas and nursery habitat is sub-optimal. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.
A-2 / River Dee at N33 bridge crossing	**Survey Results** Conditions for undertaking fish habitat appraisals at this site were suboptimal due to high flow conditions and poor visibility. Nevertheless, some instream habtiats were visible so a tentative assessment was made. Salmonid and lamprey adult and spawning habitat was assessed as 'Fair' due to the presence of some gravel habitat as well as deep pool and glide habitat for resting adults. Juvenile salmonid habitat was rated as 'Fair' due to the presence of suitable cover and coarse substrate. As the survey was carried out from a bridge, possible lamprey nursery habtiat (e.g. silty deposits along the river margins) was diffiult to see so an assessment was not made.
A-3 / River Dee at Drumcar Bridge	**Survey Results** Salmonid adult and spawning was rating as 'Very Good' due to the presence of cobble/gravel spawning habitat, resting pools for adults and low siltation within the gravels. Juvenile salmonid habitat was also rated as 'Very Good' due to the presence of areas of shallow, fast flowing water and coarse substrate. Cover was noted in the form of aquatic vegetation and overhanging vegetation. Lamprey spawning habtiat was rated as 'very good' due to the presence of cobble/gravel spawning habitat, resting pools for adults and low siltation within the gravels. Lamprey nursery was rated as 'Very Good' due to the presence of deep silty deposits along the river margins. A lamprey was captured within the kick-net during the macroinvertebrate sample collection.

Site code / name	Salmonid fish assessment results
A-4 / Newhall 06 Stream	**Survey Results** Salmonid and lamprey spawning habitat was assigned a rating of 'None-Poor'. Juvenile salmonid habitat was rated as 'Fair', due to the presence of fast flowing water over coarse substrate, and cover in the form of overhanging vegetation. It should be noted that water quality at this stream (at risk) is likely to affect juvenile salmonids and lamprey should they occur in this stream. Lamprey nursery habitat potential was assigned a rating of 'None-Poor'. There were no silted areas of slow backwater within the survey reach, only small areas of silty deposits within the stream channel were noted.
A-8 / Salterstown Stream downstream Site 6	**Survey Results** Salmonid spawning and adult habtiat for this stream was rated as 'Fair', due to the presece of cobble and gravel spawning habitat and resting pools for adults. The stream is more suited to brown trout as opposed to salmon due to it's small size. It is worth noting, however, that low dissolved oxygen levels (83%) and an SSRS of 4 are indicative of pollution. Heavy siltation of the gravels was also noted. Juvenile salmonid habitat was rated as 'Good' due to the presence of shallow, fast flowing water, cover in the form of overhanging vegetation and coarse substrate. Lamprey nursery habtiat within the stream was limited and no areas with deep silt/sandy deposits suitable for ammocetes was noted. A rating of 'None-Poor' was assigned.
A-9 / Port 06 Stream	**Survey Results** Salmonid and lamprey adult and spawning habitat was rated as 'None'. The stream was heavily vegetated and silted, with no suitable spawning habitat. The substrate was 100% silt. Juvenile salmonid habtiat was also assigned a rating of 'None' due to the slow flowing and silty nature of the stream. Lamprey nursery habitat was assigned a rating of 'Good' due to the presence of a deep silt layer in the channel and slow flowing water. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.
A-10 / Port 06 Stream upstream Site 9	**Survey Results** There is no potential for salmonids or lamprey at any life stage at the site surveyed and a habitat rating of None was assigned. The stream was stagnant, drain-like and choked with aquatic vegetation. DO was measured at 56.6%.
A-11 / Broadlough Stream	**Survey Results** Salmonid and lamprey adult and spawning habitat was rated as 'None'. The stream was heavily vegetated and silted, with no suitable spawning habitat. The substrate was 100% silt. Juvenile salmonid habtiat was also assigned a rating of 'None' due to the slow flowing and silty nature of the stream. Lamprey nursery habitat was assigned a rating of 'None-poor' due to the presence of a deep silt layer and slow-stagnant flow in the channel. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.

4 KEY PARAMETERS FOR ASSESSMENT

4.1 Project design parameters

The project description is provided in section 2 of the NIS. Table 4-1 outlines the project design parameters that have been used to inform the assessment of potential impacts of the construction, operational and maintenance and decommissioning phases of the Project on onshore biodiversity.

The final location and layout of the Transition Joint Bay will be confirmed post consent on examination of the electrical and thermal properties of the selected offshore export cable and the ground conditions at the landfall (see design flexibility details in section 2 - Project Description of the NIS). The identification of potential impacts in section 6 considers the two proposed options as outlined in Table 4-1.

Table 4-1: Project design parameters considered for the assessment of potential impacts on onshore biodiversity.

Potential impact	Phase[1]			Project design parameters	Justification
	C	*O*	*D*		
Disturbance from noise, vibration, lighting and human presence on ecological features	✓	x	✓	**Construction phase:** All construction activities (including mobilisation, site investigations, excavation, through to reinstatement) and machinery used to construct the onshore infrastructure including the TJB (TJB) (Option 1 / Option 2), 29 joint bays, 20.1 km of onshore cable, substation, grid connection and fibre optic cable connection, within the planning application boundary over a 27 month construction programme. This includes all excavations and potential for night time working for the installation of the onshore cable from the landfall to the onshore substation site; HDD activities at five locations, open trench crossings at three locations; seven temporary construction compounds, and all excavations and works to construct the onshore substation. Disturbance from construction activities also includes works between the LWM and HWM i.e. installation and trenching of the offshore cable for connection to the onshore cable at the transition joint bay. **Decommissioning phase:** Removal of onshore substation infrastructure and removal of onshore cable i.e. cable, joint bays and link boxes.	Activities within the planning application boundary that have the potential to result in disturbance.
Removal and/or fragmentation of important ecological features	✓	x	x	Permanent removal of vegetation and habitats at onshore substation, TJB. Temporary removal of vegetation and habitats at passing bays (where located away from the public road), and installation of onshore cable.	The maximum spatial extent of habitats which will be removed (temporarily/permanently) in the planning application boundary.
Surface water run-off carrying suspended silt or contaminants into local watercourses	✓	x	✓	All excavations and works in the planning application boundary.	The area where surface water run-off carrying suspended silt or contaminants could arise and discharge into local watercourses.

1 C= Construction, O = Operation, D = Decommissioning

4.2 Measures included in the Project

As part of the project design process, a number of measures have been proposed to reduce the potential for impacts on onshore biodiversity. These measures include designed-in and management measures (controls). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Project and have therefore been considered in the assessment of potential impacts presented in section 6 (i.e. the determination of magnitude assumes implementation of these measures).

These measures are considered standard industry practice for this type of Project. This approach has taken regard of the mitigation hierarchy as described by CIEEM (2018), where a sequential process is adopted to avoid, mitigate and compensate negative ecological impacts and effects.

4.2.1 Suitably qualified and experienced Ecologist

A suitably qualified and experienced ecologist (hereafter referred to as 'the ecologist') will be utilised in the implementation of the measures and survey requirements outlined in this report. The ecologist will be a full member of a relevant institution, such as the Chartered Institute of Ecology and Environmental Management (CIEEM), have relevant experience in the management of mitigation measures and ecological constraints on construction sites/restoration projects, and hold or have previously held a protected species derogation licence in the Republic of Ireland.

4.2.2 Construction Environmental Management Plan (CEMP)

For overall onshore biodiversity management during construction, a CEMP has been prepared and will be implemented (see appendix K: Management Plans). The CEMP will cover the construction phases of the Project and will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. The CEMP will be updated by the Contractor following receipt of planning consent to ensure that all relevant planning conditions are incorporated as environmental management measures to be applied during the construction phase.

4.2.3 Reduction of impact on sites designated for nature conservation

Timing of the works at the landfall location (i.e. transition jointing pit, the onshore cable route construction, and the offshore cable corridor construction where it occurs between the LWM and HWM) will avoid the peak season for intertidal birds (October to April, inclusive). Timing of vegetation removal works will avoid the bird nesting season (March to August, inclusive).

4.2.4 Pre-construction surveys

At least one month in advance, but no greater than six months in advance, of commencing any enabling or advance works, a pre-construction survey for protected and invasive species will be undertaken. The surveys will be undertaken by an ecologist. The ecologist will also advise on any additional relevant protective measures and/or licensing requirements resulting from the pre-construction survey findings.

The ecologist will complete pre-construction protected species surveys (within a suitable season), which will assess the known locations of relevant protected species and will also assess the onshore components of the Project. The ecologist will feed any additional mitigation measures resultant from these surveys into the CEMP *(*see appendix K: Management Plans*).*

The ecologist will complete pre-construction invasive alien plant species surveys (within a suitable season), which will assess the know locations of invasive alien plants (see annex 2: Onshore Biodiversity – Additional Information) and will also assess the onshore components of the Project. The ecologist will feed any additional mitigation measures resultant from these surveys into the CEMP (see appendix K*:* Management Plans*).*

The results of the pre-construction surveys will be used by the ecologist to advise the Applicant on potential implications of any potential breeding or resting sites identified, in the light of the development programme and licensing requirements.

4.2.5 Disturbance measures

The following measures, outlined in Table 4-2, are proposed to reduce the potential impacts from disturbance on the important ecological features.

Table 4-2: Disturbance measures.

Disturbance measures	Phase[1]		
	C	*O*	*D*
Timing of landfall works (i.e. installation of the cable in the intertidal and shingle banks) will avoid the peak season for intertidal birds (October to April, inclusive).	✓	x	✓
Timing of HDD works will avoid the peak movements of fish (i.e. fish migration into rivers for spawning, and smolt emigration from the river to the sea) between March-May (smolt emigration) and June-August (return for spawning).	✓	x	✓
Timing of works in the intertidal area (i.e. cable repair and reburial) will avoid the peak season for intertidal birds (October to April, inclusive).	x	✓	x
The removal of existing hedgerow will avoid the bird nesting season (March to August, inclusive).	✓	✓	✓
Any external lighting utilised to facilitate night-time working or security (i.e. at the onshore substation site, onshore cable route and landfall location) will be directional and cowled to avoid the light spill (above 1 LUX) to all relevant ecological features.	✓	✓	✓
In the unlikely event that roosting or stranded bats are encountered on the Project, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted. If present, bats will only be removed under licence from the NPWS.	✓	✓	✓
All works within the disturbance range of identified badger setts will implement the following: • Prior to works commencing within the vicinity of any sett, all site personnel will be given a Toolbox talk where operatives will be briefed on the presence of the sett and the legal protection and exclusion buffer zones that badgers and setts are afforded; • Any piling and/or drilling will take place at a distance greater than 150 m from identified badger setts; • An exclusion buffer zone of 30 m will be maintained around the setts in the summer season (July to October, inclusive), extended to 50 m during the badger breeding season (November to June, inclusive); • All overburden mounds will be sited at a minimum distance of 50 m from any identified sett; • The buffer zones will be physically demarked using post and rail/post and rope/bunting, or equivalent, and be signposted to identify an ecological sensitivity. The sensitive protected species (e.g. badger) will not be identified in any signage. The ecologist will assess and verify the demarcation and signage before works commence; and • In the event that previously unidentified badger setts are detected, the recommendations set out in the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2007) will be applied, and the ecologist will formally agree any proposed additional mitigation measures with the local NPWS Conservation Ranger. Further consultation and wildlife derogation licences may be required.	✓	x	✓

a 1 C= Construction, O = Operation, D = Decommissioning

4.2.6 Surface and groundwater pollution measures

The following measures, outlined in Table 4-3, are proposed to reduce the potential impacts from surface and groundwater pollution on the relevant ecological features.

Table 4-3: Surface and groundwater pollution measures.

Surface and groundwater measures	Phase[1]		
	C	*O*	*D*
• Prior to construction, all Methods Statements for watercourse crossings will be issued to IFI for agreement; • All instream works will avoid the IFI recommended 'closed season' (October to May, inclusive); • All works will be undertaken in accordance with IFI Guidance on the protection of fisheries during construction works in and adjacent to waters (IFI, 2016); and • All construction works will be undertaken in accordance with CIRIA Guidance (CIRIA, 2001; CIRIA 2006a; CIRIA 2006b) titled "Control of water pollution from construction sites (C532)" and "Control of water pollution from linear construction projects (C648 and C649)".	✓	✓	✓
For the general protection of watercourses, the following measures will be employed: • Stockpiling of construction materials will be strictly prohibited within 5 m of any ditch or water-laden channel; • Hazardous materials including diesel, fuel oils, solvents, paints and/or lubricants stored on site will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container; • Re-fuelling of plant will not occur within 20 m of any watercourse or surface water/groundwater feature. Drip trays will be used, and spill kits will be kept available and used if necessary; • Fuel will be transported in a mobile, double skinned tank; • Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or recycling; • Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and relevant all will be familiar with emergency procedures; and • Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, with an appropriate emergent response put in place. Any contaminated soil will be removed from the site and properly disposed of.	✓	x	✓
For the protection of watercourses associated with the onshore substation site, the following measures will be employed: • All ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline waste waters to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite; • Ensure run-off generated from dewatering activities for discharge to surface waters is treated utilizing temporary settlement pond/tanks(s) in accordance with CIRIA Report No.113 titled "Control of groundwater for temporary works" (CIRIA, 1986); • Concrete will be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall, and quick setting mixes will be used; and • Waste materials will be stored in designated areas that are isolated from surface water drains. Skips will be closed or covered to prevent materials being blown or washed away.	✓	x	✓
For the protection of watercourses associated with the trenchless works (i.e. horizontal directional drilling) at the M1 motorway/railway, River Dee (Richardstown and Drumcar), Ardballan/Port streams (Togher) and Salterstown stream, the following measures will be employed: • A buffer zone of at least 10 m will be established from the River Dee, Ardballan/Port streams and Salterstown stream crossings. The buffer zones will be physically demarked using post and rail/post and	✓	x	✓

Surface and groundwater measures	Phase[1]		
	C	*O*	*D*
rope/bunting, or equivalent, and be signposted to identify an ecological sensitivity. The ecologist will assess and verify the demarcation and signage before works commence; • Silt fencing will consist of a maintainable geotextile membrane (equivalent to Terrastop™ Premium; 250 micron; 45 l/m2/sec). Installation, maintenance, and removal will follow the manufacturers' specifications. The geotextile membrane will be inspected at least once a week and following any period of heavy rainfall; and • HDD crossing design will ensure no hydraulic connection or interference with the watercourses. Additionally, for the protection of watercourses associated with the use of bentonite during HDD operations: • At pre-construction, detailed site investigations will be undertaken to inform the final design of the HDD route. The results of the site investigations will be used to inform the design and to prevent the risk of a bentonite break out; • An aquatic ecologist will be required onsite to observe the HDD drill operations to ensure that no bentonite leaks or escapes into nearby surface waters; • Bentonite batching locations will be located at least 10 m from watercourses in order to minimise bentonite leaks and spills; • Earth banks and sand bag barriers will be used alongside silt fencing around bentonite batching areas in order to minimise bentonite leaks and spills; • The pressure of bentonite pumping will be strictly monitored, and lowered if necessary to mitigate against a bentonite breakout; • Monitoring of watercourses will be undertaken while works are in progress using hand-held water probes to measure pH, alongside visual observations for water quality characteristics including colour and turbidity; • Bentonite will be recycled through the HDD process but must be disposed of as controlled waste at the end of construction; • Should any inadvertent bentonite release occur, containment and clean-up operations will be in place, and works will cease immediately; • For releases on land, the Contractor will make immediately available (and the resources to deploy them) - silt fences, sand bags and earth berms to prevent fluid from migrating or flowing from the immediate area of the discharge. Clean up operation will include removal equipment such as vacuum trucks and small pumps.			
For the protection of watercourses associated with the onshore cable route, the following measures will be employed: • Waste materials will be stored in designated areas that are isolated from surface water drains. Skips will be closed or covered to prevent materials being blown or washed away.	✓	x	x
For all works associated with joint bays 10-29, and the transition joint bay, inclusive, the following measures will be employed: • All ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline waste waters to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite; • Ensure run-off generated from dewatering activities for discharge to surface waters is treated utilizing temporary settlement pond/tanks(s) in accordance with CIRIA Report No.113 titled "Control of groundwater for temporary works" (CIRIA, 1986); • Concrete will be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will not occur during periods of heavy rainfall, and quick setting mixes will be used; and	✓	x	✓

Surface and groundwater measures	Phase[1]		
	C	*O*	*D*
• Waste materials will be stored in designated areas that are isolated from surface water drains. Skips will be closed or covered to prevent materials being blown or washed away; and • Open trench crossings at the Newhall stream and the Port stream at Clonmore will be achieved by fluming the existing stream flow through one or more pipes depending on the size of the flows in the stream. The flume pipe(s) will be approx. 10 m long and the diameter suitable to accommodate the existing flows. Where applicable, under the supervision of the ecologist, spawning gravels will be removed at the stream crossing areas where construction will take place. The extent of spawning gravel removal will be agreed for each site with IFI prior to construction commencing. Following the installation of the cable ducts, the stream bed (and associated riparian habitat) will be reinstated with original or similar material and the spawning gravels replaced under the supervision of the aquatic ecologist.			

1 C= Construction, O = Operation, D = Decommissioning

4.2.7 Removal and/or fragmentation measures

The following measures, outlined in Table 4-4 are proposed to reduce the potential impacts from destruction and/or fragmentation on the important ecological features.

Table 4-4: Removal and/or fragmentation measures.

Removal and/or fragmentation measures	Phase[1]		
	C	*O*	*D*
The removal of existing hedgerow will avoid the bird nesting season (March to August, inclusive).	✓	x	✓
Replacement at all hedgerow removal locations will be undertaken and the following measures will be employed: • All replacement planting will be of native tree/shrub species of Irish providence (i.e. from within the island of Ireland); • Replacement planting at each location will be dominated by native species identified for those locations within the baseline. Where ash was the dominant hedgerow species removed, hawthorn or blackthorn will be planted as dominant instead; • The dominant tree species in the planting will be feathered whips, while sub-dominant species will be greater than 40 cm in height. • All replacement hedgerow planting will contain, at a minimum, four native tree/shrub species; • Planting will follow a double-row format of zig-zag pattern, with row spacing at 50 cm and tree spacing at 40-45 cm. • All replacement hedgerows will be maintained for eight years, with seasonal checks by a suitably qualified arboriculturalist/ecologist for the first two years and yearly checks for the subsequent six years. A rate of 90% living individuals after four years and 80% living individuals at eight years will be retained, with replacement planting as required. Any gaps greater than 1 m will be replanted with native tree/shrub species of similar size to those adjacent; • Depending on the progression of hedgerow/tree replanting and restoration, maintenance of vegetation may extend beyond an eight year period. This will be determined by a suitably qualified ecologist.	✓	x	x
Replacement of hedgerow associated with joint bay 20 will also include 20-40% replanting with spindle. Maintenance, as outlined above, will also be completed.	✓	x	x

4.2.8 Invasive Alien Plant Species

The following measures, outlined in Table 4-5, are proposed to reduce the potential impacts from invasive alien species on the important ecological features.

Table 4-5: Invasive alien species measures.

Invasive alien species measures	Phase[1]		
	C	*O*	*D*
Before construction begins, avoidance and management measures for invasive alien plant species (IAPS) listed in the third schedule for the EC birds and Natural Habitats Regulations, 2011 (as amended) will be implemented by the ecologist or a suitably qualified and experienced invasive species specialist. These measures will include the following information and management protocols for dealing with occurrences of scheduled invasive species: • Pre-construction field survey for IAPS within the planning application boundary of the Project will be completed by the Ecologist; • A buffer zone of 10 m will be put in place around all known location of IAPS. The buffer zone will be physically demarked using post and rail/post and rope/bunting, or equivalent, and be signposted to identify an ecological sensitivity. The ecologist will assess and verify the demarcation and signage before works commence; • Prior to works commencing within the vicinity of any IAPS, all site personnel will be given a Toolbox talk where operatives will be briefed on the presence of the IAPS and the legal protection that badgers and setts are afforded; • All excavated material within 7 m of the IAPS locations will be considered to be contaminated with material (roots, stem fragments, or seeds) suitable to cause the spread of IAPS (see Transport Infrastructure Ireland (TII), 2020) and be disposed of at an appropriately licensed waste facility; and • No disturbance of IAPS will take place during the works, apart from essential works within the 7m buffer zone for construction of the Project.	✓	x	✓
The materials which are introduced to the site during the construction will be free from scheduled invasive species, with certification of such.	✓	x	x
Where a scheduled invasive species is accidentally introduced or becomes established within the Project site during pre-construction surveys and/or the construction phase, works will be immediately halted and an effective exclusion zone will be erected (minimum 10 m) until such time that the ecologist/invasive species specialist can assess the site(s), and implement the required management protocol (as set out in the measures above).	✓	x	✓

1 C= Construction, O = Operation, D = Decommissioning

4.3 Impacts scoped out of the assessment

On the basis of the baseline environment and the project description is provided in section 2 of the NIS, a number of impacts are proposed to be scoped out of the assessment of potential impacts for onshore biodiversity. These impacts are outlined, together with a justification for the scoping out decision, in Table 4-6.

Table 4-6: Impacts scoped out of the assessment for onshore biodiversity.

Potential impact	Justification
Changes of groundwater quality, yield and/or flow paths associated with earthworks and impacts on ecological features, during all phases.	There are no specific groundwater features (e.g. Groundwater Dependant Terrestrial Ecosystems (GWDTE) or species) which could be affected as a result of excavation activities or any interaction with the groundwater table. Interaction with the groundwater table when it occurs is considered infrequent and small in scale and will not significantly alter groundwater yield and flow paths.

Potential impact	Justification
Construction dust and dust associated with the operational and maintenance phase.	During the construction phase dust emissions are considered to be negligible. During the operational and maintenance phase, due to the limited nature of activities required for the operational and maintenance of the onshore infrastructure, there is minimal risk that fugitive dust will arise.
Disturbance from noise, vibration, lighting and human presence on ecological features during the operational and maintenance phase.	Operational phase impacts on relevant ecological features (i.e. designated sites for nature conservation, onshore birds, and intertidal birds) as a result of operational activities including; maintenance personnel associated with the onshore infrastructure (i.e. cable route and onshore substation), and maintenance personnel/ crew transfer vessel associated with an operations and maintenance base for the purpose of maintaining offshore infrastructure. These operational phase activities are small-scale and of minimal disturbance during the lifetime of the Project. Furthermore, the operational and maintenance base will be an existing operational port, and will not introduce any new significant levels of disturbance.
Disturbance from noise, vibration, lighting and human presence on breeding birds of the North-west Irish Sea SPA during the construction, and operational and maintenance phase.	No birds of the North-west Irish Sea SPA were found to be breeding within the Dunany bay beach shoreline and within the ZoI of the Project. Disturbance of birds listed as features of the site as a result of the TJB, the onshore cable route construction and the offshore cable corridor construction will not occur. Additionally, ddisturbance of birds listed as features of the site as a result of operational phase activities (i.e. vessels for maintenance of the offshore cable, and routine checks of the onshore cable) will not occur.
Removal and/or fragmentation of important ecological features during the operational and maintenance phase.	Operational impacts on relevant ecological features (i.e. Dunany Point pNHA, depositing/lowland rivers, and onshore birds) due to the removal and/or fragmentation of important ecological features will not occur. Therefore, no pathway of effect has been identified.
Surface water run-off carrying suspended silt or contaminants into local watercourses during the operational and maintenance phase.	Operational impacts on this relevant ecological features (i.e. depositing/lowland rivers) are not deemed likely to occur due to the infrequent and small-scale onshore activity expected during the lifetime of the Project.

5 IMPACT METHODOLOGY

5.1.1 Overview

This report takes account of the following guidance documents and legislation:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Version 1.1- Updated September 2019 (CIEEM, 2018);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes, Revision 2 (NRA, 2009);
- The Habitats Directive 92/43/EEC; and
- European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

5.1.2 Ecological impact assessment process

The impact assessment process, as described by CIEEM (2018), involved:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

The assessment comprises the review of the baseline data gathered and the identification of relevant ecological features with features valued on the basis of available information/guidance and using professional ecological judgement.

5.1.3 Impact assessment criteria

Impact on relevant ecological features are characterised with the following qualitative terms, as relevant (CIEEM, 2018):

- **Positive or Negative (adverse)**. Positive and negative (adverse) impacts and effects were determined according to whether the change is in accordance with nature conservation objectives and policy:

– **Positive** – a change that improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment.

– **Negative** (adverse) – a change which reduces the quality of the environment e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution.

- **Extent**. The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g. noise transmission under water).
- **Magnitude**. Magnitude refers to size, amount, intensity and volume. It was quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
- **Duration**. Duration was defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the

human context or that of other long-lived species, would span at least five generations of some invertebrate species.

- **Frequency and Timing**. The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. bird nesting season.

- **Reversibility**. An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

5.1.4 European sites

Where Natura 2000 sites (i.e. internationally designated European sites) are considered, this report summarises the potential impacts on the QIs of internationally designated sites as described within section 3. The complete assessment of adverse effects on European sites is contained in the NIS for the Project.

6 POTENTIAL IMPACTS

A description of the potential impacts on onshore biodiversity caused by each identified impact is given below.

6.1 Disturbance from noise, vibration, lighting and human presence

Construction and decommissioning phase

Scoping of impacts

During construction, a potential effect resulting from the impact caused by disturbance from noise, vibration, lighting and human presence has been assessed. The construction impact from disturbance has the potential to affect the relevant ecological features - designated sites for nature conservation and intertidal birds. Potential impacts on these relevant ecological features during the decommissioning phase is deemed to be similar but less than those anticipated to that of the construction phase and is not described separately.

Assessment of effects

The construction impact of disturbance from noise, vibration, lighting and human presence has the potential to affect the following European sites: North-west Irish Sea SPA and Dundalk Bay SPA. Disturbance to the North-west Irish Sea SPA and Dundalk Bay SPA during construction may result from noise, vibration, lighting and human presence indirectly affecting migratory birds at Dunany Bay beach and Dunany Point within the foraging range of these sites, which are connected indirectly via spatial pathway to the relevant ecological features. Disturbance of birds listed as features of the site may result during the transition jointing bay, the onshore cable route construction, and the offshore cable corridor construction where it occurs between the LWM and HWM within the intertidal area. The assessment has considered that the potential extent of the effect could extend up to approximately 300 m from the landfall location. This extent has been based on a 'rule of thumb' as set out in Cutts *et al.* (2013) in the waterbird disturbance mitigation toolkit. This extent also has consideration for the duration of effect. The magnitude of the effect is likely to be localised disturbance of foraging and resting intertidal and migratory birds, including those described as features for the site. The duration of the effect will not extend further than the construction timeframe associated with works and is considered to be short-term. The timing of the construction works may influence the magnitude (i.e. works during the wintering migratory bird season). This effect is considered to be reversible after construction works are completed.

The construction impact of disturbance from noise, vibration, lighting and human presence has the potential to affect foraging and resting intertidal and migratory birds. Disturbance of birds may result from noise, vibration, lighting and human presence during the TJB construction. The assessment has considered that the potential extent of the effect is the Dunany Point shoreline within 300 m of the landfall location. The magnitude of the effect is likely to be localised disturbance of foraging and resting intertidal and migratory birds, including those described in the baseline. The duration of the effect will not extend further than the construction timeframe associated with works and is considered to be short-term. The timing of the construction works may influence the magnitude (i.e. works during the wintering migratory bird season). This effect is considered to be reversible after construction works are completed.

6.2 Removal and/or fragmentation of important ecological features

Construction and decommissioning phase

Scoping of impacts

During construction, a potential effect resulting from the impact caused by removal and/or fragmentation has been assessed. The construction impact from removal and/or fragmentation has potential to effect depositing/lowland rivers. Potential impacts on these relevant ecological features during the decommissioning phase is deemed to be similar but less than those anticipated to that of the construction phase and is not described separately.

Assessment of effects

The construction impact of removal and/or fragmentation of habitats and ecological features has the potential to affect the depositing/lowland rivers crossed by or adjoining the Project. Removal and/or fragmentation of habitats may result from temporary fragmentation of relevant watercourses (River Dee (crossed twice), Newhall Stream, Salterstown Stream, Port Stream (crossed twice) and Ardballan Stream), which are connected via direct physical pathways to the Project. The extent of the effect is the crossings points of these rivers and the upstream and downstream catchments of the waterbodies. The magnitude of the effect is likely to be temporary and localised habitat fragmentation but is unmeasurable; therefore, the precautionary principle has been applied. The duration of the effect will be linked with the construction timeframe associated with watercourse crossing works and predicted to take approximately three months for HDD crossings of the River Dee (in Richardstown and Drumcar) and approximately four weeks for HDD crossings of the Port Stream, Togher and Salterstown. Open trench crossing are predicted to take less than four weeks to complete. Therefore, the duration of the impact is considered to be short-term. The timing of the construction works may influence the magnitude (i.e. works during high rainfall events). This effect is considered to be reversible after construction works are completed.

6.3 Surface water run-off carrying suspended silt or contaminants into local watercourses

Construction and decommissioning phase

Scoping of impacts

During construction, a potential effect resulting from the impact caused by surface water run-off carrying suspended silt or contaminants into local watercourses. The construction impact from surface water run-off has potential to effect depositing/lowland rivers. Potential impacts on these IEFs during the decommissioning phase is deemed to be similar but less than those anticipated to that of the construction phase and is not described separately.

Assessment of effects

The construction impact of surface water run-off carrying suspended silt or contaminants into local watercourses has the potential to affect the depositing/lowland rivers crossed by or adjoining the Project. Water pollution during construction may result from surface water run-off carrying suspended silt or contaminants into local watercourses (Rock Stream, River Dee (crossed twice), Newhall Stream, Salterstown Stream, Port Stream (crossed twice), Ardballan Stream, and Broadlough Stream), which are connected via direct physical pathways to the Project. The extent of the effect is the crossings points of these rivers and the downstream catchments of the waterbodies. The magnitude of the effect is likely to be localised water pollution but is unmeasurable; therefore, the precautionary principle has been applied. The duration of the effect will be linked with the construction timeframe associated with watercourse crossing works and predicted to be three months for HDD crossings at the River Dee (in Richardstown and Drumcar) and four weeks for HDD crossings of the Port Stream, Togher and Salterstown. Therefore, the duration of the impact is considered to be short-term. The timing of the construction works may influence the magnitude (i.e. works during high rainfall events). This effect is considered to be reversible after construction works are completed.

7 IN-COMBINATION EFFECTS

The in-combination assessment (ICA) takes into account the impact associated with the Project together with other projects. The projects selected as relevant to the in-combination assessment have based upon the results of a screening exercise (see appendix J: Screening - In-combination Effects). Each project has been considered on a case-by-case basis for screening in or out of this assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

The approach to in-combination examines the potential for adverse effects associated with the Project alongside the following projects if they fall within the Zone of Influence (ZoI) for relevant European sites:

- Other projects with consent but not yet constructed/construction not completed;
- Other projects in a consent application process but not yet determined (including planning applications, foreshore lease/licence applications, Dumping at Sea Permit applications);
- Other projects currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact; and
- Projects, which satisfy the definition of ‘relevant maritime usage’ under the Maritime Area Planning Act (2021) (i.e. wind farm projects designated as ‘Relevant Projects’ or ‘Phase 1 Projects’) including Arklow Bank II, Bray Bank and Kish Bank; North Irish Sea Array, Codling Wind Park (I and II).

No projects were screened into the in-combination assessment for onshore biodiversity.

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ANNEX 1: INTERTIDAL BIRD SURVEY AND ONSHORE BIRD SURVEY REPORTS

Intertidal Bird Survey for Proposed Landfall Dunany Point, Co. Louth

Produced by

AQUAFACT International Services Ltd

On behalf of

Parkwind

December 2020

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Report Approval Sheet

Client	Parkwind
Report Title	Intertidal Bird Survey for Landfall Dunany Point, Co. Louth
Job Number	JN901
Issue Date	December 2020

Rev	Issue Date	Document File Name	Author (s)	Approved by:
1	December 2020	JN901 Intertidal Bird Survey Dunany Point	TR	

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Introduction

This report contains the results from a baseline intertidal bird survey carried out by AQUAFACT as commissioned by Oriel Windfarms Ltd to cover the landfall sites located to the north (point A) and south (Point B) of Dunany Point, Co. Louth. The counts at Point A took in a period covering two calendar years, December 2017 to December 2019, and one wintering season, September 2018 to March 2019. The survey area north of Dunany Point is located within Dundalk Bay SPA, one of the most important wintering waterfowl sites in the country and one of the few that regularly supports more than 20,000 waterbirds. The survey period for Dunany South began in July 2019 and as such has only six months of data available. This area is outside the Dundalk Bay SPA, see Appendix 4.

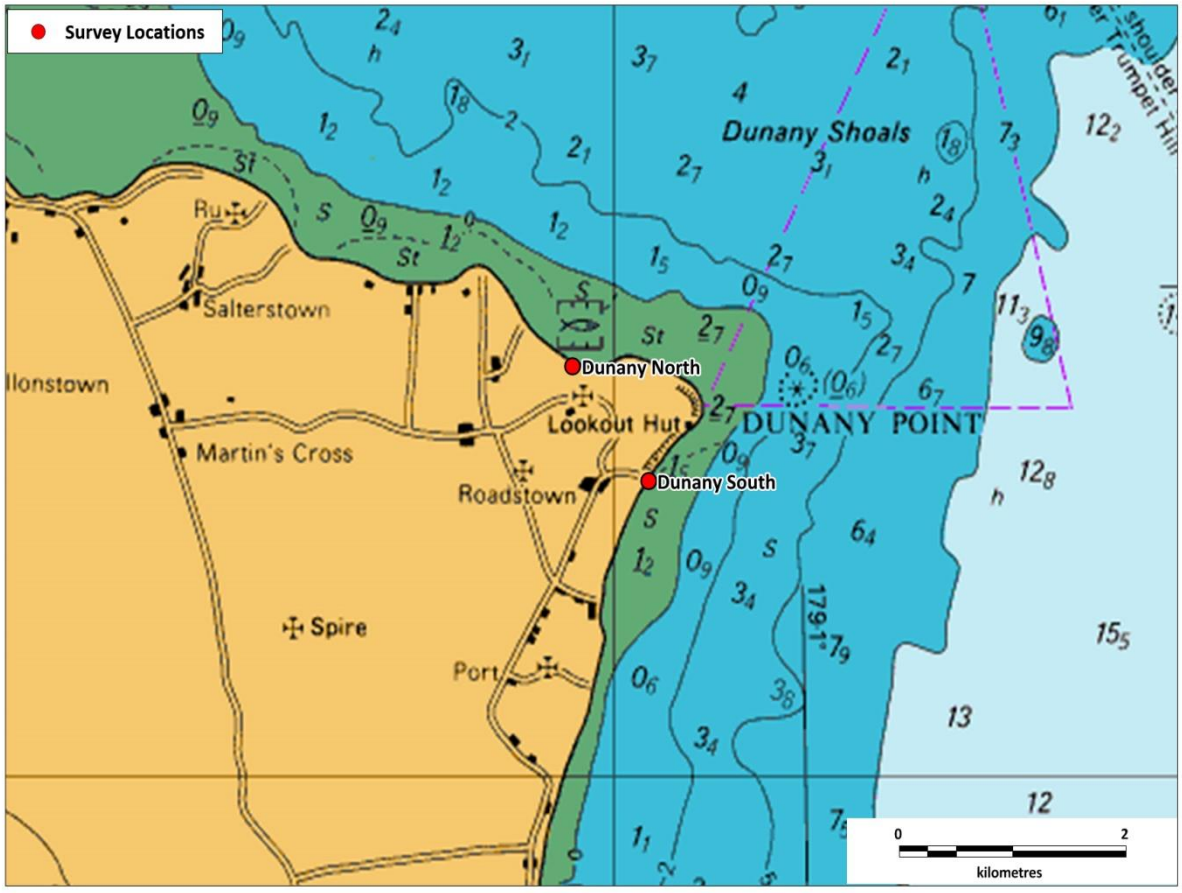

Figure 1: Site locations to north (Site A) and south (Site B) of Dunany Point.

Methodology

The area surveyed encompasses circa 100 metres to the East and 100 metres to the West of the proposed landfall points. A field to the East of the Point A (Dunany North) was also surveyed during the monthly visits as this was noted to be used by migrating birds and waders. The observation point was located in a field raised *ca* 1 metre above the high water mark at Point A and above the upper shore at the end of the road access onto the shoreline at Point B. Surveys are carried out over a six hour period to include 3 hours prior to and 3 hours post high tide (Lewis and Tierney, 2014). Surveys were also carried out to cover a 6 hour period in which low water occurred. Species behaviour, and location of birds are recorded using the designated habitats of subtidal, intertidal, supratidal and terrestrial (Lewis and Tierney 2014). Bird counts are made for a 10 minute period on each hour using both binoculars (10x42 HD) and a telescope. Seashore and seabird species are counted and their behaviour, e.g. foraging, roosting and flying through the site are noted. Environmental conditions such as wind direction, weather, sea state and a qualitative description of the level of turbidity, are recorded throughout. Site disturbances during the survey, i.e. humans, dogs, horses, and their effect on the seabirds are recorded. Disturbances in the survey area can lead to discrepancies in counts and problems in identifying favoured areas used for foraging and roosting through the tidal cycle. The presence of fishing vessels, mainly razor clam suction vessels, was also recorded. Records were also kept of any marine mammals observed during the survey.

Results

3. Dunany North (Point A)

3.1 Abundance

3.1.1 Species of Conservation Interest

The intertidal survey yielded a total of 33 species compromising 4621 individuals. Dundalk Bay SPA has 23 bird species listed as Species of Conservation Interest (SCI), see Appendix 1. Four species occur in numbers of international importance, Light-Bellied Brent Goose, Knot, Bar-tailed Godwit and Black-tailed Godwit, and a further 19 species in numbers of national importance. Of these only Light-bellied Brent Geese and Bar-tailed Godwit were recorded. No counts were made of the SCI species of Greylag Goose, Teal, Pintail, Lapwing, Knot, Black-tailed Godwit and Golden Plover, see Table 1. The seasonal spread for total abundance is represented in Fig. 2.

Table 1. Peak Counts and Total Abundance of SCI species, Dunany North

Species	Peak Count	Total Abundance
Brent Goose	184	353
Shelduck	3	13
Mallard	20	62
Common Scoter	36	84
Red-breasted Merganser	93	326
Great Crested Grebe	1	4
Oystercatcher	300	1911
Ringed Plover	23	48
Grey Plover	6	9
Dunlin	11	17
Redshank	55	371
Bar-tailed Godwit	33	81
Curlew	27	134
Common Gull	16	41
Black Headed Gull	93	360
Herring Gull	81	385

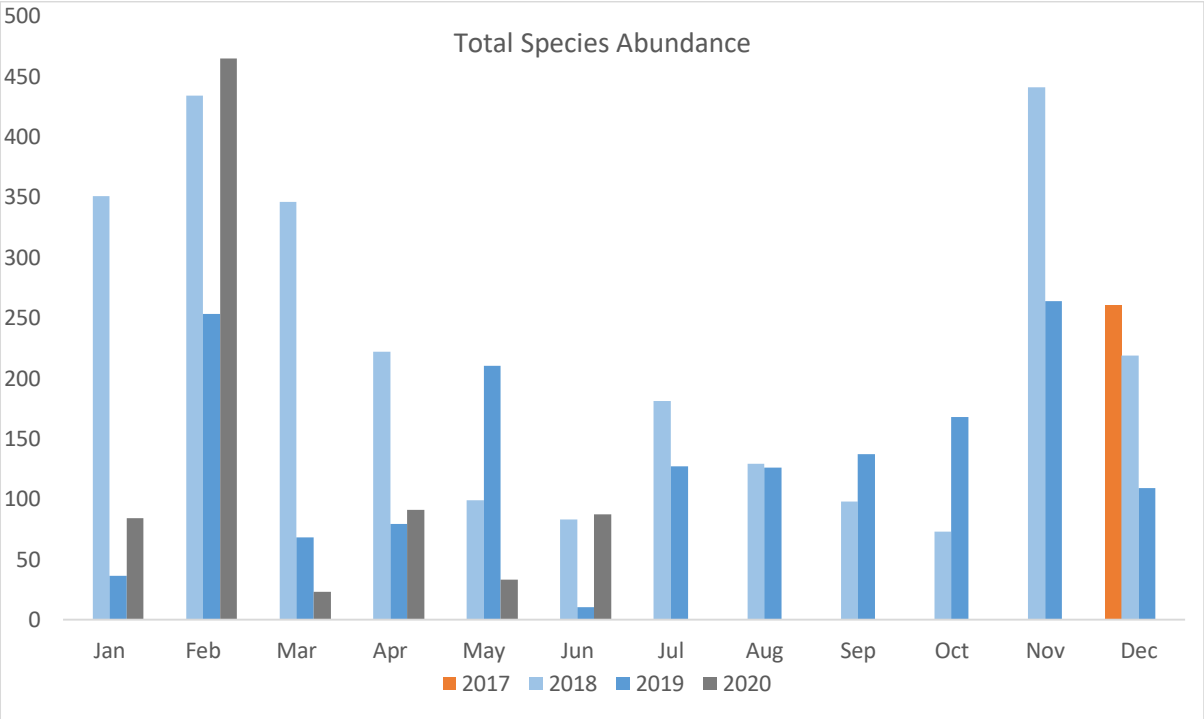

Fig. 2 Total Abundance of all species by month, Dunany North

3.1.2 Waders

Species abundance was dominated by wading birds followed by gulls, see Appendix 1. Numbers of wading birds increase from the months of September through to March with the influx of over-wintering species, see Fig. 3. Unfortunately poor weather conditions during these months have

affected some counts leading to undercounts at times. Most noticeable is the difference in the January counts of 2018 and 2019, this was as a result of poor visibility during the January 2019 count. In March of 2019 Oystercatcher were the only wading bird species recorded with all counts low on that occasion. The top wading birds are represented in Fig. 4.

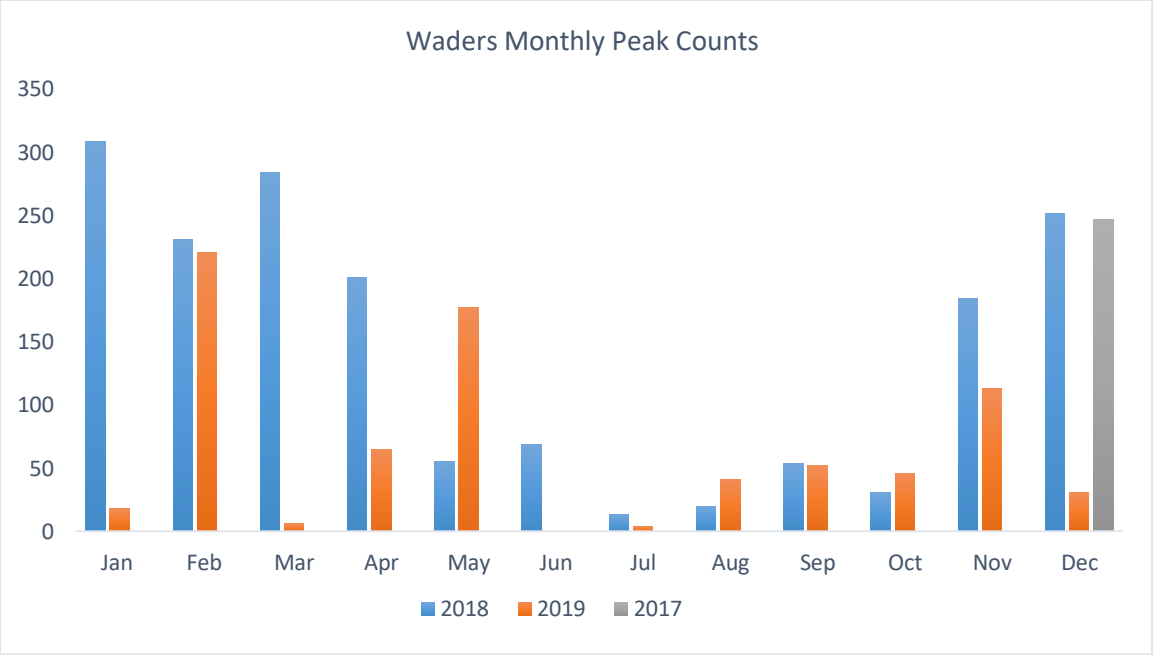

Fig. 3 Peak Counts of wading birds, Dunany North

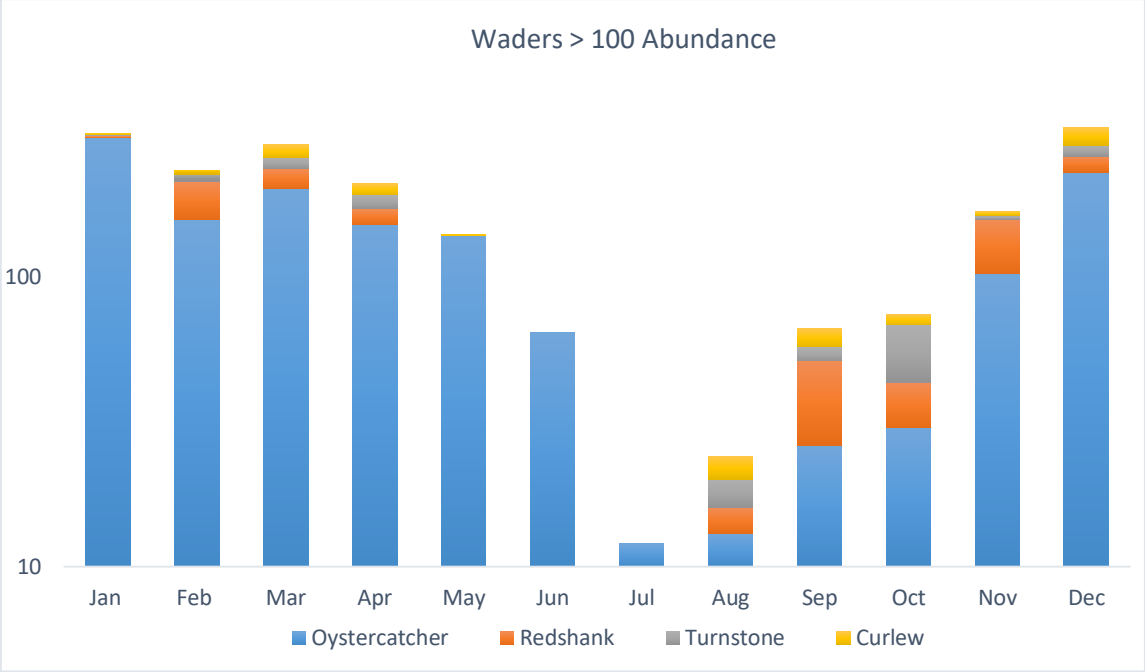

Fig. 4 Peak Counts of wading birds >100 total individuals, Dunany North

3.1.4 Gulls and Terns

Black-headed Gulls and Herring Gulls, both SCI species, dominated the survey counts particularly in the late summer to early winter months, see Fig 5. Low numbers of Common Gulls and Great and Lesser Black-backed Gulls were recorded throughout the survey period.

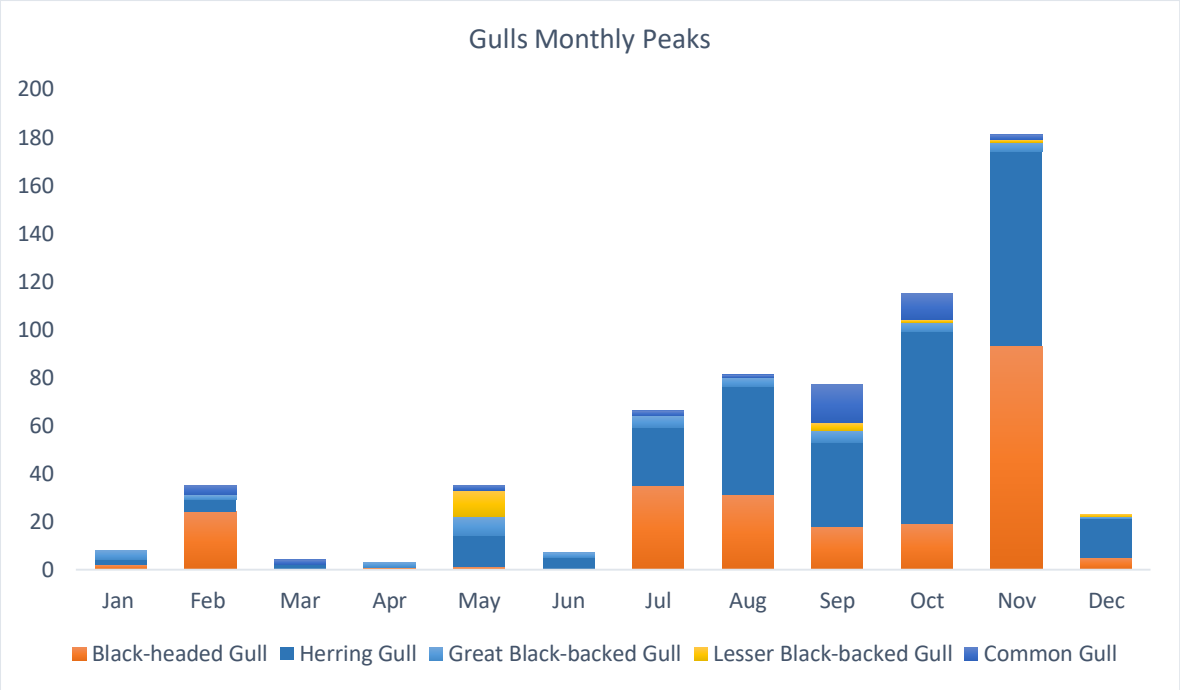

Fig. 5 Monthly peaks for Gull species, Dunany North

Three species of Terns, Common, Arctic and Sandwich were recorded during the summer months of May to September. Common Tern had a peak count of 3 in July 2019 while both other Tern species had peak counts of 2 during the summer months.

3.1.3 Wildfowl

The most abundant species of wildfowl recorded were Light-bellied Brent Geese (Peak: 184) and Red-breasted Merganser (Peak: 96), see Fig. 6. Numbers of Red-breasted Mergansers were boosted with three large counts in July 2018 (93), August 2018 (90) and July 2019 (96). After these three counts the next highest fell to 8 individuals in January 2019. Other SCI wildfowl species recorded occurred in very low numbers. Shelduck (Peak: 3), Mallard (Peak 20) and Common Scoter (Peak 36). The peak count of 36 (Nov 2018) for Common Scoter is followed next by 13 (Dec 2018), thereafter no peak count exceeds 5 individuals.

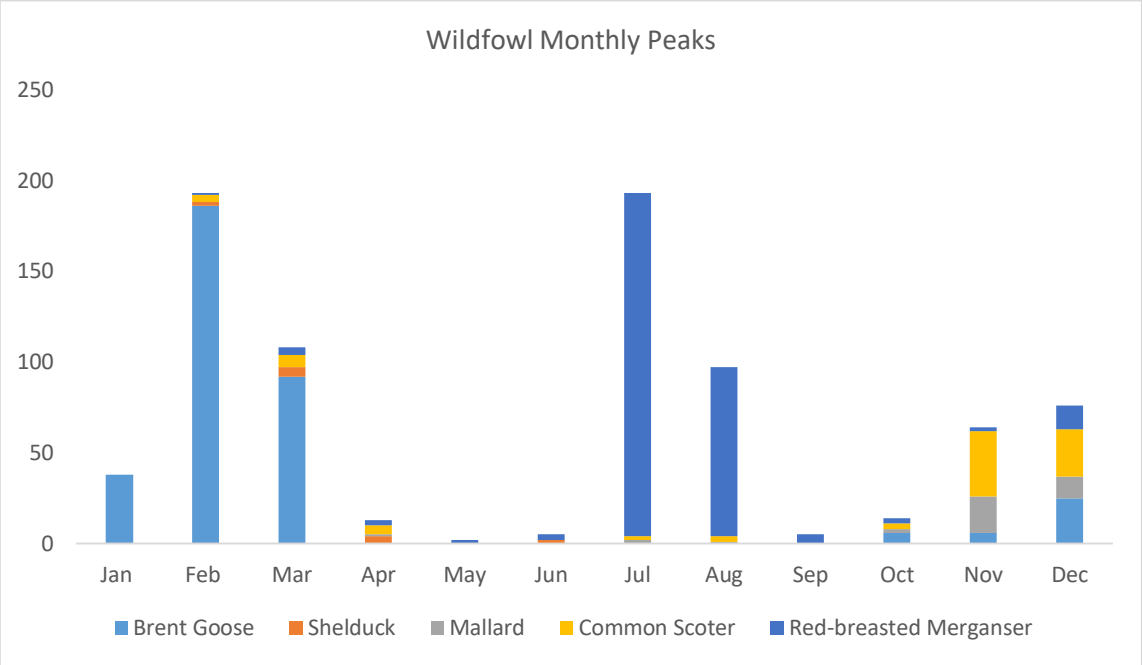

Fig. 6 Monthly peaks for Wildfowl species, Dunany North

3.1.5 Other Species

Other species were recorded in the survey flying through to a maximum distance of 1km from the observation point. Of the other species observed, see Fig. 7, only Cormorant, Heron and Little Egret were recorded intertidally. Cormorants were most abundant as they flew through the survey area before roosting on wooden posts to the west of the survey area. Herons and Little Egrets were observed foraging intertidally. Great Northern Divers were also observed regularly on nearly one in every two surveys (44%), although in low numbers.

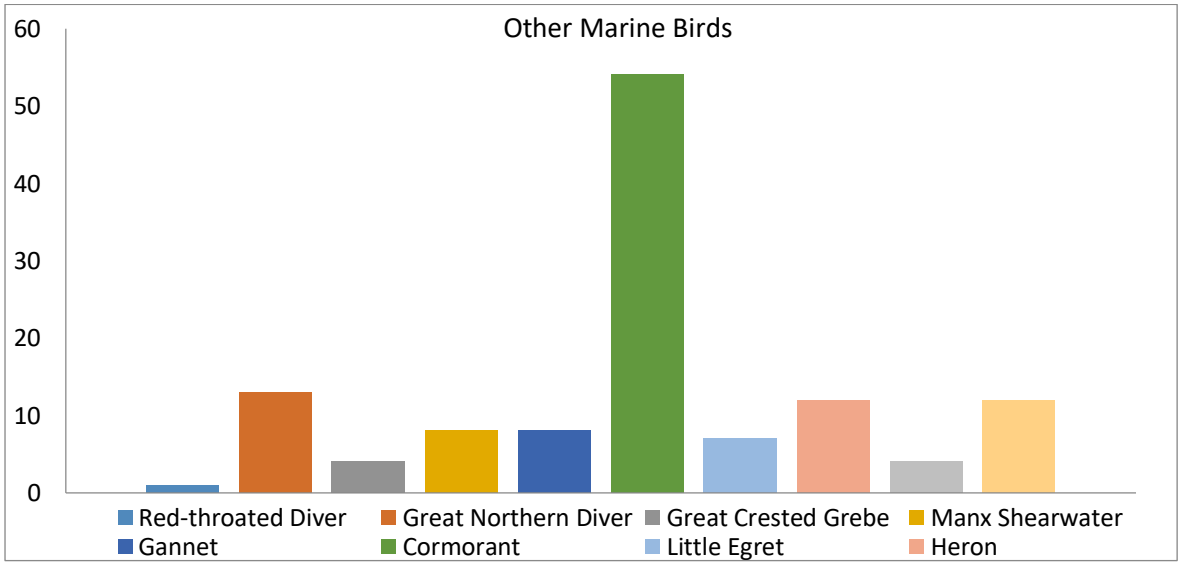

Fig. 7 Total abundance of other marine bird species recorded, Dunany North

3.2.6 Marine Mammals

Marine mammal sightings were recorded over the course of the surveys. A single Grey Seal was recorded during the January, May and July 2019 counts. A single observation of a Harbour Porpoise was recorded in January 2019.

3.2 Distribution and Behaviour

3.2.1 Roosting Sites

Two main supratidal roosting areas were recorded at high water both lying outside the landfall area. The field to the east of the observation point is the only terrestrial habitat used for roosting, see Appendix 3 for list of species and abundance. The main supratidal roosting area was a rocky headland circa 200 metres east of the observation point, see Fig. 8. This was used all year round and by large numbers of gulls and waders equally. This rocky substrate is dominated by gulls with small numbers of Oystercatchers observed foraging in the rocks on occasion. During low tide a small area of sandy substrate in front of the observation point at the upper end of the intertidal zone has been used by black headed gulls for roosting, see Fig. 8. Intertidal wooden posts located to the east of the landfall area are used by roosting cormorants.

November 2018 recorded the highest abundance of roosting birds within the field with 5 species numbering 356 in total peak counts, see Appendix 3. Black-headed Gulls, 152, Oystercatcher, 102, and Redshank, 55, dominated. There were no intertidal species recorded in the field during the Spring/Summer months of April – September. The presence of horses, which are absent in the Autumn/Winter months, along with the natural decrease in birds during the breeding season explain the absence of roosting birds.

Large flocks of Red-breasted Mergansers containing >90 individuals at peak counts, see Appendix 1, were recorded roosting subtidal between 50 and 100 meters from the shoreline.

3.2.2 Foraging Sites

Intertidal foraging is mainly concentrated on two areas circa 50 metres to the east and to the west of the observation point, see Fig. 8, The rocky sandy substrate to the north east of the observation point (B) is dominated by waders such as Oystercatcher, Redshank, Turnstone and Bar-tailed Godwit. The foraging area to the west (A) with the same rocky sandy substrate is dominated by gulls and

Oystercatchers. Curlews were observed foraging between both sites and along the shoreline at low water.

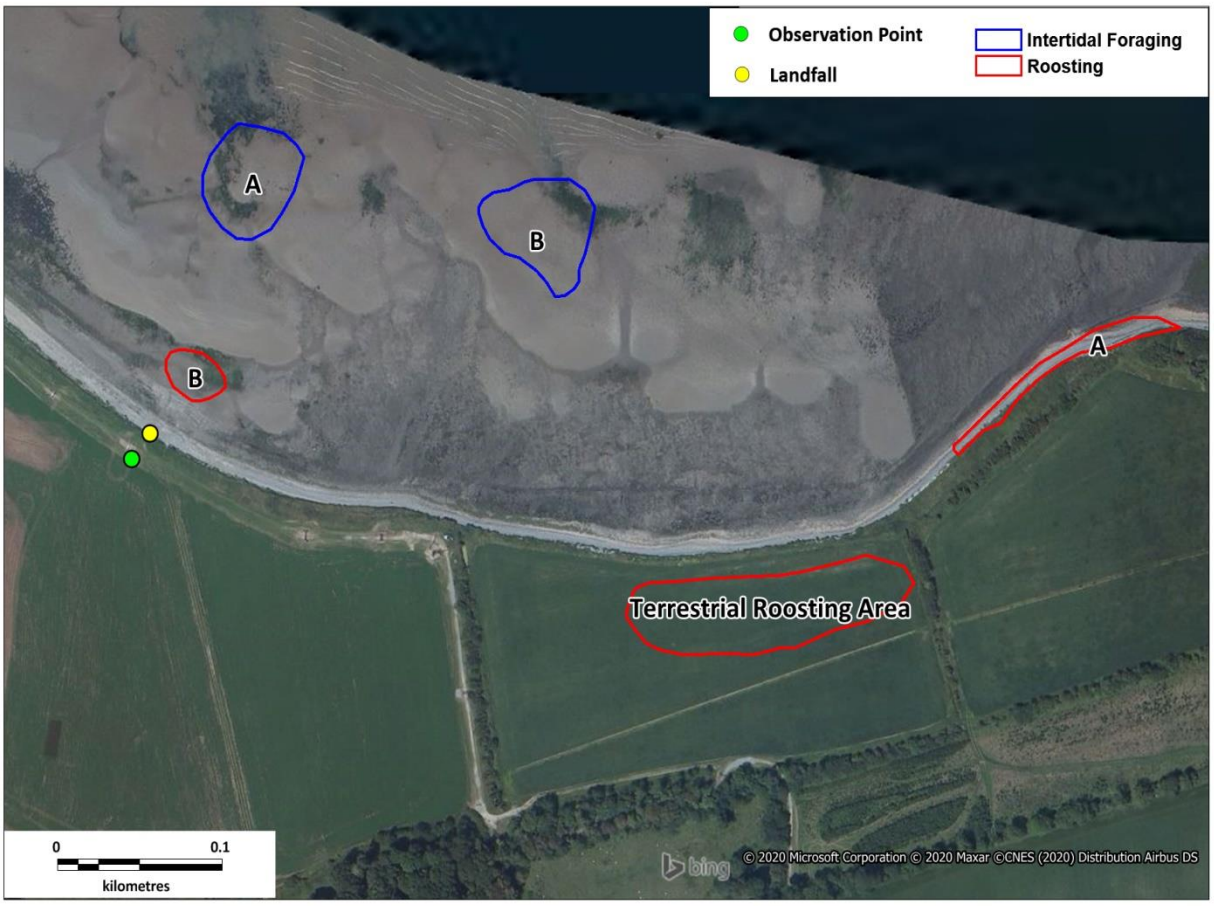

Fig. 8 Intertidal and terrestrial roosting and Foraging sites, Dunany North

4. Dunany South (Point B)

4.1 Abundance

4.1.1 All Species

Over the 12 month intertidal survey period a total of 718 individuals were counted constituting 23 different species. Total species seasonal spread represented in Fig. 9. The Dunany South landfall was dominated by gulls as opposed to waders unlike the Dunany North landfall.

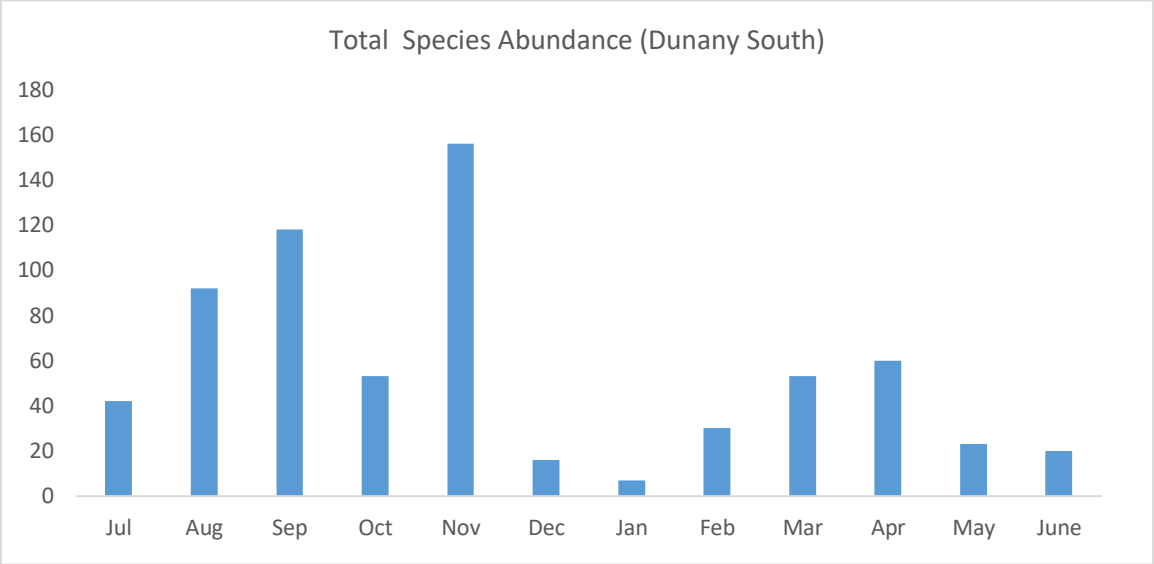

Fig. 9 Total Abundance of all species, Dunany South

4.1.2 Waders

As per Dunany North the Oystercatchers were the most abundant wading bird species with a total count of 93, see Fig. 10, and occur most frequently with only the July survey not recording their presence. Ringed plover, observed in July and September, are the second most abundant wading bird, 55 total individuals, but sit behind both Curlew and Redshank in terms of frequency of observations. A large flock of Ringed Plover, 50, were counted in September thus increasing its overall abundance. This number is far greater than the next largest count of 38 Oystercatcher, also in September. The November count was hampered by strong winds, heavy rain and poor visibility. This may have led to an undercount in small wading birds or their presence in a more sheltered area.

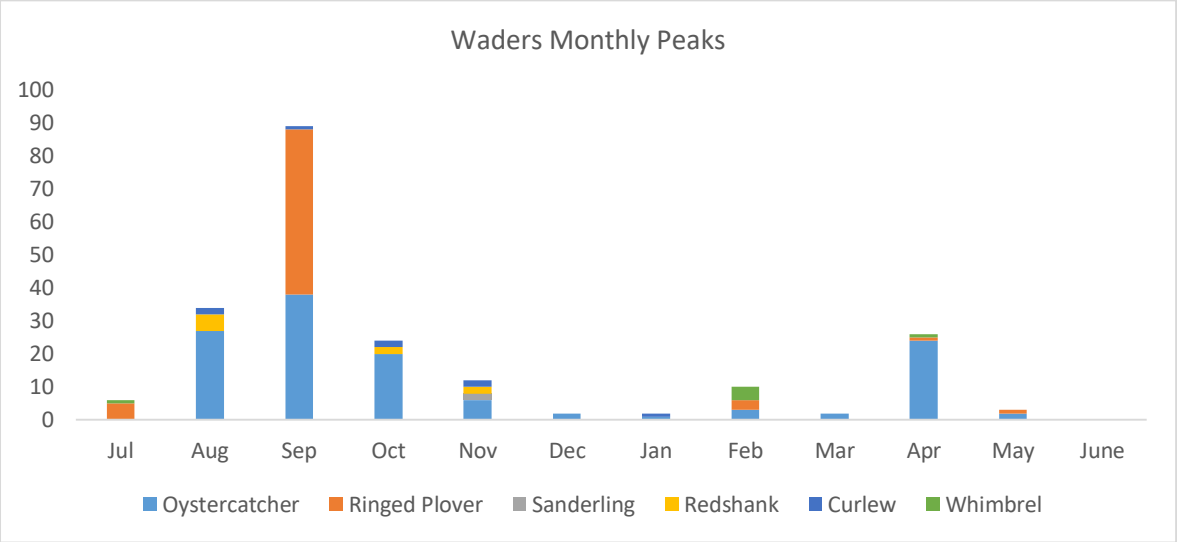

Fig. 10 Monthly peaks for Waders, Dunany South

4.1.3 Gulls and Terns

Dunany South counts have been to date dominated by gull species with an overall abundance of 323 individuals, see Fig. 11.

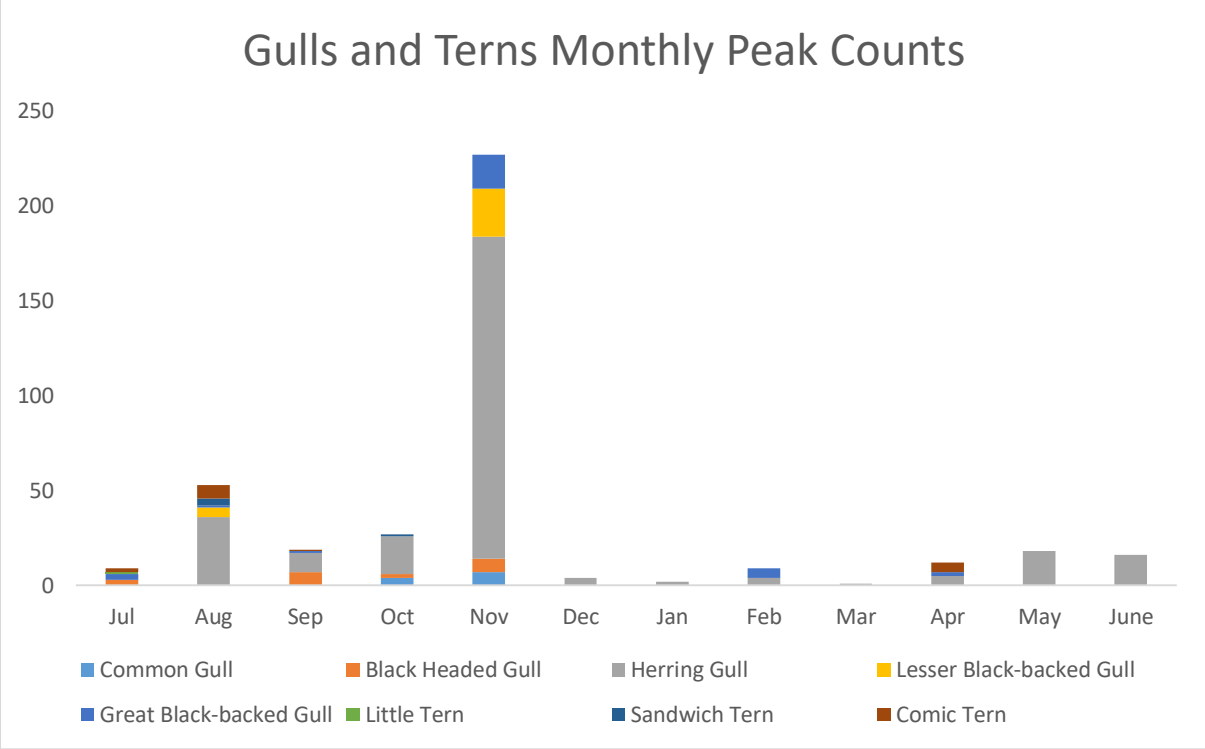

Fig. 11 Monthly peaks for Gulls, Dunany South

Herring gulls make up the greatest abundance with a total of 240 and were recorded on all but the July count. They also had a peak count in November of 170. Great Black-backed and Lesser Black-backed Gulls numbered 18 and 25 individuals respectively during the November survey.

Counts were also made of Little Terns, Sandwich Terns and a species recorded as Comic Terns (where not possible to distinguish between Arctic and Common Tern). These totals have not been graphed as there was only 3 species with a total combined count of 16 individuals, Little Tern; 1, Sandwich; 5 and Comic; 10.

4.1.4 Wildfowl

As with Tern species wildfowl numbers were low with only one count of Brent Geese recorded, 17 in November, and two counts of Red-breasted Merganser recorded, 2 in August and 8 in December.

4.1.5 Other Species

Of the remaining 7 species of birds recorded over the six month period July saw the most recordings with 4 different species, see Fig 12. Cormorants were the most frequently occurring of the remaining species and Manx Shearwater had the greatest abundance, 15, despite only being observed in July.

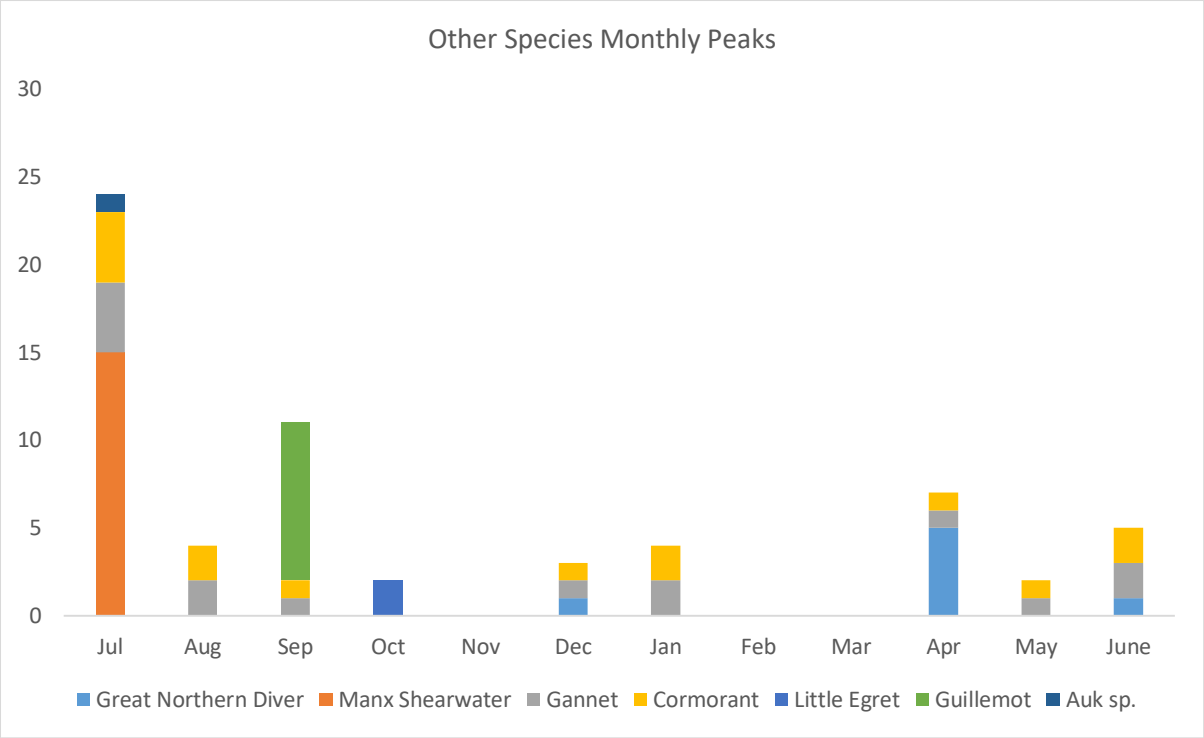

Fig. 12 Total monthly abundance of other marine birds recorded, Dunany South

4.1.6 Marine Mammals

Only one recording was made of a marine mammal during the survey period. On the July count 1 Grey Seal was observed inshore during a falling tide.

4.2 Distribution and Behaviour

The main roosting area lies circa 200m north of the observation point (A) with another area further north (B) on the southern side of Dunany Point, see Fig. 13. The area nearer to the observation point (A) was seen to support a majority of gulls while the area further north (B) also contained some roosting Cormorants.

Foraging behaviour in low numbers by waders, gulls and a flock of Brent geese has been observed at the water line and a rocky area circa 100 meters to the north of the observation point. The greatest

number of birds observed feeding in the area was a flock of 50 oystercatchers which had moved from down the southern end of the beach outside the landfall area due to the presence of dogs on the beach.

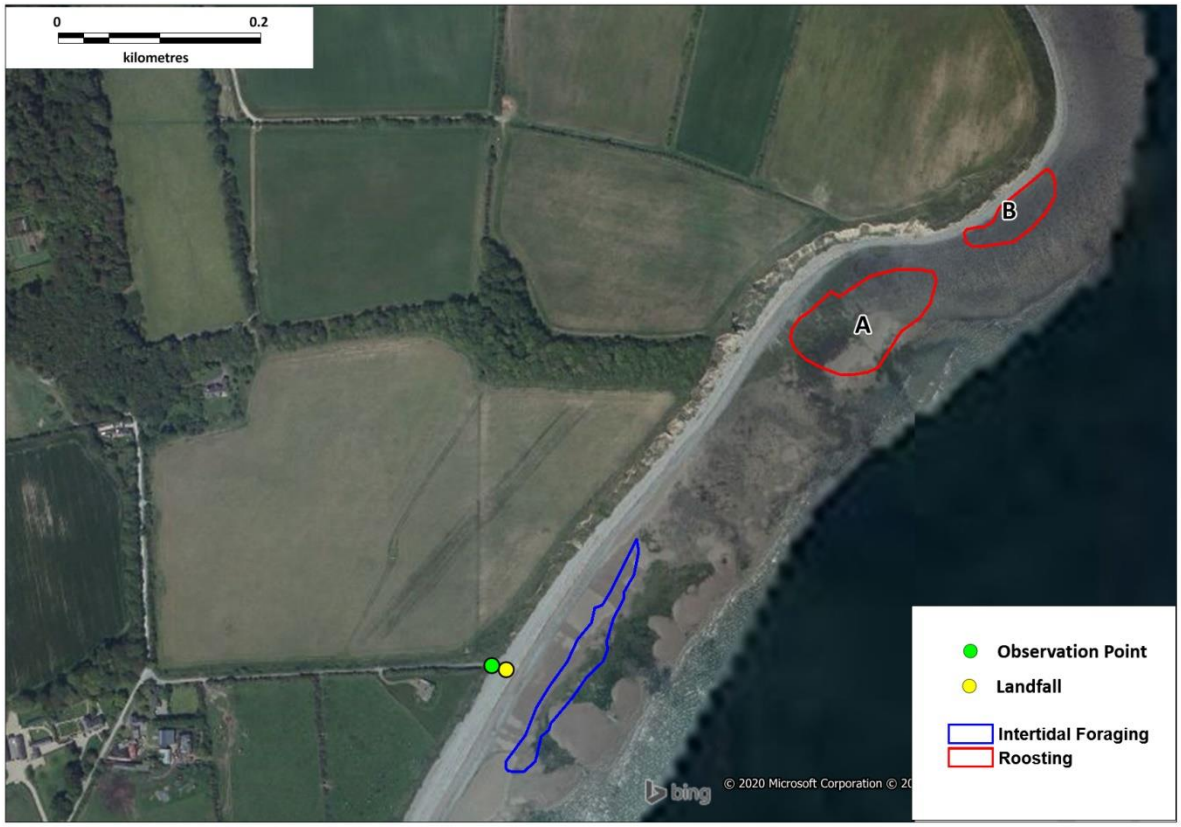

Fig. 13 Intertidal Foraging and Roosting sites, Dunany South

Discussion/Conclusions

Dunany North was surveyed over a two year period and as such the results herein can be taken to accurately reflect the population of seabirds at the location. The site referred to as Dunany South was surveyed over a 12 month period observing any breeding and winter migratory species present.

Seasonal populations follow the expected trends with an increase of waders during the wintering months and low numbers during the summer breeding months. At the Dunany North site the most abundant wading bird; Oystercatcher, increased greatly in numbers during the November to April months of 2018 and 2019. Both Herring Gull and Black-headed Gull numbers declined during the summer months suggesting there is no breeding area within the vicinity of the landfall site at Dunany North. Terns were recorded in small numbers during the summer months of May to September. One Little Tern was recorded at Dunany South in July. While the Little Tern colony at Baltray south of Clogherhead has failed in settling and breeding for a second successive year (source:

BirdWatch Ireland) it is also considered to be too distant from the landfall of either the northern or southern sites at Dunany Point. The tern colonies at Rockabill (Roseate Terns) and Carlingford (Sandwich and Common Terns) are also considered to be at too great a distance from the landfall sites to be effected by disturbances.

Light-bellied Brent Geese are an over-wintering species in Ireland and are also one of two species of international importance within Dundalk SPA. According to I-WeBS (Irish Wetland Bird Survey) data 2012 – 2017 the Salterstown subsite, see Appendix 5, which contains the survey area of Dunany North, only accounts for 2.8% of the total population of Brent Geese within Dundalk Bay. This makes it the least abundant subsite within the SPA in terms of Brent Geese. Greylag Geese are a qualifying interest in Dundalk SPA and the nearby Stabannan-Braganstown SPA. No Greylag Geese were recorded at either the northern or southern landfalls though the sites are both within their winter foraging distances, 15- 20km (Mitchell C., 2012). Red-breasted Mergansers, also an SCI species, were observed in large flocks roosting subtidal within the Dunany North survey area during the months of July and August. Normally occurring in only small numbers of individuals this significant increase during the breeding season supports the presence of a nearby breeding site.

Rare but noted observations are the large flock of *ca* 1000 Whimbrel recorded flying to the south of the landfall area and the presence of a Little Stint both recorded at Dunany North. Bar-tailed Godwit were recorded during 5 surveys at Dunany North for a total abundance of 81 individuals. While this number is low the I-WeBS data 2012 – 2017 (source: Birdwatch Ireland) has no record of any Bar-tailed Godwit observed at the Salterstown subsite. Almost the entire abundance was made up of two roosting flocks recorded in February (33 indv.) and May (40 indv.). Due to the fact that there have been no records of Bar-tailed Godwits in this area and that they were observed roosting in both intertidal and terrestrial sites within the landfall area it would be important to observe if this is a new trend in the use of this site by this species.

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Appendix 1

Peak and Mean Counts for Dunany North (Point A) Landfall

Species	Dec '17	Jan '18	Feb '18	Mar '18	Apr '18	May '18	June '18	July '18	Aug '18	Sep '18
Brent Goose	6	38	184	42						
Shelduck			2	2	2		2			
Mallard								2		
Common Scoter	4			5	2				3	
Red-breasted Merganser			1	2	2		3	93	90	3
Red-throated Diver										
Great Northern Diver			1	2	2					
Great Crested Grebe			1	1	1					
Manx Shearwater										
Gannet						6	2		3	
Cormorant		1	6	8	5	1	1	2	1	5
Little Egret						1				
Heron	1				1	1				
Oystercatcher	150	300	156	200	150	37	64	12	13	26
Ringed Plover							2			
Grey Plover		1		1		6				
Turnstone	23	4	12	21	13					6
Dunlin						11	3			
Little stint										
Redshank	31	2	55	35	21				3	20
Bar-tailed Godwit										
Curlew	43	2	8	27	17	1			4	2
Whimbrel								1		
Common Gull						2		2		16
Black Headed Gull			3		1	1		35	2	
Herring Gull	2	2	3			13	4	24	3	14
Great Black-backed Gull		1	2		2	8	2	5	2	3
Lesser Black-backed Gull						11				
Sandwich Tern								2		
Common Tern									2	2
Arctic Tern									2	
Comic Tern					3			3		
Guillemot									1	1
Auk sp.										

Species	Oct '18	Nov '18	Dec '18	Jan '19	Feb '19	Mar '19	Apr '19	May '19	June '19	July '19
Brent Goose	6		4		2	50				
Shelduck						3	2			
Mallard		12	12				1			
Common Scoter	2	36	13		4	2	3			
Red-breasted Merganser	3	2	7	8		2	1	2		96
Red-throated Diver		1								
Great Northern Diver		1	1		2	1	1	1		
Great Crested Grebe					1					
Manx Shearwater							2			6
Gannet	1		1			1	1	3	3	1
Cormorant	2	5	2	3	2		1	3	1	2
Little Egret										3
Heron		1				1		1	1	
Oystercatcher	16	102	228	12	144	6	30	138		3
Ringed Plover		4					2			
Grey Plover										
Turnstone		18	2	2			20			
Dunlin										
Little stint							2			
Redshank	13	55	19	4	37		6			
Bar-tailed Godwit					40			33		
Curlew	2	5	3							
Whimbrel							5	6		1
Common Gull					4					
Black Headed Gull	19	152	5	2	24					8
Herring Gull	5	36	2	1	5	2		4	5	3
Great Black-backed Gull	4	15	1	4				15		1
Lesser Black-backed Gull			1					1		
Sandwich Tern								1		
Common Tern										3
Arctic Tern										
Comic Tern							2	2		
Guillemot										
Auk sp.										

Species	Aug '19	Sep '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20	Mar '20	Apr '20	May '20	Jun '20	Species Abundance
Brent Goose				6	15	62	55	5	12			487
Shelduck						2		2	2			19
Mallard	1		2	20	12			4				66
Common Scoter			1		9			4				88
Red-breasted Merganser	3	2			6				2			328
Red-throated Diver												1
Great Northern Diver					1	1						14
Great Crested Grebe												4
Manx Shearwater												8
Gannet	1	1						1	1			26
Cormorant	1	1			1	1	1	2		2	1	61
Little Egret		1	1	1						1		8
Heron		4	1					1				13
Oystercatcher	7	16	30	56	15	6	78	1			2	1920
Ringed Plover	23				17					2	1	51
Grey Plover					1							9
Turnstone	4			25	5		24					179
Dunlin	3										66	83
Little stint												2
Redshank	1	25	10	27	7	2	47	1				405
Bar-tailed Godwit		2		5	1							81
Curlew	3	9	6		2	3				1		138
Whimbrel												13
Common Gull	1		11	5			28					69
Black Headed Gull	31	18	24	35			5					365
Herring Gull	45	35	80	81	16	5	226	2	37	25	14	694
Great Black-backed Gull	2	5	1	2	1	2	1		3	2	3	83
Lesser Black-backed Gull		3	1	1								18
Sandwich Tern		1										4
Common Tern												7
Arctic Tern												2
Comic Tern												10
Guillemot		2										4
Auk sp.		12										12

Appendix 2

Species recorded in Field East of Survey Site

Species	Jan-18	Feb '18	Mar '18	Oct '18	Nov '18	Dec '18	Feb '19	Mar '19	Oct '19	Jan '20	Feb '20	Apr '20
Herring Gull					36							
Black-headed Gull					152							
Great Black-backed Gull					11							
Oystercatcher					102	78	±130				78	
Redshank					55	15	12				47	
Shelduck		2	2					3		2		2
Mallard						12			2			
Bar-tailed Godwits							±40					
Turnstone												
Brent Goose	6	184	42	6		4	2	50		62	55	

Appendix 3

Peak and Mean Counts for Dunany South (Point B) Landfall

Species	July '19	Aug '19	Sep '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20	Mar '20	Apr '20	May '20	Jun '20	Species Abundance
Brent Goose					17			11					28
Shelduck													0
Mallard													0
Common Scoter													0
Red Merganser		2				8	1						11
Red-throated Diver													0
Great Northern Diver						1				4		1	6
Great Crested Grebe													0
Manx Shearwater	15												15
Gannet	7								50	3		1	61
Cormorant	4	2	1			1	2			2	1	2	15
Little Egret				2									2
Heron											1		1
Oystercatcher		27	38	20	6	2	1	3	2		2		101
Ringed Plover	5		50					3			1		59
Grey Plover													0
Turnstone													0
Sanderling					2								2
Dunlin													0
Little stint													0
Redshank		5		2	2								9
Bar-tailed Godwit													0
Curlew		2	1	2	2		1	4					12
Whimbrel	1												1
Common Gull				4	7								11
Black Headed Gull	3		7	2	7								19
Herring Gull		36	10	20	170	4	2	4	1		18	16	281
Great Black-backed Gull	3	1	1		18			5					28
Little Tern	1												1
Lesser Black-backed gull		5			25								30
Sandwich Tern		4		1									5
Common Tern													0
Arctic Tern													0
Comic Tern	2	7	1										10
Razorbill													0
Guillemot			9										9
Auk sp.	1												1
Unidentified Wader					1								1

Appendix 4

Qualifying Interests for Dundalk Bay SPA

Species	QI
Great Crested Grebe	A005
Light-bellied Brent Goose	A043
Greylag Goose	A046
Shelduck	A048
Teal	A052
Mallard	A053
Pintail	A054
Common Scoter	A065
Red-breasted Merganser	A069
Oystercatcher	A130
Ringed Plover	A137
Golden Plover	A140
Grey Plover	A141
Lapwing	A142
Knot	A143
Dunlin	A149
Black -tailed Godwit	A156
Bar-tailed Godwit	A157
Curlew	A160
Redshank	A162
Black Headed Gull	A179
Common Gull	A182
Herring Gull	A184

Source: National Parks and Wildlife https://www.npws.ie/protected-sites/spa/00402

Appendix 5

I-WeBS Dundalk Bay and Subsites

Dundalk Bay I-WeBS subsites

January 6, 2020

1:288,895

0 1.5 3 6 mi
0 2.25 4.5 9 km

Dundalk Bay; I-WeBS subsite Salterstown

November 4, 2019

★ Observation Point

1:36,112

0 0.17 0.35 0.7 mi
0 0.28 0.55 1.1 km

Appendix 6

Brent Goose I-WeBS Counts for Dundalk Bay and Salterstown Subsite

Site	Species	2012/13	2013/14	2014/15	2015/16	2016/17	Mean	Overall peak
Dundalk Bay	Light-bellied Brent Goose	1861	1800	1462	2337	1856	1863	2337
Salterstown		-	161	2	82	14	52	161

Bird Survey for a Proposed Cable Route from Dunany Point to the Ardee 220Kv line, Co. Louth

Produced by

AQUAFACT International Services Ltd

On behalf of

Oriel Windfarm Limited

March 2021

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Report Approval Sheet

Client	Parkwind
Report Title	Bird Survey along cable route from Dunany Point to Ardee 220Kv cable line, Co. Louth.
Job Number	JN901
Issue Date	March 2021

Rev	Issue Date	Document File Name	Author (s)	Approved by:
1	March 2021	JN901 Bird Survey Dunany Point – Ardee	Tom Rea	Brendan O'Connor

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Introduction

Oriel Windfarms Ltd commissioned AQUAFACT to carry out a survey of birds along a proposed cable route from Dunany Point to the 220Kv ESB cable line, east of Ardee (see Figure 1 below). The route was surveyed on a monthly basis over the period October 2018 to December 2019. The route follows existing roadways along its entire length.

Figure 1: Proposed cable route from Dunany Point to the 220Kv ESB cable line east of Ardee.

As can be seen on Figure 1, the route starts just south of Dunany Point and runs in a southeasterly direction for *ca* 4 km before turning west and continuing for a further 14 km. It then turns north for *ca* 1.5 km and turns west again where it crosses the River Dee and continues west crossing the M1 and the River Dee again before terminating at the ESB 220Kv cable line *ca* 2.5 km east of Ardee.

There is one Special Protection Area (SPA) close the proposed route and that is the Stabannan-Braganstown SPA (site code 004091) which has just one Species of Conservation Interest which is the

Grey Lag Goose (*Anser anser).* This SPA site is *ca* 2 km to the north of the route and *ca* 2 km west of the M1.

Methodology

Except for one location (the site just west of the M1), the cable route was divided into 500m lengths and were labelled CR1 closest to Dunany Point to CR30 at the ESB220 Kv cable line.

At each location, the area was examined birds present within *ca* 10 m of either side of the road side whether in the air, on the ground or in trees were identified (either by eye or using 10 x 50 magnification binoculars).

Results

Habitat types along the cable route include non-irrigated arable land, pastureland and complex cultivation patterns (see Figure 2 below showing Corine habitats along the cable route).

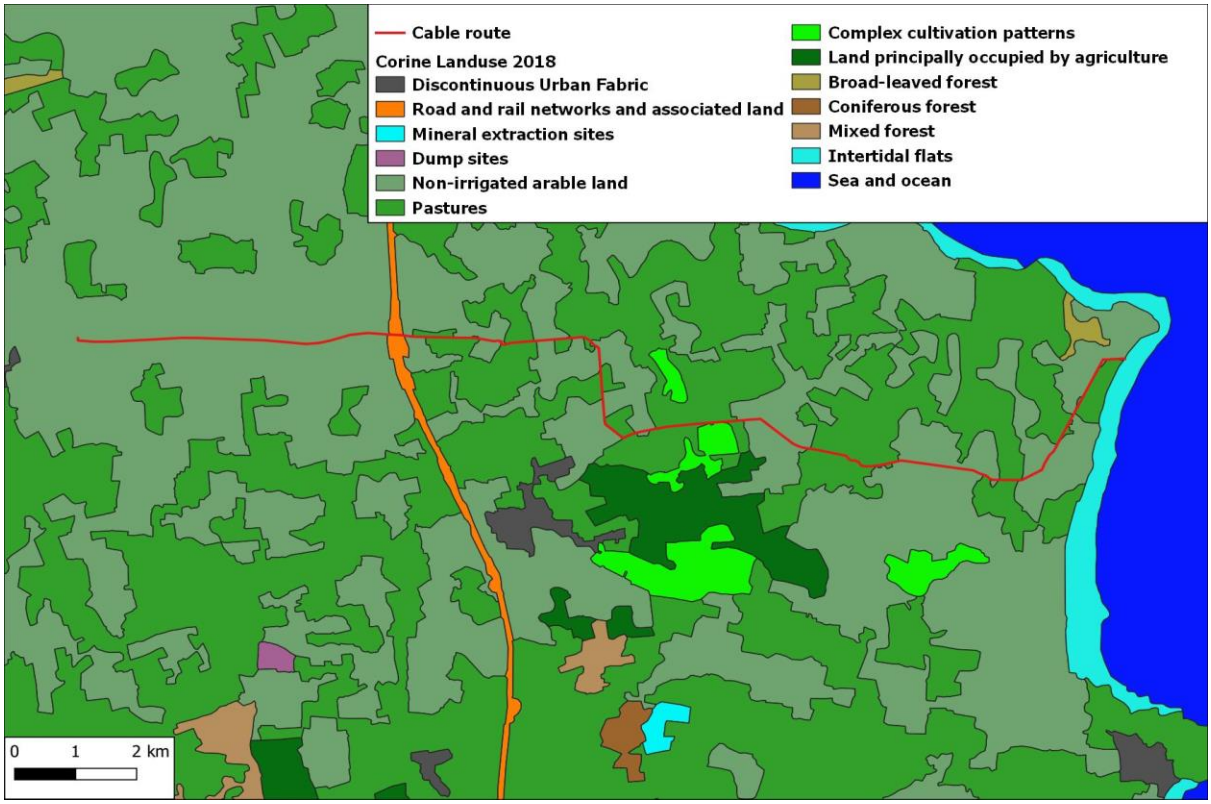

Figure 2. Corine habitats along the cable route.

Other habitats along the route include hedgerows and treelines, copses, rivers and private dwellings with gardens.

With regard to birds, the survey returned a total of 53 bird species and the records for each species is presented below.

Mute swan, *Cygnus olor*. Mute swan is a resident species in Ireland and two were seen overflying the cable route at CR12 from south to north in March 2019. It is presumed the birds were flying to the nearby Simonstown Lake.

Whooper swan, *Cygnus cygnus*. Whooper swan is a winter visitor to Ireland and flock of up to thirty five birds was regularly seen feeding on grassland in fields east of CR17 in the townland of Drumcar between the months of November 2018 to March 2019 and November and December of 2019. This area is *ca* 1km east of the cable route.

Mallard, *Anas platyrhynchos*. Mallard is a resident species in Ireland. A pair was seen overflying the cable route at CR10 (March 2019) and at CR19 (November 2018).

Pheasant, *Phasianus colchicus*. Pheasant is a resident species in Ireland. There were several sitings of single male birds: October 2018: CR5, CR14, CR19, CR27; March 2019: CR3, CR11, CR30; May 2019: CR2, CR8, CR21, CR27; July 2019: CR9, CR14, CR20, CR27; September 2019: CR1, CR4, CR16, CR20, CR25 and one siting of 2 males and 5 females in June 2019 at CR10.

Cormorant, *Phalacrocorax carbo*. Cormorant is a resident species in Ireland. There was one siting of a bird flying in a south easterly direction out to sea over the cable route at CR1.

Heron, *Ardea cinerea*. Heron is a resident species in Ireland. Single birds were recorded flying over the cable route on the following months and at the listed locations. November 2018: CR3, CR28; December 2018: CR18 and CR 24; March 2019: CR2, CR10, CR18, CR26; May 2019: CR1, CR11, CR19, CR24; July 2019: CR12, CR18, CR26; September, 2019: CR11, CR12, CR18 and CR22; November 2019:CR10, CR17, CR19, CR30.Some of these locations are close to the River Dee and it is speculated that the birds were making passage to or from the river.

Buzzard, *Buteo buteo*. Buzzard is a resident species in Ireland. Individual birds were observed flying over the cable route between CR1 and CR5 in April 2019 and in the same area in July 2019 and September 2019. Two birds were seen flying over the area between CR15 and CR17 in August 2019.

Sparrowhawk*, Accipiter nisus*. Sparrowhawk is a resident species in Ireland. Individual birds were recorded at CR6 and CR26 in October 2018, at CR11 in January 2019, at CR29 September 2019 and at CR19, December 2019.

Kestrel, *Falco tinnunculus*. Kestrel is a resident species in Ireland. Individuals were recorded flying/hovering in the vicinity of the cable route in January 2018 at CR7, in March 2019 at CR6, in May 2019 at CR20, and in September 2019 at CR14.

Lapwing*, Vanellus vanellus.* Lapwing is a resident species in Ireland. Single birds and small flocks (less than 10) were seen in December 2018 at CR14 and CR19, In January 2019 at CR6 and CR13, and in November, 2019 at CR15 and CR21.

Curlew, *Numenius arquata.* Curlew is a resident species in Ireland. One flock of 22 birds was recorded flying in a northwesterly direction over the cable route in November, 2018 at CR3. Another flock of 14 birds was recorded in February 2019 flying over the cable route at CR1 in the same direction and in October 2019, a flock of 19 birds was recorded flying over the cable route at CR4 in a southeasterly direction. It is presumed that the birds were making local migrations to/from Dundalk Bay.

Whimbrel, *Numenius phaeopus*. Whimbrel is a passage migrant northwards through Ireland in Spring on its migration to Iceland and other Arctic parts northern European countries. Large flocks (hundreds of birds) were recorded in May 2019 and June 2019 flying and calling over the cable route at CR 1 and CR2.

Woodcock, *Scolopax rusticola.* Woodcock is resident species in Ireland. Single birds were recorded in November 2018 at CR8 and CR28 and again in November 2019.

Snipe, *Gallinago gallinago*. Snipe is a resident species in Ireland. A single bird was set up at CR24 close to the River Dee on January 2019.

Black headed Gull, *Crocriocephalus ridibundus*. Black headed Gull is a resident species in Ireland. It was recorded commonly along in farm land adjacent to the cable route particularly during periods when slurry was being spread on fields.

Herring Gull, *Larus argentatus.* Herring Gull is a resident species in Ireland. Like the Black headed Gull, it was recorded commonly along in farm land adjacent to the cable route particularly during periods when slurry was being spread on fields.

Greater Black backed Gull, *Larus marinus.* Greater Black backed Gull is a resident species in Ireland. It was recorded in agricultural lands at CR1 – CR 4 in November and December 2018

Wood Pigeon, *Columba palumbus.* Wood Pigeon is a resident species in Ireland. Over the period of observation (October 2018 – December 2019), it was recorded either flying over the cable route or in fields on the ground or on trees adjacent to the cable route at all CR locations. Wood Pidgeon nests were recorded at the following locations: between CR1 and CR2, CR4 and CR18.

Collard Dove, *Streptopelia decaocto.* Collard Dove only relatively recently (*ca* 1959) became a resident species in Ireland. As for Wood Pigeon, Collard Dove was recorded either flying over the cable route or on the ground adjacent to the cable route at all CR locations.

Cuckoo, *Cuculus canorus.* Cuckoo is a Summer visitor to Ireland. Calling birds were heard In April and May, 2019 at CR3, CR6, CR13, CR17 and CR29.

Swift, *Apus apus.* Swift is a Summer visitor to Ireland. Birds were seen throughout the survey area from May to September, 2019.

Skylark, *Alauda arvensis*. Skylark is a resident species in Ireland. During the winter months October – March, records of Skylark along the cable route were scarce with only 4 records (November, 2018, CR26; February 2019, CR4, October 2019, CR17 and December, 2019, CR10) noted. However, in the Spring Summer months, March – September, records were more numerous with birds being recorded either flight over the cable route or calling in the air in each of these months along the extent of the cable route.

Swallow, *Hirundo rustica*. Swallow is a Summer visitor to Ireland. As for Swift, birds were seen throughout the survey area from May to September, 2019.

House Martin, *Delichon urbicum*. House Martin is a Summer visitor to Ireland. Birds were recorded between April and September throughout the area surveyed.

Meadow Pipit, *Anthus praetensis*. Meadow Pipit is a resident species in Ireland. Meadow Pipit was recorded either in flight over the cable route or in fields either side of it in November 2018 at CR11, CR 22 and CD29, in February 2019 at CR3, CR8, CR14, CR23 and CR30, in April 2019 at CR2, CR5, CR9, CR14, CR20 and CR25, in June 2019 at CR7, CR13, CR20 and CR29, in July 2019 at CR3 and CR4, CR7, CR11, CR15, CR20 and CR26, in August 2019 at CR2, CRCR7, CR13, CR21, CR25 and CR30 and in October 2019 at CR20 and CR27.

Pied Wagtail, *Motacilla alba.* Pied Wagtail is a resident species in Ireland. Pied Wagtail was recorded throughout the survey period at all sites either on the ground close to the cable route or flying over the route.

Hedge Sparrow, *Prunella modularis*, Hedge Sparrow is a resident species in Ireland. Throughout the survey period, Hedge Sparrow was recorded at every site along the route.

Robin, *Erithacus rebecula*. Robin is a resident species in Ireland. As for Hedge Sparrow, Robin was recorded throughout the survey period and at every site along the route. A robin nest was recorded at CR1 and CR17.

Song Thrush*,* Turdus *philomelos*. Song Thrush is a resident species in Ireland. As for Robin, Song Thrush was recorded in every month and at every location throughout the survey period. One Song Thrush

Redwing, *Turdus iliacus*. Redwing is a Winter visitor to Ireland. Redwing was recorded in January 2019 at CR9 and CR24 and in February 2019 at CR11 and CR28.

Mistle Thrush, *Turdus viscivorus*. Mistle Thrush is a resident species in Ireland. Mistle Thrush was recorded in November, 2018 at CR6, CR10, CR21 and CR29, in December 2018 at CR2, CR6, CR12, CR16, CR20 and CR26, in February 2019 at CR1, CR11, CR21 and CR30, in April 2019 at CR11, CR16, CR21, and CR27, in May 2019 at CR1, CR17 and CR26, in June 2019 at CR7, CR11, CR19 and CR29 and in July at CR23.

Fieldfare, *Turdus pilaris*. Fieldfare is a Winter visitor to Ireland. Fieldfare was recorded along with Redwing in January 2019 at CR9 and CR24 and In February 2019 at CR11 and CR28.

Blackbird, *Turdus merula*. Blackbird is a resident species in Ireland. Blackbird was recorded on every survey date and overall, at every survey location. Blackbird nests were recorded at CR1, CR7, CR14 and CR18.

Sedge Warbler, *Acrocephalus scheonobanus.* Sedge Warbler is a Summer visitor to Ireland. Sedge Warbler was heard calling in April and May 2019 at CR19 and CR24 and seen on July 2019 at CR30.

Willow Warbler, *Phylloscopus trochilus*. Willow Warbler is a Summer visitor to Ireland. Willow Warbler was recorded both visually and singing throughout the length of the cable route in the months of April – August, 2019.

Chiffchaff, *Phylloscopus collybita*. Chiffchaff is a Summer visitor to Ireland. Chiffchaff was recorded both visually and singing throughout the length of the cable route in the months of April – July, 2019.

Goldcrest, *Regulus regulus.* Goldcrest is a resident species in Ireland. Goldcrest was heard calling in April and May 2019 at CR19.

Wren, *Troglodytes troglodytes*. Wren is a resident species in Ireland. Wren was recorded in each month and throughout the length of the cable route.

Spotted Flycatcher, *Muscicapa striata.* Spotted Flycatcher is a Summer visitor to Ireland. One bird was recorded in May 2019 at CR19.

Great Tit, *Parus major.* Great Tit is a resident species in Ireland. Great Tit was recorded throughout the survey area and in every month.

Coal Tit, *Periparus ater*. Coal Tit is a resident species in Ireland. Coal Tit was recorded in March 2019 at CR18 and in August 2019 at CR1.

Blue Tit, *Cyanites caeruleus.* Blue Tit is a resident species in Ireland. Blue Tit was recorded throughout the survey area and in every month.

Long Tailed Tit, *Aegithalos caudatum.* Long tailed Tit is a resident species in Ireland. One troupe of 12 Long Tailed Tit was recorded at CR19 in August 2019.

Magpie, *Pica pica.* Magpie is a resident species in Ireland. Magpie was recorded throughout the survey area and in every month. A magpie nest was recorded at CR19

Jackdaw, *Corvus monedula.* Jackdaw is a resident species in Ireland. Jackdaw was recorded throughout the survey area and in every month.

Rook, *Corvus frugilegus*. Rook is a resident species in Ireland. Rook was recorded throughout the survey area and in every month. It was the commonest occurring species of all birds. Rookeries were recorded between CR3 and CR5 and between CR17 and CR19.

Hooded Crow, *Corvus cornix.* Hooded Crow is a resident species in Ireland. Hooded Crow was a regularly recorded bird throughout the survey period and cable route.

Starling, *Sturnus vulgaris.* Starling is a resident species in Ireland. Flocks (+ 100 birds) of Starlings were recorded flying over the cable route in November 2018 at CR5 and CR27, in December 2018 at CR9 and CR16, in January 2019 at CR12, CR14 and CR25 in March 2019 at CR2, CR13, and CR20, in October 2019 at CR8, CR21 and CR30 and in December 2019 at CR10.

House Sparrow, *Passer domesticus.* House Sparrow is a resident species in Ireland. House Sparrow was recorded in October 2018 at CR1, CR4, CR14 and CR17, in November 2018 at CR1, CR8, CR15 and CR22, in December at CR1, CR7, CR10 and CR20, in February 2019 at CR1, CR5 and CR17, in April 2019 at CR1, CR3, CR8 and CR17, in May 2019 at CR1, CR3, CR14 and CR17, in June 2019 at CR1 and CR3, in July 2019 at CR1 and CR3, in September 2019 at CR1, CR4, CR8, CR14 and CR20, in October 2019 at CR1, CR3, CR7, CR14 and CR17 and in December 2019 at CR1 and CR17.

Chaffinch, *Fringilla coelebs.* Chaffinch is a resident species in Ireland. Chaffinch was recorded in October 2018 at CR5, CR13, CR19 and CR26, in November 2018 at CR20, in December 2018 at CR1, CR8 and CR29, in February 2019 at CR2, CR8, CR11 and CR18, in March 2019 at CR2, CR7, CR13, CR16, CR20 and CR28, in May 2019 at CR1, CR7, CR10, CR17, CR21 and CR25, in June 2019 at CR2, CR6, CR13, CR19, CR22 and CR26, in July 2019 at

CR1, CR3, CR8, CR12, CR16, CR21 and CR29, in August 2019 at CR2, CR6, CR11, CR15, CR18, CR24 and CR30, in September 2019 at CR1, CR4, CR8, CR12, CR14, CR17 and CR29, in November at CR1, CR5, CR10, CR14, CR20 and CR27 and in December 2019 at CR1, CR4 and CR21.

Linnet, *Carduelis cannabina.* Linnet is a resident species in Ireland. Linnets are recorded along the cable route in October 2018 at CR3 and CR27, in November 2018 at CR2 and CR16, in February 2019 at CR29, in April 2019 at CR2, CR9 and CR15, in June 2019 at CR7, CR21 and CR25, in July 2019 at CR3, in September at CR2, CR7, CR9 and CR22 and in November 2019 at CR1, CR6, CR10, CR22 and CR23.

Goldfinch, *Carduelis carduelis.* Goldfinch is a resident species in Ireland. Goldfinch was recorded in February 2019 at CR11, in April 2019 at CR1 and CR18 and in September 2019 at CR3, CR12 and CR23.

Bullfinch, *Pyrrhula pyrrhula.* Bullfinch is a resident species in Ireland. Bullfinch was recorded in April 2019 at CR6 and in August 2019 at CR2.

Discussion

Of the 53 bird species recorded, the following 41 are resident in Ireland: Mute Swan, Mallard, Cormorant, Heron, Pheasant, Buzzard, Sparrowhawk, Kestrel, Lapwing, Curlew, Woodcock, Snipe, Black headed Gull, Herring Gull, Greater black backed Gull, Wood Pigeon, Collard Dove, Meadow Pipit, Skylark, Hedge Sparrow, Robin, Song Thrush, Mistle Thrush, Blackbird, Goldcrest, Wren, Great Tit, Coat Tit, Blue Tit, Long tailed Tit, Magpie, Jackdaw, Rook, Grey Crow, Starling, House Sparrow, Chaffinch, Linnet, Goldfinch and Bullfinch.

As some of these are more aquatic than terrestrial in occurrence *e.g.* Mute Swan, Mallard, Cormorant, Heron, Lapwing, Curlew, Snipe, Black headed Gull, Herring Gull and Greater Black backed Gull, in ecological terms, they are cannot be considered as hedgerow species. Similarly, Kestrel, Skylark and Meadow Pipit are associated with open field conditions and rather than with hedgerows.

The resident species that are most frequently found in hedgerows or on trees include Wood Pigeon, Hedge sparrow, Robin, Song Thrush, Mistle Thrush, Blackbird, Goldcrest, Wren, Great Tit, Coal Tit, Blue Tit, Long tailed Tit, Magpie, Jackdaw, Rook, House Sparrow, Chaffinch, Goldfinch and Bullfinch.

None of the three Winter visitors *i.e.* Whooper Swan, Redwing and Fieldfare are associated with hedgerows while of the eight Summer visitors *i.e.* Cuckoo, Swift, Swallow, House Martin, Sedge Warbler, Willow Warbler, Chiffchaff and Spotted Flycatcher, the flowing species are associated with hedgerows and trees: Cuckoo, Sedge Warbler, Willow Warbler, Chiffchaff and Spotted Flycatcher.

The single Passage Migrant species, Whimbrel, is a wading bird and is not associated with hedgerows or trees.

The area that returned mots species was CR1 (33 species) and that section of the route from CR1 to CR5 collectively had higher numbers of species than many other areas. There is a bias in these records however; this part of the route is clearly close to the sea and it was in this area of the route that a number of marine species were recorded. CR19 returned 32 species none of which are marine in occurrence.

In order to minimise the impact of cable laying on terrestrial birds, all such activities should take place outside the bird breeding season which is March 1st to August 31st.

References

BirdWatch Ireland. 2017 Annual Report. BirdWatch Ireland, Kilcoole, Co. Wicklow

NPWS (2011b). Dundalk Bay SPA (site code 4026). Conservation objectives supporting document. NPWS, Ely Place, Dublin, 122pp.

ANNEX 2: ONSHORE BIODIVERSITY – ADDITIONAL INFORMATION

ORIEL WIND FARM PROJECT

Natura Impact Statement
Annex 2: Onshore Biodiversity – Additional Information

MDR1520B
NIS – Annex 2
A1 C01
March 2024

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Tables

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Glossary

Term	Meaning
DAFOR scale	The DAFOR scale records each species' abundance as Dominant, Abundant, Frequent, Occasional, or Rare based on a semi-quantitative description of each category.
Environmental Quality Ratio (EQR)	Represents the relationship between the values of the biological parameters observed for a body of surface water and the values for these parameters in the reference conditions applicable to that body.
Small Streams Risk Score (SSRS)	A biological risk assessment system for identifying rivers that are definitely 'at risk' of failing to achieve the 'good' water quality status goals of the Water Framework Directive (WFD).
Q-value	Standard monitoring methodology for rivers and streams in Ireland

Acronyms

Term	Meaning
BSBI	Botanical Society of Britain and Ireland
EPA	Environmental Protection Agency
EQR	Environmental Quality Ratio
HDD	Horizontal Directional Drilling
IAAS	Invasive Alien Animal Species
IAPS	Invasive Alien Plant Species
IEF	Important Ecological Feature
IFI	Inland Fisheries Ireland
HWM	High Water Mark
NBDC	National Biodiversity Data Centre
NPWS	National Parks and Wildlife Services
pNHA	Proposed Natural Heritage Area
SCI	Special Conservation Interest
SSRS	Small Streams Risk Score
WFD	Water Framework Directive

Units

Unit	Description
cm	Centimetre
m	Meter
mg/l	Milligrams per Litre
°C	Degrees Celsius

1 ONSHORE BIODIVERSITY – ADDITIONAL INFORMATION

This report provides details on the methodologies (see section 1.1) used to collect data to inform the assessment on biodiversity included in appendix I: Onshore Biodiversity – Supporting Information. It also provides information on the baseline environment (see section 1.2), including protected and rare species returned from the National Biodiversity Data Centre (NBDC) desk study search within 5 km of the Project (see section 1.2.1) and information collected through site-specific field surveys (see section 1.2.2).

1.1 Field study

1.1.1 Habitats and flora

Terrestrial

Surveys were carried out on 14 February 2019, 18 July 2019, 2 October 2019, 29 September 2020, 20 and 21 July 2022, 17 November 2022 and 26 April 2023 to classify habitats using the Heritage Council's habitat classification system (Fossitt, 2000) for onshore habitats (terrestrial and freshwater) occurring above the High Water Mark (HWM). The mapping of habitats followed the Heritage Council's mapping methodology (Smith *et al*., 2011). The information gained from the survey was used to describe habitat features, and to direct further habitat and species-specific survey work to inform this assessment. 'Target Notes' were recorded as necessary on maps in the field to identify the location of additional important ecological features.

Habitat surveys recorded species using an ordinal abundance scale, the DAFOR scale[1], as detailed in Smith *et al*. (2011). Indicator species for different habitat types or conditions and rare or declining species identified on relevant Red Lists (Wyse Jackson *et al*., 2016; Lockhart *et al*., 2012) were also noted.

Vascular plant nomenclature follows that of the Botanical Society of Britain and Ireland (BSBI) 'Complete list of taxon names from the BSBI's database'. As such, any name changes, including those outlined in Stace (2019), are not included. Bryophyte nomenclature follows the British Bryological Society (Atherton *et al.*, 2010).

Freshwater aquatic

The aquatic habitat assessment was carried out on 18 and 19 July 2023. A total of 8 sites were assessed. The aquatic habitat assessment included surveys of the general river habitat, crayfish/lamprey/salmonid habitat potential and invasive aquatic species. The general physical characteristics and hydromorphological features of each site were recorded including substrate, flow types and aquatic vegetation during surveys. All sites were assessed in terms of:

- Stream width and depth;
- Substrate type, listing substrate fractions in order of dominance;
- Flow type, listing prevalence of flow types in the area;
- Instream vegetation, listing plant species occurring and their percentage coverage of the stream bottom at the sampled area;
- Dominant bankside vegetation, listing the main species overhanging the watercourse;
- Estimated cover by bankside vegetation, and estimated shading of the sampling site, and

[1] The DAFOR scale records each species' abundance as Dominant, Abundant, Frequent, Occasional, or Rare based on a semi-quantitative description of each category.

- The degree of siltation was recorded on a scale of clean, slight, moderate and heavy, prior to kick sampling.

The rating of habitat for salmonids, crayfish and lamprey is on a scale of *None/Poor/Fair/Good/Very Good/Excellent*. This rating assesses the physical suitability of the habitat; the presence/absence/density of the species in question will also depend on present and historical water quality and accessibility of the section to these species.

A rating of;

'***None'*** indicates that the ecologist carrying out the assessment regards it as impossible that the watercourse could support the species in question in the relevant life stage.

'***None – Poor***' indicates that it is regarded as possible but extremely unlikely that the stream could support the species in the relevant life stage.

'Fair' indicates that it is possible that the stream section could support the species in question.

'**Good**' indicates that the ecologist considerers it possible and likely that the stream could support the species in question.

'**Very Good**' indicates that the stream certainly could support the species.

'**Excellent**' indicates that the ecologist regards the stream as the ideal habitat for the species in question.

Invasive plants and animals

Habitat surveys recorded the presence and location of invasive alien plant species (IAPS). For the purpose of this assessment, IAPS are those contained within the third schedule to the European Communities (Birds and Natural Habitats Regulations) 2011-2015.

During all onshore biodiversity surveys of the site and wider ZoI, the potential was also noted for invasive alien animal species (IAAS). For the purpose of this assessment, IAAS are those contained within the third schedule to the European Communities (Birds and Natural Habitats Regulations) 2011-2015.

1.1.2 Fauna

Otter

Surveys for otter were carried out on 22 and 23 October 2019, 3 and 4 December 2019, 2 and 3 February 2021, 20 and 21 July 2022, 26 April 2023 and 18 and 19 July 2023.

Watercourses, drainage ditches and wetland habitats within the onshore substation site and the onshore cable route were assessed for otter *Lutra lutra*. The survey methodology had regard for guidance of the NRA (2006) and included searches for breeding or resting sites within riparian habitats up to 150 m of the footprint of the Project to account for the potential effect of disturbance from noise and vibration. Evidence of otter including spraints, footprints, or feeding remains was recorded, where present.

Other protected mammals

During all onshore biodiversity surveys of the Project, the potential was also noted for habitats of other protected terrestrial mammal species to occur including: hedgehog *Erinaceus europaeus*, pygmy shrew *Sorex minutus*, pine marten *Martes martes*, Irish stoat *Mustela erminea*, red squirrel *Sciurus vulgaris*, Irish hare *Lepus timidus hibernicus*, and red deer *Cervus elaphus*.

Birds

Onshore

Onshore bird survey

An onshore bird survey of the onshore cable route from Dunany Point to the onshore substation site was carried out on a monthly basis over the period October 2018 to December 2019. The route follows existing roadways along its entire length. Except for one location (the site just west of the M1), the onshore cable route was divided into 500 m lengths and were labelled CR1 closest to Dunany Point to CR30 at the onshore substation site (see annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports).

The NRA (2009) note that large sites should be divided into sections and counts made from vantage points wherever possible. This approach was adapted, and the onshore cable route was divided into evenly spaced 500 m sections. At each location, the area was examined for birds present within approximately 10 m of either side of the road side, whether in the air, on the ground or in trees. Identification was made by eye or using 10 x 50 magnification binoculars. Each survey section along the onshore cable route was surveyed for a 10 minute period from a single static location. All surveys were carried out during daylight hours and survey dates were selected to coincide with periods of reasonably good weather.

Breeding bird survey

Breeding bird surveys were carried out monthly from April 2023 to July 2023 along the onshore cable route. The survey methodology was adapted from the Breeding Bird Survey (Gilbert *et al.,* 1998) whereby all suitable breeding bird habitat associated with the onshore elements of the Project were slowly walked in a manner allowing the surveyor to come within 50 m of all habitat features (see Figure 1-1 for habitat mapping). Identification was made by eye, using binoculars (8 x 42 magnification) or by bird song. General location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes. All surveys were carried out during daylight hours, starting at 06:00 am (or at sunrise if later than 06:00am) and ending no later than noon. Survey dates were selected to coincide with periods of reasonably good weather.

Intertidal

2017 - 2019 intertidal bird surveys

Two locations were surveyed for intertidal bird activity: the landfall location and a location on the north of Dunany point (Dunany north) (see annex 1: Intertidal Bird Survey and Onshore Bird Survey Reports). The area surveyed encompassed approximately 100 of these locations. A field to the east of the Dunany north location was also surveyed during the monthly visits as this was noted to be used by migrating birds and waders. The observation point was located in a field raised approximately 1 m above the HWM at the Dunany north location and above the upper shore at the end of the road access onto the shoreline at the landfall location.

Surveys were carried out over a six hour period to include three hours prior to and three hours post high tide (Lewis and Tierney, 2014). Surveys were also carried out to cover a six hour period in which low water occurred.

Species behaviour, and location of birds were recorded using the designated habitats of subtidal, intertidal, supratidal and terrestrial (Lewis and Tierney, 2014). Bird counts were made for a 10 minute period on each hour using both binoculars (10 x 42 magnification) and a telescope. Seashore and seabird species were counted and their behaviour (e.g. foraging, roosting and flying) through the site were noted. Environmental conditions such as wind direction, weather, sea state and a qualitative description of the level of turbidity, were recorded throughout. Site disturbances during the survey (i.e. humans, dogs, horses) and their effect on the seabirds were recorded. The presence of fishing vessels, mainly razor clam suction vessels, was also recorded. Records were also kept of any marine mammals observed during the survey.

2023 intertidal bird surveys

Intertidal bird surveys were carried out monthly from April 2023 to August 2023, focusing within a 300m buffer of the proposed transition joint bay.

Surveys were carried out over a six hour period to include a range of times, focusing on the three hour window either side the high or low tide, alternating monthly.

Species, behaviour, and location/habitat of birds were recorded, with peak counts recorded for each survey. Equipment used included binoculars (10 x 42 magnification) and a telescope (20 – 60x eyepiece). Seashore and seabird species were counted and their behaviour (e.g. foraging, roosting and flying) through the site were noted. Environmental conditions such as wind direction, weather, sea state and a qualitative description of the level of turbidity, were recorded throughout. Site disturbances during the survey (i.e. humans, dogs, horses) and their effect on the seabirds were recorded. Records were also kept of any marine mammals observed during the survey.

Amphibians and reptiles

During all onshore biodiversity surveys of the Project, the potential was also noted for amphibian and reptile habitats.

Invertebrates

Terrestrial

During walkover surveys of the Project and wider ZoI, the potential was also noted for habitats of protected invertebrate species to occur including marsh fritillary *Euphydryas aurinia* and small blue *Cupido minimus*. In the case of these two butterfly species, searches were made of suitable habitats for the larval food plants of marsh fritillary (devil's bit scabious *Succisa pratensis*), and small blue (kidney vetch *Anthyllis vulneraria*).

Freshwater aquatic

Freshwater pearl mussel *Margaritifera margaritifera* and *Margaritifera durrovensis* surveys were not conducted as there are no records of this species from within the same catchment management unit (Newry, Fane, Glyde and Dee) as the Project.

A total of 8 sites were assessed. Assessment of the quality of white-clawed crayfish *Austropotambius pallipes* habitat was completed on the 18 and 19 July 2023, and was based on published information on the habitat criteria for crayfish (Holdich, 2003; Peay, 2002; Peay, 2003).

An aquatic bio-index assessment of each aquatic ecology survey site was undertaken, where possible, using benthic macroinvertebrates as bioindicators. Benthic macroinvertebrates are an excellent tool for water quality assessment as they exhibit differential responses to physical and chemical changes in their environment. Macroinvertebrate community diversity declines in the presence of pollution, and sensitive species are progressively replaced by more tolerant forms as pollution increases. As such, macroinvertebrates provide a realistic record of prevailing water quality conditions. Water quality at each survey location was inferred, where possible, using the EPA Q-value system. Small streams that were deemed by the surveyor to be unsuitable for aquatic bio-index assessment (e.g. small headwater streams) were assessed using the Small Streams Risk Score (SSRS), a biological risk assessment system for identifying rivers that are definitely 'at risk' of failing to achieve the 'good' water quality status goals of the Water Framework Directive (WFD). The SSRS methods were developed by the Environmental Protection Agency (EPA) in association with the Western River Basin District (WRBD) in 2006. Surveys were carried out on the 18 and 19 July 2023.

Macroinvertebrates were collected using a two-minute kick sampling method with a standard hand net (0.5 mm mesh). The survey technique adhered to the ISO Standard (10870:2012) for kick sampling. Stone washing was also undertaken to ensure collection of species which cling to rock surfaces. Where kick-sampling was not possible (e.g., where heavy siltation precluded the surveyor entering the river channel), macroinvertebrates were collected from the riverbank by pulling a standard hand net upstream along the riverbed to cover as much surface area as possible, whilst simultaneously agitating the stream bed. The margins of the stream bank were also swept as part of this assessment. Based on the area available to

survey, sweeping was undertaken for 2-3 minutes. Macroinvertebrates were identified on the river bank and returned to the river on completion of analysis. Faunal composition was analysed on the bank side following SSRS methodology set out in EPA guidance document (Ryan *et al.*, 2015) and the EPA Q-value classification system as set out in Toner *et al.* (2005), as appropriate.

In summer/autumn, anthropogenic pressures are greatest on macroinvertebrates due to lower flows and higher temperature. The number of sensitive species expected in winter is higher due to a combination of flow and species life cycles and therefore the SSRS score may be higher in winter compared to summer/autumn samples. Similarly, the aquatic bio-index assessment is usually applied in summer/autumn when anthropogenic pressures are greatest on macroinvertebrates due to lower flows and higher temperature. The bio-index species composition with affinity to Q-value therefore be higher in winter compared to summer/autumn samples. However, Irish research has shown that Q values remain largely consistent across seasons (spring, summer and autumn) with few sites moving between status classes (Kelly-Quinn *et al*., 2005).

The SSRS scores are categorised as follows:

- >7.25 – stream 'probably not at risk';
- 6.5 to 7.25 – stream 'probably at risk'; and
- <6.5 stream 'at risk'.

Q-values and water quality groups were inferred using a combination of habitat characteristics and the structure of the macroinvertebrate community within the waterbody. Individual macroinvertebrate taxa are ranked for their sensitivity to organic pollution and the bio-index species composition with affinity to Q-value is determined based on their relative abundance within sample and reflects the average water quality at a location (see macroinvertebrate indicator groups in Table 1-1).

Table 1-1: Macroinvertebrate indicator groups.

Group	Indicator
Group A	Very Pollution Sensitive
Group B	Moderately Pollution Sensitive
Group C	Moderately Pollution Tolerant
Group D	Very Pollution Tolerant
Group E	Most Pollution Tolerant

The Environmental Quality Ratio (EQR) represents the relationship between the values of the biological parameters observed for a body of surface water and the values for these parameters in the reference conditions applicable to that body. The ratio is expressed as a value between zero and one, with high ecological status represented by values close to one and bad ecological status by values close to zero. In Ireland it is calculated as Observed Q-value/Reference Q-value (i.e. Q5). The EQR allows comparison of water quality status across the European Union as each Member State has an EQR value for 'High'; 'Good' etc., based on an intercalibration of boundaries between water quality categories (e.g. 'High-Good').

The Q-value is assigned on a scale of 1 to 5 with a Q5 representing high quality pristine conditions and a Q1 representing bad seriously polluted conditions. The intermediate values (Q1-2, 2-3, 3-4, etc.) denote transitional conditions. The scheme mainly reflects the effects of organic pollution (i.e., deoxygenation and eutrophication) but where a toxic effect is apparent or suspected the suffix '0' is added to the biotic index (e.g. Q1/0, 2/0 or 3/0). An asterisk after the Q value (e.g. Q3*) indicates heavy siltation of the substratum. EPA indices, EPA water quality status and WFD status are interpreted in Table 1-2.

Table 1-2: EPA Biotic index (Q-value) and equivalent WFD water quality status groups.

Biotic index	Environmental quality ratio (observed/reference)	EPA quality status	Water Framework Directive (EPA, 2006) status
Q5	1.0	Unpolluted	High
Q4-5	0.9	Unpolluted	High
Q4	0.8	Unpolluted	Good
Q3-4	0.7	Slightly Polluted	Moderate
Q3	0.6	Moderately Polluted	Poor
Q2-3	0.5	Moderately Polluted	Poor
Q2	0.4	Seriously Polluted	Bad
Q1-2	0.3	Seriously Polluted	Bad
Q1	0.2	Seriously Polluted	Bad

Colour coding as employed under the WFD as specified in Schedule 3 of S.I. No 272 of 2009: High – blue, Good – green, Moderate – yellow, Poor – orange, and Bad – red.

Fish

On 18 and 19 July 2023, each surveyed site was rated for its potential to support the three lamprey species that occur in Ireland (river, brook and sea lamprey). Assessment of the quality of lamprey habitat is based on published information on the habitat criteria for lamprey (Maitland, 2003). Lamprey habitat preferences change with the stages of their life cycle. They show a preference for gravel-dominated substratum for spawning similar to salmonids. After hatching, lamprey larvae (ammocoetes) swim or are washed downstream by the current to areas of sandy silt in still or slow flowing water where they burrow and spend the next few years in tunnels. Lampreys therefore require mainly silt and sand dominated substratum for nursery habitat. Other important environmental characteristics for optimal ammocoete habitat are shallow waters with low velocity, and the presence of organic detritus.

Suboptimal habitat supporting only a few individuals may consist of a few square centimetres of suitable silt in an open, comparatively high-velocity, boulder-strewn streambed. The following summarises the ecological requirements assessed for lamprey:

- Spawning habitat is broadly similar to that favoured by salmonids. Usually occurs at the tails of pools where the gravels have been deposited from upstream and the scouring of pools but the current is still reasonably fast with some water flow through the substrate;
- Larval nursery beds are at the edges of streams and rivers, well away from the main current, and that the current over them is often not only very slow, but is actually a backwater in reverse of the main current;
- Water depth in nursery areas is typically 0.1 to 0.5 m with silty/sandy substrate;
- Channelization can be damaging to lampreys, mainly through destruction of their habitat. The removal of areas of riffle and associated spawning gravels, and the dredging of essential nursery silt beds, may eliminate lampreys from a river; and
- Dams/weirs can be obstacles to upstream migration of sea lamprey.

Assessment of the quality of salmonid (salmon and trout) spawning, nursery and adult habitat is based on published information on the habitat criteria of salmonids (Bjorn & Reiser 1991; Hendry and Cragg-Hine, 2003), water quality criteria listed in the Salmonid Regulations (S.I. 293/1988). Habitat features important to the lifecycle of salmonids include; stream width, depth, flow type, substrate type, vegetation cover, gradient and altitude. These habitat requirements can vary during the life stages of salmonids and the proximity of juvenile habitat to spawning gravels may be significant to their utilisation. The more diverse the stream habitat in terms of substrate, flow rate, depth, riparian vegetation, light conditions, etc., the richer the biological community is likely to be, and the more suitable it is likely to be for salmonids.

The presence of overturned gravels lighter in colour compared to the rest of surrounding substrate is used to indicate the presence of salmonid redds. Excessive fine sediment can be detrimental to the survival of eggs by limiting the amount of dissolved oxygen to diffuse across the egg membrane. The presence of 10% fine sediment can reduce egg survival to hatching to 43% (Cocchiglia *et al*., 2012). Fine sediment content of substrate is assessed visually and high levels present indicate reduce spawning habitat quality.

The habitat rating assigned applies to the salmonid species salmon *Salmo salar* which is considered to be more sensitive and less tolerant of pollution than trout *Salmo trutta*. Optimal habitat for brown trout is noted. The following summarises ecological requirement assessed for salmonids:

- Salmon spawning is likely to occur where the gradient of a river is 3% or less;
- Typical spawning sites are the transitional areas between pool and riffle where flow is accelerating and depth decreasing, where gravel of suitable coarseness is present and interstices are kept clean by up-welling flow;
- Salmon fry and parr occupy shallow, fast-flowing water with a moderately coarse substrate with cover;
- Deep or slow-moving water, particularly when associated with a sand or silt substrate, does not support resident juvenile salmonids;
- Suitable cover for juveniles includes areas of deep water, surface turbulence, loose substrate, large rocks and other submerged obstructions, undercut banks, overhanging vegetation, woody debris lodged in the channel, and aquatic vegetation;
- Adults require holding pools immediately downstream of spawning gravels in which they can congregate prior to spawning;
- Cover for adult salmon waiting to migrate or spawn can be provided by overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water and surface turbulence; and
- EPA Q-value of Q4 or higher.

Water Quality Criteria within the Salmonid Regulations S.I. 293/1988 include:

- pH ≥6 ≤9;
- Dissolved Oxygen (DO) ≥9 mg/l (50% off the time);
- Temperature downstream of point thermal discharge must not exceed (a) 21.5°C or (b) 10°C from 1 November to 30 April during reproductive season; and
- Sediment ≤25 mg/l (annual average).

1.2 Baseline environment

1.2.1 Desk study

Protected and rare fauna species returned from the desk study within a 5 km radius of the Project are detailed in Table 1-3.

Table 1-3: Protected and rare species returned from the NBDC desk study search within 5 km of the Project.

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
Flora (protected)					
Slender Thistle *Carduus tenuiflorus*	-	Near threatened	1	01/07/2018	Sandy banks and dry ground; occasional in centre and southeast Ireland, rare elsewhere; declining (Parnell and Curtis, 2012).
Mammals (terrestrial)					
Eurasian Badger *Meles meles*	✓e	-	77	23/04/2017	Varied habitats including grassland, woodland and Bog often near hedgerows or treelines and streams (Small, 1995).
Irish Hare *Lepus timidus* subsp. *Hibernicus*	✓e	-	14	04/12/2017	Varied habitat preferences including bog, moor, heath, marsh, and pastoral farmland (Reid *et al*., 2007).
European Otter *Lutra lutra*	✓b, e	Near threatened	5	16/04/2013	Lakes and Ponds, watercourses, riparian woodland, estuaries, sea inlets and bays, saltmarshes, swamps.
West European Hedgehog *Erinaceus europaeus*	✓e	-	4	05/05/2021	It is considered to be present in all lowland habitats where there is sufficient food to eat and ground cover for nesting, and commonest where grassland abuts mixed woodland and scrub. It appears to avoid coniferous woodland, blanket bog and other wet areas.
Lesser Noctule *Nyctalus leisleri*	✓c,e	Near threatened	50	11/08/2014	Woodland species but it is also to be found in parkland, along treelines, pasture and riparian habitats, over lakes, beaches and dunes and above streetlights in urban areas. Not as dependent on linear features like hedgerows as our other bat species.
Common Pipistrelle *Pipistrellus pipistrellus sensu lato*	✓c,e	-	67	11/08/2014	Highly adaptable species foraging along linear landscape features such as hedgerows and tree lines as well as within woodland and parkland. Roosting in old and modern structures in addition to trees and bat boxes.
Soprano Pipistrelle *Pipistrellus pygmaeus*	✓c,e	-	31	11/08/2014	The Soprano forages along linear landscape features such as hedgerows and tree lines as well as within woodland however it has a notable preference for riparian habitats and it too has adapted to modern dwellings and lives in similar locations beneath roofing felt etc. Crevice dweller, but sometimes enters roof voids. Hibernates in a variety of places, which may be quite exposed. Frequently in cavities in buildings, rarely underground (Kelleher and Marnell, 2006).
Brown Long-eared Bat *Plecotus auritus*	✓c,e	-	1	15/07/2013	Prefers to forage in parkland, open deciduous and coniferous woodland, orchards and gardens. They are frequently found in older buildings, in lofts, barns, stables etc. Usually, they cluster along the ridge beam or next to a chimney. The species also makes use of trees as summer roosts and colonise bat boxes readily.
Daubenton's Bat *Myotis daubentonii*	✓c,e	-	11	25/08/2012	Calm, slow-moving water is chosen by Daubenton's Bat as it makes it easier for it to locate insects on the surface. Sometimes forages in woodland, away from water. Habitats

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					include but are not necessarily limited to; Semi-natural woodland, Highly modified non-native woodland, Building and artificial surfaces, Lakes and Ponds, Watercourses.
Mammals (Marine)					
Common Porpoise *Phocoena phocoena*	✓b, c, e	Threatened	1	28/09/2020	Native Irish resident. It is mostly found over continental shelf, very often within 10 kms of the coast. This species may be encountered in estuaries, bays and around coastal headlands.
Grey Seal *Halichoerus grypus*	✓b, e	-	1	28/03/2021	Forages at sea, within the continental shelf boundary. The species may be expected to be encountered in a variety of coastal habitats both terrestrial and aquatic. Habitats may include but are not necessarily limited to; Marine water body, Littoral, Salt marshes, Brackish waters and Shingle and gravel banks.
Bottle-nosed Dolphin *Tursiops 9runcates*	✓b, e	-	1	18/08/2012	The Bottlenose Dolphin, in Irish waters, occurs out to the continental shelf, as well as a resident population occurring in the Shannon estuary. The species can occur in much deeper waters.
Common Dolphin *Delphinus delphis*	✓c,e	-	1	04/10/2015	Habitats include but are not necessarily limited to open marine water.
Birds					
Barnacle Goose *Branta leucopsis*	✓a,d	Amber List	4	31/12/2011	Local winter visitor from Greenland, occurring in Ireland between October & April. Mostly on remote islands in the northwest Ireland where it is relatively free from disturbance. Highly gregarious.
Barn Owl *Tyto alba*		Red List	16	07/01/2021	Scarce resident mainly in central and southern Ireland. Breeds in ruined buildings, such as castles and to a lesser extent in outbuildings (barns/sheds).
Bar-tailed Godwit *Limosa lapponica*	✓a,d	Amber List	9	31/12/2011	Winter visitor to coastal estuaries from October to April wintering in estuaries. Feed along the tidal edge, or in shallow water (up to 15 cm depth).
Barn Swallow *Hirundo rustica*	-	Amber List	39	31/12/2011	Summer visitor throughout Ireland. Range of habitat preferences, flocks gather at wetland sites in autumn
Bewick's Swan *Cygnus columbianus subsp. Bewickii*	✓a,d	Red List	1	31/12/2011	Low-lying wet pasture, lakes, ponds and stubble. The majority of the European population winters in Germany, the Netherlands and Britain. One of the potential reasons that the species has declined in Ireland is that Bewick's Swans find suitable sites in these countries and no longer need to fly as far west as Ireland
Black Guillemot *Cepphus grylle*	-	Amber List	2	31/12/2011	Resident along all Irish coasts. Nests amongst boulders at the base of cliffs, also in rock crevices and in man-made structures, such as piers. Will nest singularly and in loose colonies. Winters in the vicinity of its breeding sites and can be seen inshore throughout the year.
Brent Goose *Branta bernicla*	-	Amber List	1	31/12/2011	Winter migrant from high-Arctic Canada. Most occur in Ireland between October and April. This population winters almost entirely in Ireland, with small numbers in parts of Britain and

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					France. Mostly found on coastal estuaries during the autumn and early winter, and also on grasslands from mid-winter, until departure for the breeding grounds begins in late April.
Black-headed Gull *Chroicocephalus ridibundus*	✓d	Red List	23	31/12/2011	Resident along all Irish coasts, wintering inland also. Breading nests on the ground in wetland areas (i.e. bogs, marshes, man-made lakes). Widespread across agricultural fields, and urban areas.
Black-legged Kittiwake *Rissa tridactyla*	✓d	Amber List	4	31/12/2011	Summer visitor to steep coastal cliffs along all Irish coasts. Disperses to the open ocean in winter and less frequently seen. Breeds on steep sea cliffs where it builds a nesting platform on the most vertical and sometimes improbably steep areas. Will occasionally use man-made structures such as old buildings.
Black-tailed Godwit *Limosa limosa*	✓d	Red List	1	31/12/2011	Winter visitor to both inland and coastal estuarine habitats. Rare Irish breeding sites in lowland wet grassland and marshes.
Black-throated Diver *Gavia arctica*	✓a	Amber List	2	31/12/2011	A scarce winter visitor to western and northern coasts from October to April to feed in Irish Waters
Common Guillemot *Uria aalge*	✓a,d	Amber List	6	31/12/2011	Resident to Irish coastal waters. Comes ashore to nest on cliff edges from May onwards
Common Coot *Fulica atra*	✓d	Amber List	12	31/12/2011	Resident at ponds and lakes throughout Ireland. Wintering in lakes, coastal estuaries and river systems
Common Goldeneye *Bucephala clangula*	✓d	Amber List	3	31/12/2011	Winter visitor between November and April on coastal estuaries and inland lakes.
Common Grasshopper Wabler *Locustella naevia*	-	Amber List	11	31/12/2011	Widespread summer visitor to Ireland from April to September. Winters in tropical west Africa.
Common Greenshank *Tringa nebularia*	✓d	Amber List	2	31/12/2011	Winter visitor to estuaries from September to April
Common Kestrel *Falco tinnunculus*	-	Amber List	32	31/12/2011	Widespread resident throughout Ireland. Nests in trees, buildings or in cracks in cliffs. Will use old crow's nests. Found in wide variety of open habitats including coasts, moor land, farmland, wetlands, roadside verges and town parks
Common Kingfisher *Alcedo atthis*	✓a d	Amber List	19	31/12/2011	Resident on Irish streams, rivers and canals. Wintering in lakes and coasts during extended periods of poor weather
Common Linnet *Carduelis cannabina*	-	Amber List	33	31/12/2011	Widespread resident throughout Ireland. Breed in a variety of habitats, including rough grassland, uplands and in coastal areas with gorse.
Common Redshank *Tringa totanus*	✓d	Red List	5	31/12/2011	Resident and visitor populations. A common wader of wetlands throughout the country, though mainly coastal estuaries in winter. Nests in grassy tussock, in wet, marshy areas and occasionally heather. Breeds mainly in midlands

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
Common Scoter *Melanitta nigra*	✓d	Red List	1	31/12/2011	Resident and winter visitor to all Irish coasts, congregating in large flocks on shallow seas with sandy bottoms. Nest on islands with dense covering of scrub and tree cover.
Common Shelduck *Tadorna tadorna*	✓d	Amber List	5	31/12/2011	Resident and winter migrant to sheltered estuaries or tidal mudflats. Breeds in open areas along seashores, larger lakes and rivers. Nest in holes in banks, trees, occasionally strawstacks or buildings. Increasing displacement to inland sites
Common Snipe *Gallinago gallinago*	-	Amber List	21	31/12/2011	Summer and winter visitor to Ireland. They forage across a variety of wetland and damp habitats. Nests on the ground, usually concealed in a grassy tussock, in or near wet or boggy terrain
Common Starling *Sturnus vulgaris*	-	Amber List	54	31/12/2011	Widespread garden bird, Irish resident. Foraging in grassland in parks, gardens and farmland, and trees. Also found in urban environments as well as woodland and farmland
Common Swift *Apus apus*	-	Amber List	24	31/12/2011	Common summer visitor throughout Ireland. Nests in small recesses in buildings, both occupied and derelict. Less frequently in holes in trees or caves in uplands or coastal areas.
Dunlin *Calidris alpina*	✓a d	Amber List	2	31/12/2011	Summer and winter visitor to coastal areas, tidal mudflats and estuaries are preferred. Breeding in machair habitats
Eurasian Curlew *Numenius arquata*	✓d	Red List	21	31/12/2011	Winter visitor to Irish wetlands. Breeding throughout Ireland in floodplains, boglands, meadows, rough pasture and heather
European Greenfinch *Carduelis chloris*	-	Amber List	50	31/12/2011	Irish resident widespread in hedgerows, parks and gardens.
Eurasian Oystercatcher *Haematopus ostralegus*	✓d	Amber List	5	31/12/2011	Resident & winter visitor to all coastal habitats, and particularly favour open sandy coasts. Nests principally on shingle beaches, dunes, salt marshes and rocky shores around the coast.
Eurasian Sparrowhawk *Accipiter nisus*	-	Amber List	34	31/12/2011	Widespread in woodland, farmland with woods, larger parks and gardens. Nests in trees. Breeds throughout Ireland and ventures into urban gardens.
Eurasian Teal *Anas crecca*	✓d	Amber List	9	31/12/2011	Resident & winter migrant. Wetland preferences in covered freshwater lakes, pools and small upland streams away from the coast. Wintering in coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs.
Eurasian Tree Sparrow P*asser montanus*	-	Amber List	31	31/12/2011	Local resident in the east of Ireland, scarce along the south and west coasts. Largely associated with cereal production. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Eurasian Wigeon *Anas penelope*	✓d	Amber List	5	31/12/2011	Fairly widespread and common winter visitor. Can be found in flocks up to and over 1000 birds on large wetlands and waterbodies. Non-breeding in Ireland.
Eurasian Woodcock	-	Red List	10	31/12/2011	Resident & winter visitor to Ireland. Habitat preferences include woodland and areas of

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
Scolopax rusticola					dead leaves and low vegetation, scrub and some open areas (bracken and heather-covered hills).
European Golden Plover *Pluvialis apricaria*	✓a,d	Red List	9	31/12/2011	Widespread distribution during wintering in coastal and inland habitats. Summer populations restricted to uplands in NW Ireland with heather moors, blanket bogs, and acidic grasslands.
European Shag *Phalacrocorax aristotelis*	✓a d	Amber List	1	31/12/2011	Breeds all around the coast of Ireland wherever suitable cliffs exist. Nests on ledges, in crevices, in caves or under boulders. A colonial nester in loose colonies with prolonged breeding season. More plentiful on the west and south coasts but with notable concentrations in Co. Dublin.
Gadwall *Anas strepera*	✓d	Amber List	2	31/12/2011	Localised wintering distribution at a variety of inland and coastal sites. Nest on a variety of freshwater and brackish wetlands, especially shallow lakes with abundant emergent vegetation, slow moving rivers and marshes.
Glossy Ibis *Plegadis falcinellus*	✓a	-	1	07/08/2014	Resident in North Africa. A rare bird in Ireland.
Goldcrest *Regulus regulus*	-	Amber List	47	31/12/2011	A common resident throughout Ireland, mainly in coniferous forests. Goldcrests breed in a wide variety of habitats, including broadleaf forests, hedgerows and suburban gardens. It is also one of the few species that will breed in dense coniferous woodlands. Resident. In very cold weather may visit garden bird tables but prefers searching for insects in vegetation.
Goosander *Mergus merganser*	-	Amber List	1	31/12/2011	Resident at larger lakes in Counties Wicklow and Donegal. Rare winter visitor throughout Ireland. Irish birds appear to be largely resident. Birds from Continental Europe can occasionally be found along coastal areas in winter.
Great Black-backed Gull *Larus marinus*	-	Amber List	6	31/12/2011	Resident along all Irish coasts. Breeds on the ground in colonies all around the coast of Ireland. Most colonies are on well-vegetated offshore islands, or in other areas difficult of access
Great Cormorant *Phalacrocorax carbo*	✓d	Amber List	6	01/12/2016	Resident, some immigration during the winter. Breeds in colonies mainly around the coast of Ireland, with some birds breeding inland. Most of the larger coastal colonies in Ireland are on the south and north west coasts with big colonies also in Co. Dublin. Birds on the coast breed on cliffs whilst those inland, in trees. Winters at sea and inland.
Great Crested Grebe *Podiceps cristatus*	✓d	Amber List	5	31/12/2011	Winter distribution is widespread with greatest concentration in the north midlands and northeast and birds from the continent join the resident population. Outside the breeding season are often solitary with some birds moving to the coast through the winter. Breed on large, shallow eutrophic loughs, and along canals and slow flowing rivers – wetlands with emergent vegetation bordered by open water are generally selected.

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
Great Northern Diver *Gavia immer*	✓a,d	Amber List	2	31/12/2011	Great Northern Divers occur along the Irish coastline between September and April and are usually observed as single birds or small groups. They are the most numerous of the divers occurring in Ireland and are particularly abundant off the south, west and northwest coasts over the winter. Do not breed in Ireland.
Greater Scaup *Aythya marila*	-	Amber List	2	31/12/2011	Winter visitor to coastal estuaries and bays, on brackish lagoons and in shallow marine waters, usually less than 10 m in depth. Does not breed in Ireland.
Great Spotted Woodpecker *Dendrocopos major*	-	Amber List	2	31/12/2011	Recent colonist to broadleaf forests in eastern Ireland. Breeding in oak woodlands with some coniferous woods nearby.
Greenland White-fronted Goose *Anser albifrons* subsp. *flavirostris*	✓a,d	Amber List	1	31/12/2011	Greenland race (*Anser albifrons flavirostris)*. Winters in Ireland and Scotland. Highly gregarious. Traditionally occurred in peatland areas, though now mostly seen feeding on intensively managed grasslands. Scarce winter visitor to wetlands in Wexford and western Ireland from October to April.
Grey Plover *Pluvialis squatarola*	✓d	Amber List	2	31/12/2011	Distribution in Ireland is widespread, but exclusively coastal. They occur mostly along eastern and southern coasts, most often on large muddy estuaries. They regularly roost among dense flocks during high tide, while their distribution is more scattered while feeding.
Greylag Goose *Anser anser*	-	Amber List	6	31/12/2011	Winter migrant between November & April wintering mostly at coastal sites near estuaries and grasslands for feeding. Feral birds are present year round. Breeds by lakes and reservoirs, with the nest site often close to water and hidden in reeds or other waterside vegetation.
Hen Harrier *Circus cyaneus*	✓a,d	Amber List	3	31/12/2011	Winter visitor to low-lying countryside along the coast. Breeding in upland areas and bogs confined to heather moorland and young forestry plantations.
Herring Gull *Larus argentatus*	✓d	Red List	8	31/12/2011	Resident along all Irish coasts, breeding inland also. Widespread distribution.
House Martin *Delichon urbicum*	-	Amber List	35	31/12/2011	Common summer visitor throughout Ireland. Nests usually sited underneath the eaves of a house. Also nests on cliffs.
House Sparrow *Passer domestiherrcus*	-	Amber List	54	06/05/2021	Widespread garden bird, Irish resident. Breeds throughout Ireland - mainly around farm buildings and built-up areas. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Jack Snipe *Lymnocryptes minimus*	-	Amber List	2	31/12/2011	Summer and winter visitor to Irish wetlands. Feeds in dense grass and low cover.
Lesser Black-backed Gull *Larus fuscus*	✓d	Amber List	2	31/12/2011	Summer populations are distributed across the Irish coastline including off shore islands, islands in inland lakes, sand dunes and coastal cliffs. Winter visitors to more inland lakes.
Little Egret *Egretta garzetta*	✓a	-	1	31/12/2011	Resident along coasts and rivers throughout Ireland. A variety of wetland habitats are used

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					including shallow lakes, riverbanks, lagoons, coastal estuaries and rocky shoreline.
Little Grebe *Tachybaptus ruficollis*	✓d	Amber List	16	31/12/2011	Resident on vegetated ponds and lakes throughout Ireland. Wintering habitat extends to include ephemeral wetlands and are often encountered on sheltered coasts, estuaries and coastal lakes and lagoons.
Little Gull *Hydrocoloeus minutus*	✓a	Amber List	1	01/12/2016	Winter visitor to east and south Irish coasts from October to March and scarce passage migrant in spring and autumn. Does not breed in Ireland.
Little Tern *Sternula albifrons*	✓a,d	Amber List	1	17/09/2016	Rare summer visitor from April to late August to shingle or sandy beaches, mainly on the east and west coasts.
Mallard *Anas platyrhynchos*	✓d	Amber List	50	31/12/2011	Widespread in almost all available wetland habitats in Ireland. Nest sites vary, mostly in ground where hidden in vegetation.
Mediterranean Gull *Larus melanocephalus*	✓a	Amber List	4	31/12/2011	Winter visitor from September to April. Regularly breeds, at Ladies Island Lake in Co. Wexford. Prefers low lying islands near the coast on which to breed. Bulk of the population breeds in eastern Europe with smaller populations found in western Europe.
Merlin *Falco columbarius*	✓a,d	Amber List	5	31/12/2011	Favours upland habitats in summer and lowland and coastal sites October-April. Nesting on the ground on moorland, mountain and blanket bog. Also nests in woodland and has taken to nesting in forestry plantations adjacent to moorland.
Mew Gull *Larus canus*	-	Amber List	12	31/12/2011	Widespread across Irish coastland. Nests on the ground in a wide variety of situations, including, islands, cliffs and shingle banks. Breeds on the coast and inland lakes in the west of Ireland.
Mute Swan *Cygnus olor*	-	Amber List	25	31/12/2011	Resident at wetlands throughout Ireland.
Northern Fulmar *Fulmarus glacialis*	✓d	Red List	4	31/12/2011	Can be seen in Irish waters throughout the year, but winters at sea. Mainly breeds on sea cliffs, but will nest on level ground, on buildings and in burrows and crevasses.
Northern Gannet *Morus bassanus*	✓d	Amber List	1	31/12/2011	Resident along all Irish coasts, wintering at sea, but can be seen in Irish waters throughout the year. Breeds in colonies on islands off the coast. Three main Gannet colonies are located off the coast of Wexford. Cork and Kerry. A small colony is also found on Irelands Eye, Co. Dublin.
Northern Lapwing *Vanellus vanellus*	✓d	Red List	25	31/12/2011	Irish resident and summer visitor across wetlands, pasture and rough land adjacent to bogs. Breed on open farmland and bare fields.
Northern Pintail *Anas acuta*	✓d	Red List	1	31/12/2011	Local winter visitor to wetlands throughout Ireland from October to March. In winter, they form large flocks on brackish coastal lagoons, in estuaries and on large inland lakes.
Northern Shoveler *Anas clypeata*	✓d	Red List	2	31/12/2011	Resident & winter migrant. Most occur between October and March. Prefer shallow eutrophic waters rich in plankton and occur on a variety of habitats while wintering in Ireland, including

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					coastal estuaries, lagoons and inland lakes and callows.
Pale-bellied Brent Goose *Branta bernicla* subsp. *Hrota*	-	Amber List	1	31/12/2011	Winter migrant. Most occur in Ireland between October and April. This population winters almost entirely in Ireland, with small numbers in parts of Britain and France. Mostly found on coastal estuaries during the autumn and early winter, and also on grasslands from mid-winter.
Peregrine Falcon *Falco peregrinus*	✓a,d	-	8	31/12/2011	Widespread resident in Ireland favouring coastal sites and cities with high vantage points.
Purple Sandpiper *Calidris maritima*	✓d	-	3	31/12/2011	Winter visitor to Irish coasts between September & April. Favour rocky shorelines, headlands, islands and harbours, also occur on sandy shorelines where rotting seaweed is piled up.
Razorbill *Alca torda*	✓d	Amber List	3	31/12/2011	Resident, though occur inshore/ land during the breeding season, March/April to August/September. Winters at sea. Nests on sea cliffs. Will also use more secluded nest sites, fissures in the cliffs and also in screes.
Red Knot *Calidris canutus*	✓d	Red List	1	31/12/2011	Winter visitor to Irish coasts between October & February. The preferred habitat mostly includes estuarine sites with extensive areas of muddy sand. They occur mostly in large flocks and on fewer estuaries than other wader species. Breed at low density, and often close to the coast, nesting on well concealed and sparsely vegetated gravel and rocky slopes.
Red-breasted Merganser *Mergus serrator*	✓d		2	31/12/2011	Resident and winter visitor to brackish and marine waters, particularly in shallow protected estuaries and bays and lagoons, and also offshore. Nest on sheltered lakes and large rivers throughout the west and north of the country, though they are largely absent from Clare and a few pairs have been recorded in Wexford.
Red-throated Diver *Gavia stellata*	✓a,d	Amber List	1	31/12/2011	Winter visitor to all Irish coasts from September to April. There is a very small breeding population in County Donegal. During the winter they are well distributed around the Irish coastline and are typically associated with shallow sandy bays. In Ireland they breed on small fresh water loughs. Ireland is the most southerly breeding location in the species' range.
Ringed Plover *Charadrius hiaticula*	✓d	Amber List	4	31/12/2011	Resident & winter visitor. Peak numbers between August and early October. Winter around the entire coastline but are quite sparse along the north and southeast coasts. Mostly recorded along sandy stretches or along the upper shores of estuaries and non-estuarine coastline.
Roseate Tern *Sterna dougallii*	✓a,d	Amber List	1	17/09/2016	Rare summer visitor from April to October, the majority breeding at two sites in the Irish Sea, with another colony in Wexford. Birds have bred at other sites recently, for example on Dalkey Island, Co. Dublin and on the Blasket Islands Co. Kerry. Rockabill holds the most important colony in Europe with up to 1,200 pairs of birds.

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					The colony at Lady's Island is much smaller with around a hundred pairs.
Ruddy Turnstone *Arenaria interpres*	✓d	-	2	09/11/2019	Winter visitor, occurs late July to late April. Winters all around the Irish coast, particularly on rocky shores, headlands, islands and piers. Does not breed in Ireland.
Ruff *Philomachus pugnax*	✓a	Amber List	1	31/12/2011	Scarce spring & autumn passage migrant in small flocks in marshes, fields and mudflats. Small numbers winter on estuaries along the southern coast of Ireland.
Sand Martin *Riparia riparia*	-	Amber List	11	31/12/2011	Widespread summer visitor throughout Ireland. Breed in burrows dug into river banks or quarries.
Sanderling *Calidris alba*	✓d	-	2	31/12/2011	First seen along the Irish coastline in July or August, though most arrive in Ireland between September & April. Found along sandy coastlines, especially non-estuarine.
Sandwich Tern *Sterna sandvicensis*	✓a,d	Amber List	4	18/06/2016	Summer visitor to all Irish coasts from March to September. Nest colonially on the ground, mainly on the coast but with some colonies inland. Nests on islands, shingle spits and sand dunes. Winters in small numbers in Galway Bay and Strangford Lough.
Short-eared Owl *Asio flammeus*	-	Amber List	2	31/12/2011	A scarce winter visitor throughout Ireland and rare breeding species in upland locations, mainly in the south and east. Favours uplands and coastal lowlands.
Sky Lark *Alauda arvensis*	-	Amber List	40	31/12/2011	Common resident throughout Ireland in uplands and areas of farmland, especially cereal. Breeds in a variety of habitats including cultivated areas, ungrazed grasslands and upland heaths. Winters in flocks on stubble fields, grasslands and coastal areas.
Slavonian Grebe *Podiceps auritus*	✓a	Amber List	1	31/12/2011	Scarce winter visitor to coastal areas from October to March. Prefer sheltered bays and estuaries on all Irish coasts. Rarely seen on larger lakes. Does not breed in Ireland.
Spotted Flycatcher *Muscicapa striata*	-	Amber List	21	31/12/2011	A widespread summer visitor to broadleaf woodlands, well-vegetated hedgerows, parks and gardens.
Stock Pigeon/Stock Dove *Columba oenas*	-	Amber List	38	31/12/2011	A widespread resident throughout Ireland favouring areas of cereal cultivation. Breeds in lowlands of eastern and southern Ireland, almost invariably near agricultural areas, especially cereal. Nests in holes in trees.
Stonechat *Saxicola torquata*	-	Amber List	9	31/12/2011	Widespread resident in scrubland throughout Ireland, mainly near the coast. Scarce in the midlands. Favours Gorse and upland bracken
Tufted Duck *Aythya fuligula*	-	Red List	6	31/12/2011	Resident & winter visitor. Preference for large open lakes in lowland areas for breeding, where nests are built in waterside vegetation. Also seen on town lakes, canals and slow-moving rivers.
Twite *Carduelis flavirostris*	-	Red List	3	31/12/2011	A declining breeding species mainly on the north and west coast of Ireland. A scarce winter visitor to northeast coasts. The majority of breeding Twite remain relatively close to their breeding areas, though some may move

Species name	Legislative protection*	Red List status	Record count	Date of last record	Habitat preferences+
					considerable distances. The Irish population is joined in winter by some of the Scottish population, which tend to winter in coastal marshes and tilled fields along the north and northeast coasts (Antrim, Down and Louth). The total wintering population is estimated to be between 650 to 1,000 birds.
Velvet Scoter *Melanitta fusca*	-	Red List	4	31/12/2011	A rare winter visitor to all Irish coasts, usually associating with Common Scoters. The main wintering grounds lie in the southern Baltic and eastern North Sea.
Water Rail *Rallus aquaticus*	-	Amber List	6	31/12/2011	Resident at wetlands throughout Ireland. Widespread.
Whooper Swan *Cygnus cygnus*	✓a,d	Amber List	8	31/12/2011	Winter visitor to wetlands and nearby open farmland throughout Ireland. Breeding in open shallow water, by coastal inlets, estuaries and rivers
Yellowhammer *Emberiza citrinella*	-	Red List	54	06/05/2021	Declining resident mainly in the east and south of Ireland. Strongly linked with the cultivation of cereals.
Amphibian					
Common Frog *Rana temporaria*	✓e	-	8	21/07/2020	Native to Ireland. Uses a broad habitat range including lakes and ponds, grassland and marsh, wet heath, peatlands, woodland and scrub, dune slacks, machair, and riparian habitats.
Smooth Newt *Lissotriton vulgaris*	✓	-	2	12/09/2021	Ireland's only native newt species, surprisingly widespread in Ireland, and can be found in many garden ponds.
Invertebrates					
Wood White *Leptidea sinapis*	-	Near threatened / least concern*	2	03/06/2018	Specialist on grassy forest clearings and limestone pavement. In dull weather adults may be found resting on flowerheads.
Large Red Tailed Bumble Bee *Bombus (Melanobombus) lapidarius*	-	Near threatened	2	06/08/2020	Found in a wide range of habitats, including parks and gardens. Has declined from the agricultural landscape
Small blue *Cupido minimus*	-	Endangered	1	24/07/2021	Specialist, unimproved dry calcareous grassland, coastal grey dunes, machair, limestone pavement, calcareous moraine and scree.
Fish					
Basking Shark *Cetorhinus maximus*	-	Threatened	1	13/08/2012	Prefers cold and temperate waters of the continental shelves with an average temperature range of 8-14 °C.

* Legislative Protection: a = Annex I Birds Directive, b = Annex II Habitats Directive, c = Annex IV Habitats Directive, d = Special Conservation Interest bird species (within SPA), e = Wildlife Act (excluding birds); f = third schedule of the European Communities (Birds and Natural Habitats Regulations) 2011-2015.

+ Habitat preferences: Birdwatch Ireland (https://birdwatchireland.ie/irelands-birds-birdwatch-ireland, accessed March and November 2019) and NBDC (https://species.biodiversityireland.ie/, accessed November 2023).

Table 1-4: Invasive alien species returned from the NBDC desk study search within 5 km of the Project.

Species name	Legislative protection*	Red List status	Record count	Date of last Record	Habitat Preferences+
Invasive alien flora					
Giant Hogweed *Heracleum mantegazzianum*	✓f	-	2	28/06/2009	Mires, bogs & fens; Grasslands and landscapes dominated by forbs, mosses or lichens; Woodland, forest and other wooded land; Constructed, industrial or other artificial habitats; Regularly or recently cultivated agricultural, horticultural or domestic habitat.
Japanese Knotweed *Reynoutria japonica*	✓f	-	4	05/09/2019	Found in a wide variety of habitats though particular established and persistent on urban waste ground, roadsides and river banks (Preston *et al*., 2004; Reynolds, 2002).
Salmonberry *Rubus spectabilis*	✓f	-	1	21/04/2018	Favours moist conditions and open sites. Moderately shade tolerant. Naturalised in many areas such as parks, riverbanks, demesnes, broadleaved and coniferous woodland
Water Fern *Azolla filiculoides*	✓f	-	1	27/02/2019	Inland surface waters.
Invasive alien animals					
Eastern Grey Squirrel *Sciurus carolinensis*	✓f	-	2	31/12/2012	Woodland, forest and other wooded land; Constructed, industrial or other artificial habitats; Regularly or recently cultivated agricultural, horticultural or domestic habitat; Miscellaneous.
Greylag Goose *Anser anser*	✓f	-	6	31/12/2011	Lakes and reservoirs, occurring mostly at coastal sites.
Ruddy Duck *Oxyura jamaicensis*	✓f	-	1	31/12/2011	Inland surface waters.

* Legislative Protection: f = third schedule of the European Communities (Birds and Natural Habitats Regulations) 2011-2015.

+ Habitat preferences: Birdwatch Ireland (https://birdwatchireland.ie/irelands-birds-birdwatch-ireland, accessed March and November 2019) and NBDC (https://species.biodiversityireland.ie/, accessed November 2023).

1.2.2 Field study

Habitats

Habitats detailed during the field study within the ZoI of the Project are illustrated in Figure 1-1**;** which includes the relevant habitat codes from Fossitt (2000) for onshore habitats (terrestrial and freshwater). A summary of each habitat is provided within this section.

Freshwater

FW2 Depositing/lowland rivers

Depositing/lowland rivers were recorded crossing and within the ZoI of the Project. Six named rivers were identified, with two of these rivers being crossed twice each (i.e. the River Dee and the Port Stream). Lowland rivers and streams identified (Common name; EPA name) within the ZoI of the Project include:

- Rock Stream (Rock 06);

- River Dee (Dee) (crossed twice);
- Newhall Stream (Newhall 06);
- Salterstown Stream (Salterstown);
- Port Stream (Port 06) (crossed twice); and
- Broadlough Stream (Broadlough).

Freshwater habitat descriptions from surveys undertaken in 2023 at eight sites (Figure 1-4) from the above watercourses are detailed in Table 1-5.

Table 1-5: Freshwater habitat descriptions.

Site code/ name	Freshwater aquatic habitat results
A-1 / Rock 06 Stream	**Survey Results** This site comprised a small headwater stream which was accessed from the N33. Bankfull width was 2 m, whereas wetted width was 1.2 m. Water depth was 0.15 m. A thick layer of silt was noted within the channel, which was measured at approximately 0.5 m in depth. The substrate comprised 100% silt and a high plume was generated when disturbed. The channel was choked with vegetation, with fool's-water-cress *Apium nodiflorum* and *Phalaris* recorded. The river habitat comprised approximately 80% pool and 20% glide. Velocity was slow and flow discharge was low. The channel has been historically channelised and straightened. Surrounding landuse comprised improved pasture and scrub. The riparian buffer comprised woodland/scrub on the left bank and scrub on the right bank. Bankside vegetation included willow *salix* sp., hawthorn *Crataegus monogyna*, ivy *Hedera helix*, nettles *Urtica dioica*, ash *Fraxinus excelsior* and soft shield fern *Polystichum setiferum*. Two pipes (approximately 30 cm diameter) underneath the N33 convey the stream from its source directly upstream. There was a very shallow flow present within the pipes with a maximum depth of 5 cm.   Site A1 looking downstream. Site A1 looking upstream. Photographs taken 19 July 2023.
A-2 / River Dee at N33 bridge crossing	**Survey Results** The channel of the River Dee has been historically dredged as part of arterial drainage schemes and this is reflected in the high banks, widened and straightened profile and deep flow that characterised this section of the river. A groyne/deflector was noted on the left bank at the N33 bridge. Flow discharge was high and turbidity moderate which affected visibilty of the riverbed from the N33 bridge. It was not possible to enter the river due to high flow and deep water depths (assumed to be >0.6 m in places).

	Instream habitat consisted of 100% glide. Cobbles, gravel and boulders were visible within parts of the channel, with cobble dominating the substrate. The riparian buffer comprised trees and shrubs, and was estimated at being between 2 and 5 m in width. Riparian vegetation consisted of dogwood *Cornus sanguinea*, hazel *Corylus avellana*, willow, ash, ivy, brambles *Rubus fruticosus*, sycamore *Acer pseudoplatanus*, rose *Rosa* sp., cypress *Cupressus* sp, birch, alder *Alnus glutinosa* and hawthorn. Land use was dominated by tillage and improved pasture with industry yards on both banks downstream.   Site A2 looking upstream Site A2 looking downstream Photographs taken 19 July 2023.
A-3 / River Dee at Drumcar Bridge	**Survey Results** Bankfull width of the River Dee was measured at approximately 10-12 m, whereas wetted width was measured at between 8 and 10 m. The channel was considerably wider at the bridge (approximately 20 m). Bank reinforcement was noted in places. Visibility of the river bed was poor due to moderate colour and turbidity. However, where the riverbed was visible, it was comprised of boulder (c. 5%), sand (c.10%), cobble (c. 35%), coarse gravel (c. 25%) and fine gravel (c. 25%). Water depth was estimated at 0.5-1 m and bank height at 2 m. Siltation was low, and when the substrate was kicked a low plume was generated. Cattle access was noted upstream and downstream of the survey location. Bank erosion was moderate where cattle had access to the river. The dominant river habtiats were riffle (c. 40%), glide (c. 30%) and pool (30%). Reeds *Phragmites*, water-crowfoot *Ranunculus* sp., *Fontinalis* and *filamentous algae* were noted in the channel. The riparian buffer was approximately 1-2 m in width, and included ash, sycamore, bramble, snowberry *Symphoricarpos albus*, bindweed *Convolvulus* sp., common hogweed *Heracleum sphondylium*, nettle, alder, common ragwort *Jacobaea vulgaris* and hawthorn. Trees were sparsely distributed on the left bank with grazing of the understorey noted. Vegetation on the right bank was considerably more scrubby and dense. A lamprey *Lampetra* sp.was captured in the macroinvertebrate kick sample collected at the site.

Site A3 looking downstream

Site A3 looking upstream

Photographs taken 18 July 2023.

A-4 / Newhall 06 Stream	**Survey Results** This stream was surveyed at a point where it flowed parallel to a rural road. Bankfull width was measured at 2 m whereas wetted width was measured at 1.5 m. Water depth was 0.2 m. The channel has been straightened. Siltation was moderate and a moderate plume of silt was generated when the substrate was disturbed. Visibility of the stream bed was poor due to high turbidity and high flow discharge. Velocity was fast. River habitat comprised 50% riffle and 50% glide. The substrate comprised c. 60% cobble, c. 30% coarse gravel and c. 10% fine gravel. The riparian buffer was between 2 and 2.5 m in width, and comprised unmanaged scrub. Species recorded included great willowherb *Epilobium hirsutum*, hedge bindweed *Calystegia sepium*, ash, dock *Rumex* spp., cleavers *Galium aparine*, meadowsweet *Filipendula ulmaria*, hawthorn, nettle, bramble, common hogweed, soft shield fern and ivy. Surrounding landuse comprised tilage, scrub and the roadside.

Site A4 looking downstream

Site A4 looking upstream

Photographs taken 18 July 2023.

A-8 / Salterstown Stream downstream Site 6	**Survey Results** The stream at Site 8 was approximately 1.7 m in width (bankfull and wetted width), and 0.15 m in depth. The stream was slightly wider at the bridge. The stream appears to have been historically straightened and was reinforced with stone on the right bank. Some light erosion was noted on the right bank. The bridge itself was not deemed to be

a barrier to fish migration. Siltation within the channel was moderate and a high silt plume was noted when the bed was disturbed. The substrate comprised boulder (5%), cobble (60%), coarse gravel (20%) and fine gravel (15%). Flow discharge was normal on the day of survey, with fast velocity and low turbidity noted. Shading was heavy. River habitat comprised riffle, pool and glide sequence. The invasive Japanese knotweed *Reynoutria japonica* was recorded on the right bank by the bridge (see Figure 1-1). Riparian vegetation comprised sycamore, elm *Ulmus* sp., brambles, ivy, elder, nettles, soft shield fern and cleavers. The riparian buffer was a narrow treeline on both banks, with gardens recorded behind the treelines on both the left and right bank. Two elvers (juvenile eels) were captured within the macroinvertebrate kick-sample collected at the site.

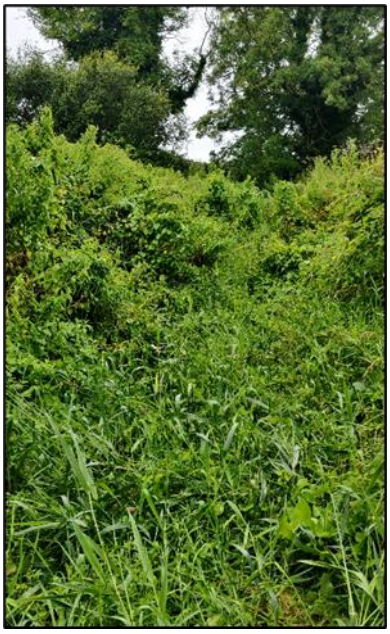
Site A8 looking downstream

Site A8 looking upstream

Photographs taken 19 July 2023.

A-9 / Port 06 Stream	**Survey Results** This stream is approximately 1.5 m wide (wetted and bankfull width). Water depth was approximately 0.3 m. The stream appears to have been historically straightened. Two other tributaries enter the stream at this site (Ardballan Stream and Wyanstown Stream). The channel was choked with aquatic vegetation comprising *Phalaris*, great willowherb, and manna grass *Glyceria sp*. Where visible, the substrate consisted of 100% silt, and a silt layer approximately 0.15 m deep was recorded in the channel. Velocity was slow, and flow discharge was normal. The river habitat consisted of 100% glide. Shading was moderate. The riparian buffer was between 3 and 5 m in width and was dominated by herbs and grasses including hedge bindweed, great willowherb, nettle, creeping thistle *Cirsium arvense*, meadowsweet, yorkshire fog *Holcus lanatus*, false oat grass *Arrhenatherum elatius*, herb robert *Geranium robertianum* and bush vetch *Vicia sepium*. Woody vegetation comprised elder, hawthorn and sycamore. The dominant landuse comprised rough pasture.

Site A9 looking downstream



Site A9 looking upstream

Photographs taken 18 July 2023.

A-10 / Port 06 Stream upstream Site 9	**Survey Results** This site is located upstream of Site 9. The stream was straightened and choked with vegetation. Bankfull width was 3 m, whereas wetted width was approximately 1.2 m. Water depth was estimated at 0.5 m. The substrate was not visible but is likely to have been dominated by silt. Flow discharge was low and velocity was stagnant. River habitat was 100% pool with no perceptible flow. Instrem vegetation consisted of flag iris *Iris pseudacorus*, water mint *Mentha aquatica*, lesser duckweed *Lemna minor*, *Phalaris*, fool's-water-cress and water cress *Nasturtium* sp. The riparian buffer was narrow, with grazing noted up to the banktop. Riparian vegetation consisted of rushes *Juncus* sp., gorse *Ulex europaeus*, bramble, creeping thiste, great willowherb and meadowsweet.

Site A10 looking upstream

Site A10 looking downstream

Photographs taken 18 July 2023.

A-11 / Broadlough Stream	**Survey Results** The Broadlough stream has been modified into a drainage ditch. Bankfull width and wetted width was measured at 2 m. Bank height was 1.8 m. Water depth was 0.15 m, and a deep layer of silt (c. 0.5 m) was noted within the channel. The substrate comprised 100% silt. Flow discharge was low, and velocity was slow and stagnant in places. Shading was moderate. River habitat comprised 100% pool. Instream

vegetation was dense and comprised fat duckweed *Lemna gibba*, fool's-water-cress and the third schedule invasive water fern *Azolla filiculoides*. The riparian buffer comprised a treeline on the left bank and tillage and woodland on the right bank. Bankside vegetation comprised hawthorn, ivy, bindweed, ash, nettle, hoary willowherb *Epilobium parviflorum*, brambles, spear thistle *Cirsium vulgare*, lime *Tilia* sp., great willow herb and willow.

Site A11 looking upstream

Site A11 looking downstream

Photographs taken 19 July 2023.

FW4 Drainage ditches

Drainage ditches were noted with high frequency throughout the landscape. These habitats were often located along one or both sides of the local road network. The drainage ditches encountered during the aquatic survey contained varying cover of vegetation but were mostly heavily silted. Due to their extensive distribution and relatively small size, these habitats have not been mapped.

Grassland

GA1 Improved agricultural grassland

Improved grassland habitat was identified within the ZoI of the Project. This habitat occurs throughout the study and occurs within the footprint at the following locations:

- Joint bays 10, 13, 17, 18, 21, 23, 26, 28 and 29;
- HDD at both River Dee crossings and Togher (joint bay 23); and
- The field south of the N33 for the fibre optic cable connection.

The improved agricultural grassland at these locations was a mix of permanent grassland and planted grasslands as part of arable rotation. A species-poor sward was typically dominated by ryegrasses *Lolium* spp., with varying occurrences of dandelion *Taraxacum* agg., creeping buttercup *Ranunculus repens*, plantains *Plantago* spp., stinging nettle, thistles *Cirsium arvense* and *C*. *vulgare*, daisy *Bellis perennis,* bush vetch*,* common ragwort and docks .

GS1 Dry neutral grassland

Situated on a steep-sloping vegetated bank adjacent to the landfall location, either side of the existing M1 motorway and west of JB23 (where HDD is proposed), this habitat was dominated by a grasses and lady's bedstraw sward (10-50 cm high), with frequent red clover *Trifolium pratense*, white clover *Trifolium repens*,

yarrow *Achilea millefolium*, bird's-foot trefoil *Lotus corniculatus*, occasional meadow vetchling *Lathyrus pratensis* and wild carrot *Daucus carota* and rare occurrences of autumn hawkbit *Leontodon autumnalis*, spear thistle, bush vetch, silverweed *Potentilla anserina*, ribwort plantain *Plantago lanceolata*, and colt's-foot *Tussilago farfara*.

GS2 Dry meadow and grassy verges

Grassy verge habitat was identified either side of the majority of the local roads and hedgerows within the ZoI of the Project. These habitats are likely mown at least once a year and contained varying abundances of hogweed, stinging nettles, creeping thistle, bramble, meadowsweet, cleavers, broad-leaved dock *Rumex obtusifolius*, tufted vetch *Vicia cracca*, great willowherb, lady's bedstraw, butterbur *Petasites hybridus*, prickly sowthistle *Sonchus asper*, hart's tongue fern *Asplenium scolopendrium*, lesser burdock *Arctium minus*, and scaly male-fern *Dryopteris affinis*.

A dry meadow located east of the River Dee crossing at Drumcar bridge contained a grass dominated sward with bent grass *Agrostis* spp., Yorkshire-fog *Holcus lanatus*, and meadow foxtail *Alopecurus pratensis*. Occasional common ragwort and stinging nettles were noted with rare occurrences of broadleaved dock, creeping thistle, and yarrow. The eastern section of the field was waterlogged in winter 2019 (during the winter mammal survey).

A dry meadow located west of Charleville Bridge (M1 crossing) contained a grass dominated sward with red fescue *Festuca rubra*, creeping bentgrass *Agrostis stolonifera* and cock's-foot *Dactylis glomerata.* Frequent red clover and stinging nettles along with occasional ribwort plantain, hoary willowherb and bush vetch were noted. Additionally, broadleaved dock, common ragwort, creeping cinguefoil, creeping thistle and autumn hawkbit were of rare occurrence. Intermittent gorse scrub also present.

Grassy verge habitats were not mapped but are presumed to be adjoining all mapped hedgerows (WL1) and roadways.

Cultivated and built land

BC1 Arable crops

Several areas have been identified as arable crop, including the onshore substation site, agricultural fields adjoining the onshore cable route, and the landfall location. The following floristic habitat descriptions are focused on the onshore substation site and landfall.

As expected, floristic diversity was limited within the arable crop habitats, although the landfall location contained an abundance of wild grasses, with occasional perennial sowthistle *Sonchus oleraceus*, hairy tare *Vicia hirsuta,* creeping speedwell *Veronica filiformis*, white clover and rare occurrence of scarlet pimpernel *Anagallis arvensis*.

This habitat also occurs within the footprint at the following locations:

- Joint bays 7, 9, 12, 14, 15, 16, 19, 24 and 25;
- Transition joint bay option 2; and
- HDD east of M1 crossing and west of River Dee crossing at the N33.

Coastland

CB1 Shingle and gravel banks

The offshore cable corridor comes onshore at a landfall location south of Dunany Point (South). A shingle bank is present here, extending from the scrub (WS1) and dry calcareous and neutral grassland (GS1) habitats (described in this section), to below the HWM. Vegetation was restricted to the upper section of shingle and contained a single species of rare occurrence, curled dock *Rumex crispus*.

Below the shingle bank a tidal mudflat and sandflat was present.

CS3 Sedimentary sea cliffs

Sedimentary sea cliff habitat was noted at Dunany Point (within Dunany Point pNHA) at the landfall location. Boulder clay was evident along the cliff face and there were signs of erosion and cliff collapse throughout.

The sedimentary sea cliffs was dominated by tall fescue *Festuca arundinacea*, with an abundance of red fescue. Creeping cinquefoil *Potentilla reptans*, great horsetail *Equisetum telmateia*, ribwort plantain, creeping thistle, and ivy were occasional, while wild carrot, dandelion, butterbur and kidney vetch were rarely recorded. Where the lower limit of the sedimentary sea cliffs adjoined the shingle beach, sea beet *Beta vulgaris* was occasionally present.

The scrub exhibited a low height (approximately 1.5 m) with abundant presence of brambles accompanied by varying abundances of gorse *Ulex europaeus*, meadowsweet, great willowherb, cleaver, creeping thistle, creeping cinquefoil, white clover and prickly sowthistle.

This habitat also occurs within the footprint at the following location:

- Transition joint bay (i.e. option 1 and option 2).

Woodland and scrub

WN2 Oak-ash-hazel woodland

An oak-ash-hazel woodland was identified during the desk study and has been described in the National Parks and Wildlife Service (NPWS) ancient woodland dataset as ash–ivy woodland group, and sycamore – hawthorn vegetation type. This approximately 10 ha woodland is located approximately 600 m east of the onshore substation site and approximately 10 m north of the onshore cable route. This woodland was not surveyed as part of the field study as it is outside the footprint of the Project.

WD1 (Mixed) broadleaved woodland

Mixed species broadleaved woodland was identified at three locations along the onshore cable route; at a location adjacent to the onshore cable route, approximately 400 m west of the landfall location, at a location approximately 30 m southwest of joint bay 11, and at a location east of the River Dee crossing at Drumcar.

The woodland near to the landfall location is several metres from the onshore cable route and is dominated by beech *Fagus sylvatica.* This planted woodland has a Forest Service Forest inventory (Forest ID 118046).

The small patch of woodland southwest of joint bay 11 is planted. This woodland is dominated by birch with ash dominant along the perimeter. Other species noted include hazel, sycamore and grey willow *Salix cinerea*.

The woodland near the eastern River Dee crossing is within the onshore cable route, located north of the local road. This woodland had a canopy dominated by mature beech with a line of conifers along the road and an understorey dominated by holly. This planted woodland has a Forest Service Forest inventory (Forest ID 118045).

WD2 Mixed broadleaved/conifer woodland

Mixed broadleaved and conifer woodland was identified at two locations along the onshore cable route, one adjoining the onshore substation site and one at a location east of the River Dee at Drumcar. The woodland at the onshore substation site was dominated by spruce *Picea* spp. with occasional presence of elder, ash, sycamore, grey willow, horse chestnut *Aesculus hippocastanum* and black poplar *Populus nigra*. The woodland east of the River Dee had a canopy dominated by scots pine and mature beech, and an understorey dominated by holly.

WS1 Scrub

Scrub habitat was recorded on the top of the shoreline (transition joint bay - option 1), adjacent to the landfall location, within a field west of the M1 (north of joint bay 8), at joint bay 20 along Togher road and

also on the eastern bank of the eastern River Dee crossing. The floristic assemblages of these four locations reflected the differences between the four areas.

The scrub adjacent to the coastal landfall location exhibited a low height (approximately 1.5 m) with abundant presence of brambles accompanied with gorse, meadowsweet, great willowherb, cleaver, creeping thistle, creeping cinquefoil, white clover, ivy, coltsfoot *Tussilago farfara*, goosefoot *Chenopodium* sp., yellow bartsia *Parentucellia viscosa*, common ragwort and prickly sowthistle.

The scrub near the River Dee was generally high (1-4 m) and dominated by hawthorn along with Elder, bramble, common ragwort, creeping thistle and cleavers.

The scrub located along Togher road at joint bay 20 was generally dense and high (1.5-3 m) located on a slope. It was dominated by bramble, stinging nettle with frequent common hogweed and ivy. Occasional herb robert and hart's-tongue fern were also noted. A stone cut bank-face is present along the boundary.

The scrub located with a field adjacent to the M1 was generally high (1.5-3 m) and consisted only of gorse and bramble.

WS2 Immature woodland

Immature woodland recorded within the redline was restricted to the planted areas along the N33. These strips of woodland were dominated by dogwood, hazel, blackthorn, hawthorn and privet *Ligustrum Ovalifolium*, with a varying abundance of ash, guelder rose *Viburnum opulus*, alder, birch, grey willow, sycamore, Norway maple *Acer platanoides*, spindle *Euonymus europaeus*, gorse, elder and field maple *Acer campestre.* The features of the woodland associated with each of the joint bays is detailed in Table 1-6. The immature woodland ranges from approximately 2-8 m in height and 2-10 m in width.

A section of immature woodland was also noted on the N33, at the entrance into the onshore substation site. This woodland is composed of hawthorn, guelder rose, dogwood, hazel, and privet; approximately 6-7 m in height and approximately 10 m wide.

Table 1-6: Features of hedgerow associated with joint bays.

Joint Bay Reference	Habitat Description Within Planning Application Boundary
JB-1	Hazel, alder, dogwood, blackthorn, birch; approximately 10 m high, approximately 10 m wide; unmanaged.
JB-2	Hazel, dogwood, guelder rose, blackthorn, willow; approximately 5 m high, approximately 10 m wide; unmanaged.
JB-3	Dogwood, blackthorn; approximately 3 m high, approximately 3 m wide. Heavily managed and cut back.
JB-4	Dogwood, guelder rose, grey willow, hazel, privet; evidence of toping management; approximately 2-3 m high.
JB-5	Dogwood, sycamore, hazel, privet, Norway maple, grey willow' approximately 3-4 m high; unmanaged
JB-6	Hazel, privet, birch, larch, dogwood; approximately 5 m high; unmanaged
JB-7	Spindle, hazel, birch, ash, Norway maple, field maple; approximately 5-8 m high; unmanaged.
JB-8	Sycamore, hazel, field maple, dogwood, alder, Norway maple, grey willow, elder, Scots pine, bramble; approximately 8 m in height; approximately 3-4 m wide; managed on sides.

WL1 Hedgerows

Hedgerows were recorded extensively within the ZoI of the onshore components of the Project. Hedgerow habitat description focuses on the onshore substation site and the onshore cable route. No hedgerow was recorded at the landfall location.

The onshore substation site was bounded by patchy, moderately managed, hedgerow of varying height, which was dominated by ash, with occasional hawthorn, grey willow, hybrid poplar *Populus alba x tremula*, and sycamore, and rare occurrences of mature beech.

Hedgerow adjoining the road network, in which the onshore cable route will be located, displayed a high degree of variation in height, thickness, species composition, and management intervention. In general, hedgerows were managed by cutting, at least once a year, and were dominated by ash, hawthorn, and blackthorn. Varying frequencies of elder, small-leaved elm *Ulmus minor*, sycamore, grey willow, hornbeam *Carpinus betulus*, cherry laurel *Prunus laurocerasus*, wild cherry *Prunus avium*, *viburnum* spp., hazel, black poplar, lime , beech, and horse chestnut were recorded. The majority of the hedgerows also contained bramble, dog rose *Rosa canina*, ivy. Hedgerow habitat was associated with grassy verges (GS2), which has been described in this section. When visited after a heavy rainfall event, several hedgerow ditches turned wet and were heavily immersed in water up to their understorey.

Hedgerow encloses the arable field at the landfall in which the transition joint bay (option 2) may be located. Hedgerow along the eastern boundary was dominated by sycamore, hawthorn and ash. The majority of the hedgerows also contained bramble, ivy, winter heliotrope *Petasites fragrans*, nettles, Alexanders *Smyrnium olusatrum* and daisy. Hedgerow habitat was associated with grassy verges (GS2), which has been described in this section. The noteworthy features of specific location of proposed hedgerow removal/alteration are detailed in Table 1-7.

Table 1-7: Features of hedgerow associated with joint bays.

Joint bay reference	Habitat Description Within Planning Application Boundary
JB-9	Ash dominated with ivy, hawthorn and sycamore; approximately 10 m in height; lower section managed – cut on sides.
JB-10	Ash dominated with ivy, bramble, holly, hawthorn, alder and sycamore; approximately 2 m in height; heavily managed – cut on all sides.
JB-11	Hawthorn dominated with ash and bramble; approximately 1.5 m in height; heavily managed – cut on all sides.
JB-12	Blackthorn and Ash dominated with hawthorn, sycamore, holly, ivy and bramble; approximately 2 m in height; heavily managed – cut on all sides.
JB-13	Stone wall – no hedgerow.
JB-14	Ash, hawthorn and blackthorn dominated with sycamore, ivy and bramble; approximately 1.3 m in height; heavily managed – cut on all sides.
JB-15	Ash and blackthorn dominated, with ivy, bramble, and dog rose. Gappy hedgerow with few mature trees approximately 2-3 m in height; heavily managed – cut on all sides excluding mature trees.
JB-16	Ash and blackthorn dominated with bramble; approximately 2-3 m in height; heavily managed – cut on all sides.
JB-17	Ash dominated with willow, blackthorn, ivy, holly and bramble; approximately 1.5 m in height; heavily managed – cut on all sides.
JB-18	Ash dominated with hawthorn, blackthorn, ivy, and bramble; approximately 3 m in height; heavily managed – cut on all sides.
JB-19	Blackthorn, ivy, and bramble; approximately 1.5 m in height; heavily managed – cut on all sides; mature ash (x2) unmanaged approximately 8 m in height.
JB-20	Hawthorn, spindle, dogrose, elder, willow, honeysuckle, gorse, ivy and bramble; heavily managed on two sides.
JB-21	Hawthorn, ash, and sycamore dominated approximately 4 m in height; heavily managed on two sides – top unmanaged.
JB-22	No hedgerow; church carpark with amenity grassland/grassy verge.

Joint bay reference	Habitat Description Within Planning Application Boundary
JB-23	Blackthorn, bramble, hawthorn and ash; approximately 3 m in height; managed hedgerow – cut on all sides. Gappy hedgerow in east with mature ash, hawthorn and sycamore. As the hedgerow moves further east, it becomes less prominent and gradually changes in vegetated bank.
JB-24	Ash, hawthorn, ivy, willow and bramble approximately 1.5 m in height; heavily managed – cut on all sides.
JB-25	Hawthorn dominated with ivy and bramble; approximately 2.5 m in height; heavily managed – cut on all sides.
JB-26	Hawthorn dominated with bramble; approximately 1.5 m in height; heavily managed – cut on all sides.
JB-27	Bramble, blackthorn and elder with ash and hawthorn; approximately 1.5 m in height; heavily managed – cut on all sides.
JB-28	No assessment – no hedgerow removal
JB-29	Hawthorn and ash dominated with bramble, ivy and blackthorn; approximately 2.5 m in height; heavily managed and gappy along southern end– cut on all sides.

WL2 Treelines

This habitat is distinguished from WL1 hedgerows by their linear representation, often being planted, along with a poorly developed understory and a typical height range of greater than 5 m. Treelines were identified along the bank of the eastern River Dee proposed crossing, and also along the local road to the east of that same proposed crossing.

The treelines located along the River Dee were significantly more diverse, with pedunculate oak *Quercus robur*, alder, sycamore, ash and white willow *Salix alba*; while the treeline along the north of the local road was dominated by planted Cypress, spruce spp., and ash.

Protected flora/species of conservation concern

No plants protected under the Flora Protection Order 2022 were recorded during the field study. All vascular plants recorded within and adjacent to the Project site were of 'Least Concern' or were unlisted on the Irish Red List for vascular plants (Wyse Jackson *et al*., 2016).

Invasive plants and animals

Two 'scheduled' invasive species were recorded within the ZoI of the Project during the field study. The species, location, and description of these occurrences are detailed in Table 1-8 and shown in Figure 1-1.

Table 1-8: Locations of invasive plant and animal species recorded during the field study.

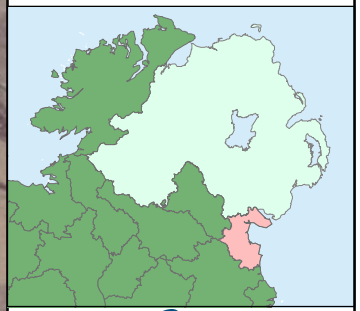
Map code	Species	Description and location (ITM)
IAPS-1	Japanese knotweed *Reynoutria japonica*	Patch identified on the south bank to the east of the bridge. No signage or evidence of previous treatment (714393-789621).
IAPS-2	Japanese knotweed *Reynoutria japonica*	North side of road 20 m x 10 m patch, south side of road 20 m x 5 m patch. Signage present and evidence of previous treatment (712927-791354).
IAPS-3	Japanese knotweed *Reynoutria japonica*	North side of road at junction with local road, 12 m x 4 m patch. No signage or evidence of previous treatment (712700-788995).
IAPS-4	Japanese knotweed *Reynoutria japonica*	North side of road, two patches 7 m x 1 m and 10 m x 2.5 m. No signage but treatment evident. Dead branches buried under soil and new sprouting showing (712244-789036).
IAPS-5	Japanese knotweed *Reynoutria japonica*	South side of road, one patch 8 m x 3 m. No signage but management (cut and sprayed) (710189-789263).

Map code	Species	Description and location (ITM)
IAPS-6	Japanese knotweed *Reynoutria japonica*	Within Drumcar woodland, single stand 1 m x 1 m. No signage or evidence of previous management (706539-791130).
IAPS-7	Water fern *Azolla filiculoides*	Within watercourse on northeast boundary of field containing proposed onshore substation (698199- 791250).

Legend

- Planning Application Boundary
- Joint Bay Locations
- Invasive Species
- FW2: Depositing/lowland rivers
- WS2: Immature woodland
- WL1: Hedgerows
- BC1: Arable crops
- WS1: Scrub
- WD2: Mixed broadleaved/conifer woodland

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-1
Habitats and IAPS Locations
Map 1 of 13

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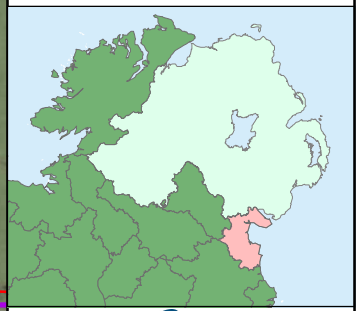
Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3003F03
Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WS2: Immature woodland
- WL1: Hedgerows
- WS1: Scrub

Data Sources: OWL, Surveyed Data



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ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

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Figure 1-1
Habitats and IAPS Locations
Map 2 of 13

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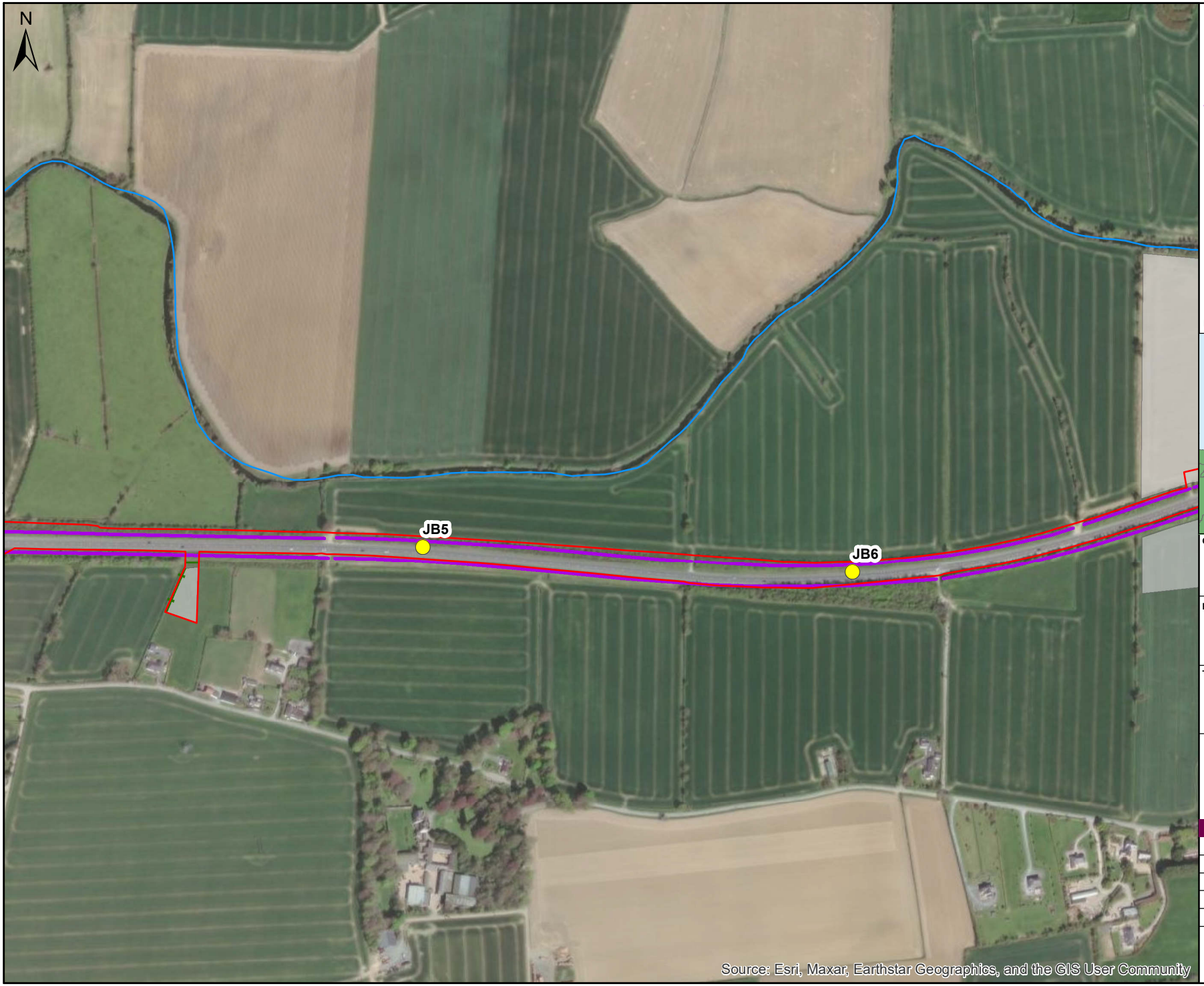
Issue Details

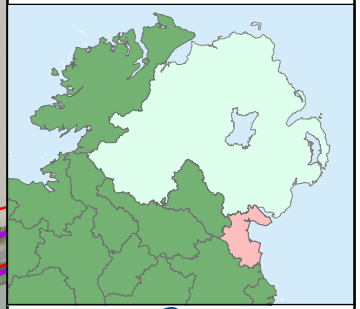
Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3003F03
Approved By: CC	
Scale: 1:7,000 @A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	



Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WS2: Immature woodland
- WL1: Hedgerows
- BC1: Arable crops

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
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Figure 1-1
Habitats and IAPS Locations
Map 3 of 13

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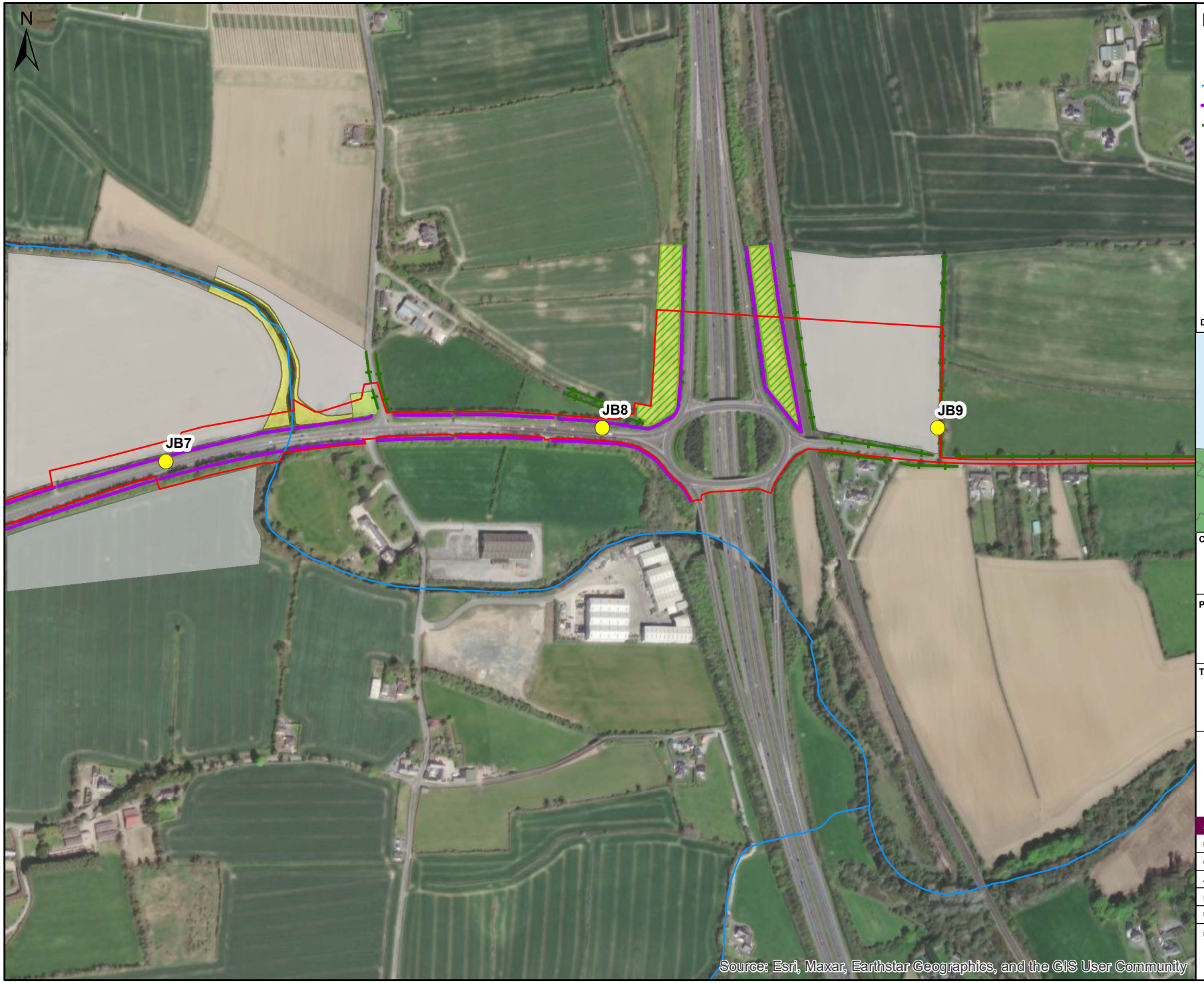
Issue Details

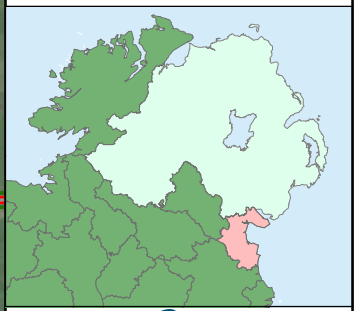
Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3003F03
Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	



Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WS2: Immature woodland
- WL1: Hedgerows
- BC1: Arable crops
- GA1: Improved agricultural grassland
- GS2: Dry meadows and grassy verges
- GS1/ WS1 (mosaic) - Dry calcareous grassland & Scrub

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-1
Habitats and IAPS Locations
Map 4 of 13

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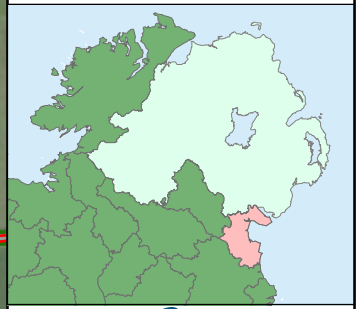
Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3003F03
Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- BC1: Arable crops
- GA1: Improved agricultural grassland
- WD1: (Mixed) broadleaved woodland

Data Sources: OWL, Surveyed Data



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Project

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Title

Figure 1-1
Habitats and IAPS Locations
Map 5 of 13

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Issue Details

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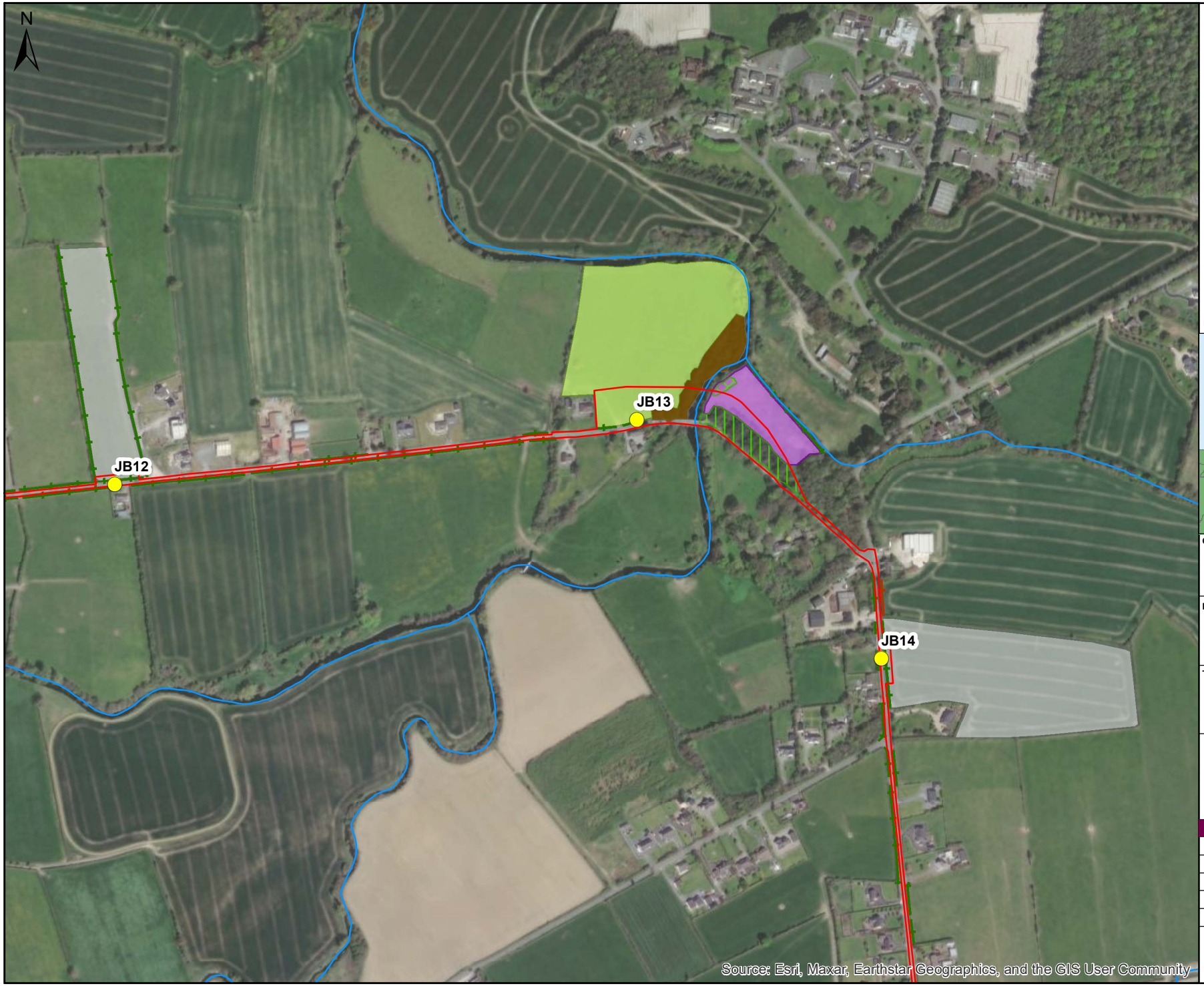
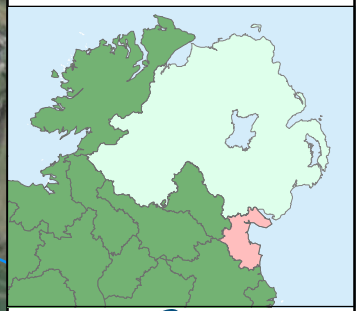
Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	



Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland
- WS1: Scrub
- WD2: Mixed broadleaved/conifer woodland
- WL2: Treelines
- GS1/ GS2 (mosaic) - Dry calcareous grassland & Dry meadows and grassy verges

Data Sources: OWL, Surveyed Data



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ORIEL WINDFARM
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Project

Oriel Wind Farm Project

Title

Figure 1-1
Habitats and IAPS Locations
Map 6 of 13

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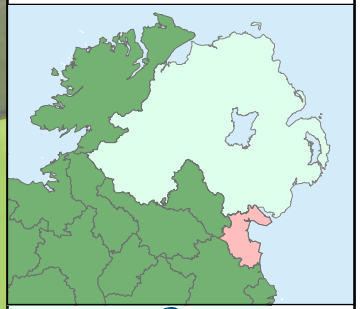
Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- BC1: Arable crops
- GA1: Improved agricultural grassland

Data Sources: OWL, Surveyed Data



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Project

Oriel Wind Farm Project

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Figure 1-1
Habitats and IAPS Locations
Map 7 of 13

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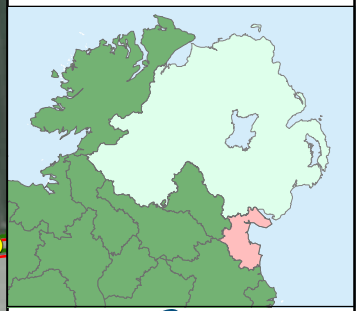
Legend

- Planning Application Boundary
- Joint Bay Locations
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland

Data Sources: OWL, Surveyed Data



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Project

Oriel Wind Farm Project

Title

Figure 1-1
Habitats and IAPS Locations
Map 8 of 13

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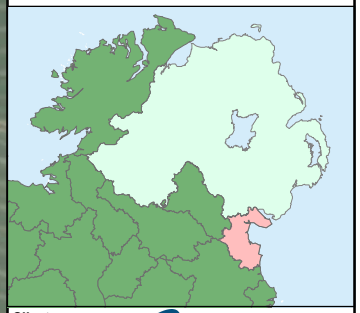
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- Invasive Species
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland
- GA2: Amenity grassland (improved)
- WS1: Scrub

Data Sources: OWL, Surveyed Data



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Oriel Wind Farm Project

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Figure 1-1
Habitats and IAPS Locations
Map 9 of 13

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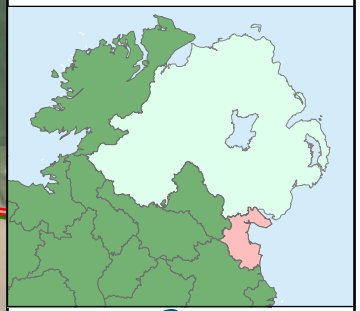
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- Invasive Species
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland
- GS1: Dry calcareous grassland

Data Sources: OWL, Surveyed Data



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Oriel Wind Farm Project

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Figure 1-1
Habitats and IAPS Locations
Map 10 of 13

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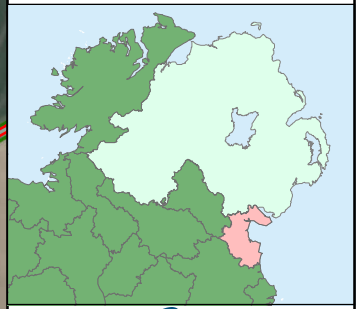
Scale: 1:7,000 @A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- Invasive Species
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland

Data Sources: OWL, Surveyed Data



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Oriel Wind Farm Project

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Figure 1-1
Habitats and IAPS Locations
Map 11 of 13

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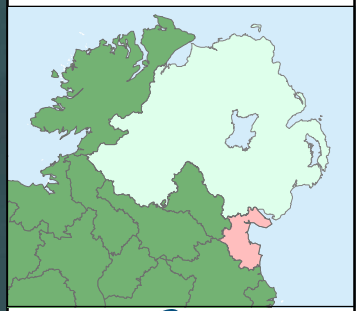
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- Invasive Species
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- WL2: Treelines
- BC1: Arable crops
- GA1: Improved agricultural grassland

Data Sources: OWL, Surveyed Data



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ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

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Figure 1-1
Habitats and IAPS Locations
Map 12 of 13

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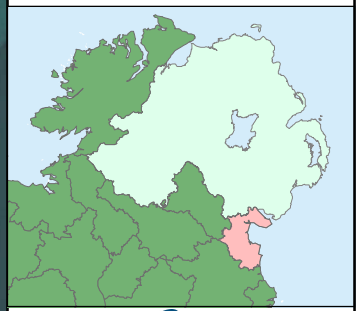
Scale: 1:7,000 @A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Legend

- Planning Application Boundary
- Joint Bay Locations
- Transition Joint Bay Option 1
- Transition Joint Bay Option 2
- FW2: Depositing/lowland rivers
- WL1: Hedgerows
- BC1: Arable crops
- CB1: Shingle and gravel banks
- CS3: Sedimentary sea cliff
- GS1: Dry calcareous grassland
- WS1: Scrub
- GS2: Dry meadows and grassy verges

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
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Project

Oriel Wind Farm Project

Title

Figure 1-1
Habitats and IAPS Locations
Map 13 of 13

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Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Otter

A single sighting of otter was noted 100 m north of the N33 bridge crossing with the River Dee in February 2021. However, no other evidence of otter was found within the Project site or wider area along the River Dee. This widespread species is nevertheless presumed to forage and/or commute along the downstream river network.

Other protected mammals

The Project site provides potentially suitable habitat for Irish hare, with two individuals observed during the field study. One sighting occurred at the onshore substation site along the southern hedgerow adjacent to the N33, and the second sighting occurred west of Charleville bridge within dry meadow (GS2) habitat. This species is presumed to occur within grassland, woodland, and hedgerow adjoining the footprint of the onshore substation site and onshore cable route. The species is considered common and widespread in Ireland and is currently assigned a conservation status of Least Concern (Marnell *et al*., 2019).

There were no visual sightings or field signs of hedgehog observed during field surveys; however, these are nocturnal, and field signs are less frequently observed than for other mammals. Hedgehog are presumed to occur within grassland, woodland, and hedgerow adjoining the footprint of the onshore substation site and onshore cable route. Breeding is from May to October (Hayden and Harrington, 2001) and it is considered possible that there may be numerous territories within the onshore substation site and onshore cable route. There are no known national or county population estimates for the species in Ireland where they are common and assigned a conservation status of Least Concern (Marnell *et al*., 2019).

Pygmy shrews were not recorded but their presence cannot be ruled out. The species nests in long grasses in dense vegetation (including damp conditions) or under rocks or logs, occurring wherever adequate insect food supplies exist. This species breeds from April to October. Given the minimum territory size of 200 m^2 (Hayden and Harrington, 2001) and the absence of extensive hedgerow and grassland adjacent to the footprint of the onshore substation site and onshore cable route, it is considered likely there may be some peripheral territories within the Project site. There are no known national or county population estimates for the species in Ireland as it is common and widespread and assigned a conservation status of Least Concern (Marnell *et al*., 2019).

Although potential suitable habitat for red squirrel was identified within the Onshore Biodiversity Study Area, no individuals were recorded, and no desk study records were found for the preceding 40 years. Suitable habitat for pine marten, Irish stoat, and deer species (e.g. red deer) was also noted; however, no evidence of their presence was noted during the field study. These species are assumed to be present in the wider landscape and have been assigned a conservation status of Least Concern (Marnell *et al*., 2019).

Other non-protected species for which there was evidence on site included rabbit *Oryctolagus cuniculus* and fox *Vulpes vulpes*. These species are not afforded wildlife protection and are not assessed further.

Birds

Onshore birds

2018/2019 onshore bird survey

The onshore birds survey returned a total of 53 bird species records, 22 of which are Red (8 species) and Amber (14 species) listed birds of conservation concern. The survey results for the 22 Red and Amber listed birds of conservation concern are summarised in annex 1 of appendix I: Intertidal Bird Survey and Onshore Bird Survey Reports and Table 1-9 and Table 1-10.

Of the 22 bird species listed, one was an Annex I (Birds Directive) species, namely whooper swan, and seven were Special Conservation Interest (SCI), including curlew, lapwing, mallard, cormorant, whooper swan, black headed-gull, and herring gull.

2023 breeding bird survey

The onshore breeding bird surveys conducted in 2023 returned a total of 48 bird species records, 16 of which are Red (3 species) and Amber (13 species) listed birds of conservation concern (Gilbert *et al*.,2021). The survey results for the 16 Red and Amber listed birds of conservation concern are provided in appendix A.1, summarised in Table 1-11 and shown in Figure 1-2. Nine species were observed showing behaviour which led them to being recorded as "possible", "probable" or "confirmed" breeding.

Of the 48 bird species recorded, one was an Annex I (Birds Directive) species, namely kingfisher, which was recorded flying up and down the River Dee at Drumcar Bridge. It was noted that there may have been a nest in the area given the frequency with which the bird was flying back and forth during their survey. However, surveys along the River Dee did not find any suitable nesting habitat for kingfisher. Kingfisher territory is known to range from 2 km to 3 km of river (Musseau *et al.,* 2021), but can reach 5 km depending on availability of food sources[2] meaning it is possible for the observed bird to be nesting outside the planning application boundary or ZoI of the Project but foraging within it.

Four of the species listed were species of Special Conservation Interest (SCI), including black-headed gull, cormorant, herring gull and the kingfisher mentioned above.

[2] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/ Accessed August 2023

Table 1-9: Onshore bird data – 2018.

Species	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12	CR13	CR14	CR15	CR16	CR17	CR18	CR19	CR20	CR21	CR22	CR23	CR24	CR25	CR26	CR27	CR28	CR29	CR30	SCI/ Annex I	Red List Status
Curlew *Numenius arquata*			11																									11			SCI	Red
Woodcock *Scolopax rusticola*								11																								Red
Meadow Pipit *Anthus pratensis*											11											11							11			Red
Whooper Swan *Cygnus cygnus*												10-12																			Annexe I & SCI	Amber
Black Headed-gull *Chroicocephalus ridibundus*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	SCI	Amber
Herring Gull *Larus argentatus*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	SCI	Amber
Starling *Alauda arvensis*					11				12							12											11					Amber
House Sparrow *Passer domesticus*	10-12			10				11-12		12				10	11		10			12		11										Amber
Linnet *Linaria cannabina*		11	10													11											10					Amber

Note: CR= Cable Route; No's 1-12 refer to the 12 months of the year.

Table 1-10: Onshore bird data - 2019.

Species	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12	CR13	CR14	CR15	CR16	CR17	CR18	CR19	CR20	CR21	CR22	CR23	CR24	CR25	CR26	CR27	CR28	CR29	CR30	SCI/ Ann. I	Red List Status
Kestrel *Falco tinnunculus*						3	1							9						5												Red
Lapwing *Vanellus vanellus*						1							1	12	11					12	11										SCI	Red
Curlew *Numenius arquata*	2			10																								11			SCI	Red
Woodcock *Scolopax rusticola*								11																								Red
Snipe *Gallinago gallinago*																								1								Red
Swift *Apus apus*	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9		Red
Meadow Pipit *Anthus pratensis*		4, 8	2		4		8	2	4				8	2, 4						4, 10	8		2		8	4	10			2, 8		Red
Redwing *Turdus iliacus*									1		2													1				2				Red
Mute Swan *Cygnus olor*												3																				Amber
Whooper Swan *Cygnus cygnus*												1-3, 11-12																			Annex I & SCI	Amber
Mallard *Anas platyrhynchos*										3									11												SCI	Amber
Cormorant *Phalacrocorax carbo*	*																														SCI	Amber

ORIEL WIND FARM PROJECT – ONSHORE BIODIVERSITY ADDITIONAL INFORMATION

Species	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12	CR13	CR14	CR15	CR16	CR17	CR18	CR19	CR20	CR21	CR22	CR23	CR24	CR25	CR26	CR27	CR28	CR29	CR30	SCI/ Ann. I	Red List Status
Black Headed-gull *Chroicocephalus ridibundus*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	SCI	Amber
Herring Gull *Larus argentatus*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	SCI	Amber
Skylark *Alauda arvensis*	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9		Amber
Swallow *Hirundo rustica*	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9	5-9		Amber
House Martin *Delichon urbicum*	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9	4-9		Amber
Goldcrest *Regulus regulus*																			4-5													Amber
Spotted Flycatcher *Motacilla striata*																			5													Amber
Starling *Sturnus vulgaris*		3						10		12		1	3	1						3	10				1					10		Amber
House Sparrow *Passer domesticus*	2, 4, 5, 10, 12		4, 5, 10	10	2		10	4						5, 10			2, 4, 12			5												Amber
Linnet *Linaria cannabina*	11	4	7			11	44748		4, 7	11					4						6	7, 11	11		6				2			Amber

Footnote: * symbol is designated to species commonly recorded within the study area

Table 1-11: Onshore breeding bird survey results - 2023.

BTO Code	Common name	Scientific name	BOCCI	Annex I Species	SCI species	Breeding status[3]	Location of breeding evidence
B.	Blackbird	*Turdus merula*	Green	-	-	-	-
BC	Blackcap	*Sylvia atricapilla*	Green	-	-	-	-
BF	Bullfinch	*Pyrrhula pyrrhula*	Green	-	-	-	-
BH	Black-headed gull	*Chroicocephalus ridibundus*	Amber	-	Yes	-	-
BT	Blue tit	*Cyanistes caeruleus*	Green	-	-	-	-
BZ	Buzzard	*Buteo buteo*	Green	-	-	-	-
CA	Cormorant	*Phalacrocorax carbo*	Amber	-	Yes	-	-
CC	Chiffchaff	*Phylloscopus collybita*	Green	-	-	-	-
CD	Collard dove	*Streptopelia decaocto*	Green	-	-	-	-
CH	Chaffinch	*Fringilla coelebs*	Green	-	-	-	-
CT	Coal tit	*Periparus ater*	Green	-	-	-	-
D.	Dunnock	*Prunella modularis*	Green	-	-	-	-
GC	Goldcrest	*Regulus regulus*	Amber	-	-	Probable	Onshore substation site HDD location at M1 Railway Drumcar woodland HDD crossing
						Possible	Onshore cable route
GO	Goldfinch	*Carduelis carduelis*	Green	-	-		
GR	Greenfinch	*Chloris chloris*	Amber	-	-	Possible	HDD location at M1 Railway Onshore cable route
GT	Great tit	*Parus major*	Green	-	-	-	-
HC	Hooded crow	*Corvus corone*	Green	-	-	-	-
HG	Herring gull	*Larus argentatus*	Amber	-	Yes	-	-
HM	House martin	*Delichon urbicum*	Amber	-	-	-	-
HS	House sparrow	*Passer domesticus*	Amber	-	-	Confirmed	Joint bay 28
						Possible	Onshore cable route
JD	Jackdaw	*Corvus monedula*	Green	-	-	-	-

[3] Breeding status is provided for Red and Amber listed species only.

BTO Code	Common name	Scientific name	BOCCI	Annex I Species	SCI species	Breeding status[3]	Location of breeding evidence
KF	Kingfisher	*Alcedo atthis*	Amber	Yes	Yes	Probable*	Drumcar woodland HDD crossing
LI	Linnet	*Linaria cannabina*	Amber	-	-	Probable	Drumcar woodland HDD crossing Landfall location
						Possible	Onshore cable route
LT	Long-tailed tit	*Aegithalos caudatus*	Green	-	-	-	-
M.	Mistle thrush	*Turdus viscivorus*	Green	-	-	-	-
MG	Magpie	*Pica pica*	Green	-	-	-	-
MH	Moorhen	*Gallinula chloropus*	Green	-	-	-	-
MP	Meadow pipit	*Pipit Anthus pratensis*	Red	-	-	-	-
PH	Pheasant	*Phasianus colchicus*	NA	-	-	-	-
PW	Pied wagtail	*Motacilla alba yarrelli*	Green	-	-	-	-
R.	Robin	*Erithacus rubecula*	Green	-	-	-	-
RB	Reed bunting	*Emberiza schoeniclus*	Green	-	-	-	-
RO	Rook	*Corvus frugilegus*	Green	-	-	-	-
S.	Skylark	*Alauda arvensis*	Amber	-	-	-	-
SC	Stonechat	*Saxicola torquatus*	Green	-	-	-	-
SD	Stock dove	*Columba oenas*	Red	-	-	Possible	Onshore cable route
SG	Starling	*Sturnus vulgaris*	Amber	-	-	Possible	Onshore cable route Landfall location
SH	Sparrowhawk	*Accipiter nisus*	Green	-	-	-	-
SL	Swallow	*Hirundo rustica*	Amber	-	-	Possible	HDD location at M1 Railway Drumcar woodland HDD crossing Onshore cable route Landfall location
ST	Song thrush	*Turdus philomelos*	Green	-	-	-	-
SW	Sedge warbler	*Acrocephalus schoenobaenus*	Green	-	-	-	-
TC	Treecreeper	*Certhia familiaris*	Green	-	-	-	-
WH	Whitethroat	*Sylvia communis*	Green	-	-	-	-
WM	Whimbrel	*Numenius phaeopus*	Green	-	-	-	-
WP	Woodpigeon	*Columba palumbus*	Green	-	-	-	-

BTO Code	Common name	Scientific name	BOCCI	Annex I Species	SCI species	Breeding status[3]	Location of breeding evidence
WR	Wren	*Troglodytes troglodytes*	Green	-	-	-	-
WW	Willow warbler	*Phylloscopus trochilus*	Amber	-	-	Probable	HDD location at M1 Railway Onshore cable route
						Possible	Onshore substation site Onshore cable route
Y.	Yellowhammer	*Emberiza citrinella*	Red	-	-	Probable	Onshore substation site HDD location at M1 Railway Onshore cable route
						Possible	Onshore cable route

* = In relation to Kingfisher, evidence of breeding based on behaviour was probable, however there was no confirmed breeding within the ZoI.

Intertidal birds

2017 - 2019 Intertidal bird surveys

The peak and mean bird abundances for 2018 and 2019 at the landfall location are summarised in annex 1 of appendix I: Intertidal Bird Survey and Onshore Bird Survey Reports. The intertidal survey at Dunany South yielded a total of 23 species compromising 718 individuals. The most commonly occurring species were oystercatcher, herring gull and cormorant while the oystercatcher and herring gull were recorded in highest abundance in the months of August to November. The Dunany South landfall was dominated by gulls as opposed to waders unlike the Dunany North landfall however, oystercatchers were the most abundant wading bird species.

The intertidal survey at Dunany North yielded a total of 33 species compromising 4,621 individuals. The most commonly occurring species were oystercatcher, herring gull, great black-backed gull; while the oystercatcher, herring gull and brent goose were recorded in highest abundance in the months of December to March. Species abundances were dominated by the influx of over-wintering wading birds, followed by gulls.

During an unrelated field survey in December 2019, 14 brent goose individuals were recorded feeding at low tide approximately 200 m northeast of the landfall at the edge of a rocky outcrop.

2023 Intertidal bird surveys

The monthly intertidal bird surveys conducted from April to August 2023 focused on Dunany South and surveyed all birds within a 300 m buffer of the transition joint bay. These surveys returned a total of 37 bird species recorded, compromising 607 individuals. Of these observations, 22 were Red (5 species) and Amber (22 species) listed birds of conservation concern (Gilbert, Standbury and Lewis, 2021). The survey results for the 22 Red and Amber listed birds of conservation concern are provided in appendix A.2, summarised in Table 1-12, and shown in Figure 1-3. Five of the birds observed onsite were Annex I (Birds Directive) species and 18 birds observed onsite were SCI species. These results are summarised in Table 1-12 along with their peak counts compared to national and international populations where applicable. The most commonly occurring species were oystercatcher and herring gull which were recorded onsite every month.

While none of the peak counts recorded within the 300 m buffer of the transition joint bay exceeded any national and international population thresholds, it should be noted that in July 2023, six red-breasted mergansers were recorded within the survey buffer, with a further 43 approximately 80 m north of the survey buffer. These birds were drifting down towards the survey buffer zone but appeared to be actively avoiding coming any closer to the surveyor onsite. As such, it is believed that they would have been present within the survey buffer had the surveyor not acted as a source of disturbance.

Two species were recorded just outside the survey buffer which were not recorded within the survey buffer during the April – August 2023 surveys, namely; sand martin *Riparia riparia* which were noted as possibly nesting in the sand cliffs 58pprox.. 400 m north of the transition joint bay and grey plover *Pluvialis squatarola*. Grey plover were recorded at Dunany point, 58pprox.. 800 m north of the transition joint bay, within a flock of about 300 roosting birds roosting on rocks at high tide. The flock included oystercatcher, curlew, whimbrel *Numenius phaeopus*, great black-backed gull, Sandwich tern, roseate tern and common tern.

Table 1-12: Intertidal bird survey results – April to August 2023.

Species			Monthly peak count					Populations		Conservation status		
BTO Code	Common name	Scientific name	April	May	June	July	August	1% National Population	1% International Population	BOCCI	Annex species	SCI species
H.	Grey heron	*Ardea cinerea*	2	0	0	0	0	25	5,000	Green	No	Yes
RP	Ringed plover	*Charadrius hiaticula*	5	1	2	4	0	120	540	Amber	No	Yes
GR	Greenfinch	*Chloris chloris*	1	0	0	0	0	N/A	N/A	Amber	No	No
RH	Red-throated diver	*Gavia stellata*	2	0	0	0	0	20	3,000	Amber	No	Yes
OC	Oystercatcher	*Haematopus ostralegus*	20	107	3	121	45	610	8,200	Red	No	Yes
SL	Swallow	*Hirundo rustica*	1	4	0	3	2	N/A	N/A	Amber	No	No
HG	Herring gull	*Larus argentatus*	4	14	37	3	17	103	15,900	Amber	No	Yes
LI	Linnet	*Linaria cannabina*	4	5	2	2	0	N/A	N/A	Amber	No	No
RM	Red-breasted merganser	*Mergus serrator*	16	0	0	6	0	25	860	Amber	No	Yes
GX	Northern gannet	*Morus bassana*	3	1	0	0	0	4,900	15,000	Amber	No	Yes
CA	Cormorant	*Phalacrocorax carbo*	3	3	3	0	0	110	1,200	Amber	No	Yes
TE	Sandwich tern	*Thalasseus sandvicensis*	5	0	0	5	0	25	4,900	Amber	Annex I	Yes
RK	Redshank	*Tringa totanus*	2	0	0	0	0	240	760	Red	No	Yes
S.	Skylark	*Alauda arvensis*	0	1	0	0	0	N/A	N/A	Amber	No	No
MP	Meadow pipit	*Anthus pratensis*	0	1	2	0	0	N/A	N/A	Red	No	No
ET	Little egret	*Egretta garzetta*	0	1	0	0	1	20	1,100	Green	Annex I	No
CM	Common gull	*Larus canus*	0	2	0	0	2	20	25,000	Amber	No	Yes
SU	Shelduck	*Tadorna tadorna*	0	1	0	0	0	100	2,500	Amber	No	Yes
CU	Curlew	*Numenius arquata*	0	0	4	1	4	350	7,600	Red	No	Yes
AF	Little tern	*Sterna albifrons*	0	0	1	0	0	4	1,900	Amber	Annex I	Yes
CN	Common tern	*Sterna hirundo*	0	0	1	4	0	50	16,000	Amber	Annex I	Yes
BH	Black-headed gull	*Chroicocephalus ridibundus*	0	0	0	1	8	78	48,000	Amber	No	Yes
RS	Roseate tern	*Sterna dougallii*	0	0	0	1	0	18	2,000	Amber	Annex I	Yes
KI	Kittiwake	*Rissa tridactyla*	0	0	0	0	1	247	146,000	Red	No	Yes

Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

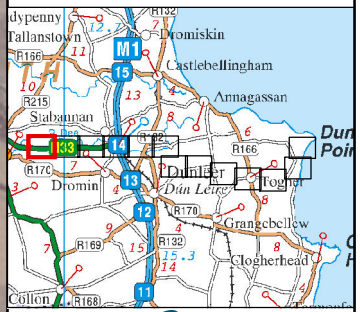

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Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 1 of 13

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Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

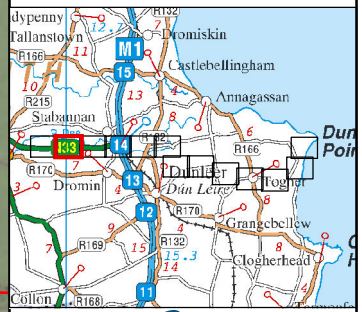

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Figure 1-2:
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Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code			
BH	CA	GC	GR
HG	HM	HS	KF
LI	MP	S.	SD
SG	SL	WW	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

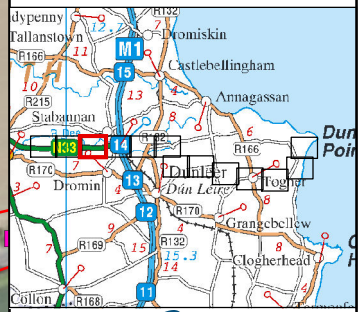

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Figure 1-2
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 3 of 13

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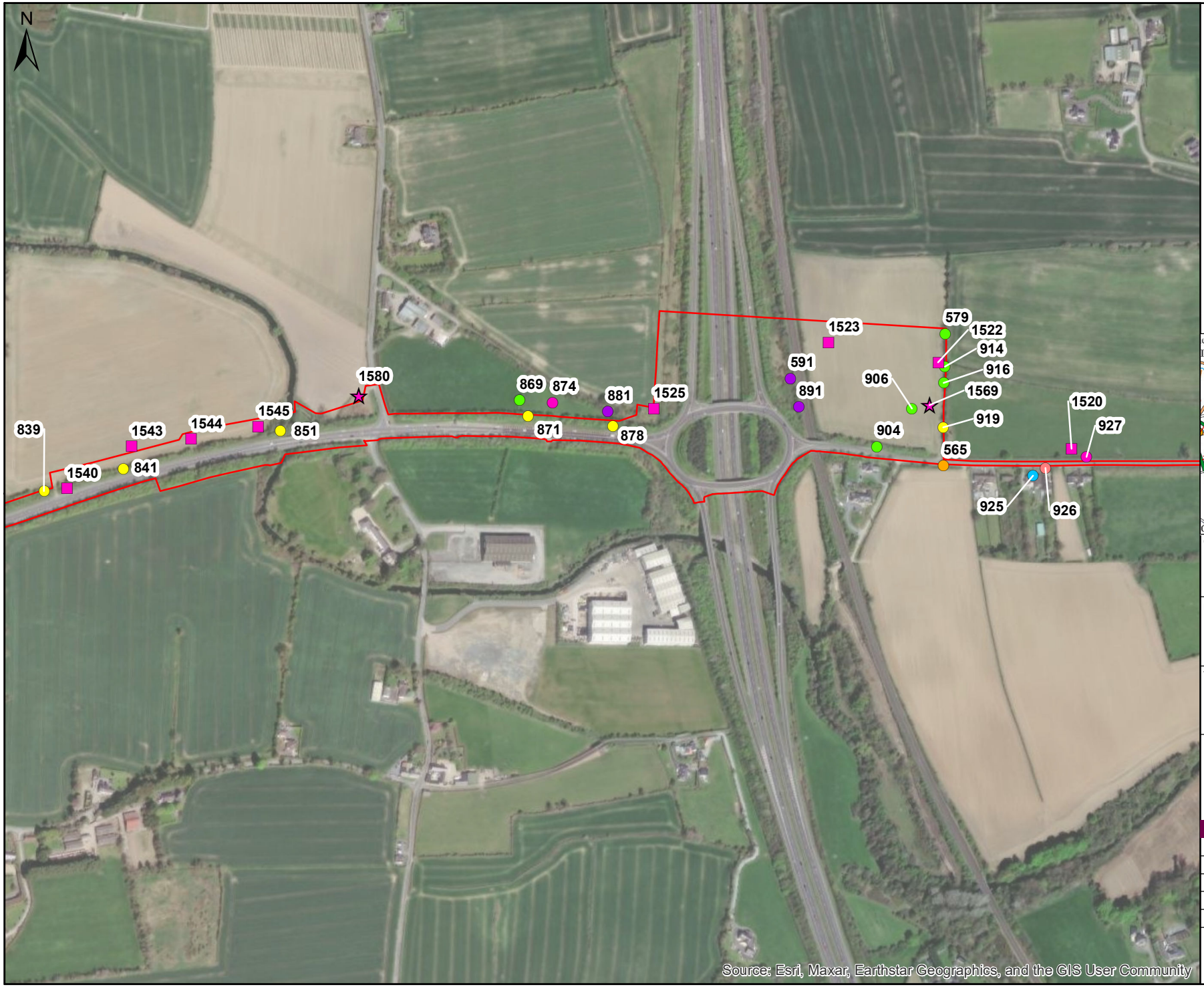

Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

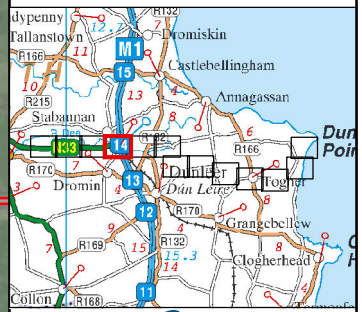

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Figure 1-2:
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Map 4 of 13

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Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

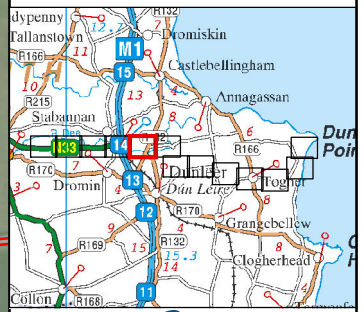

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Figure 1-2:
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Map 5 of 13

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Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

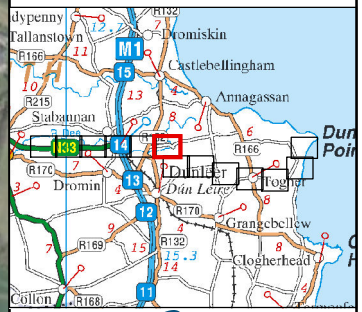

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Figure 1-2:
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Map 6 of 13

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Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

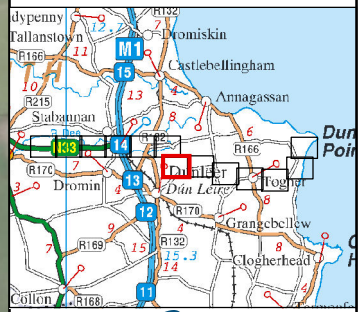

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Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 7 of 13

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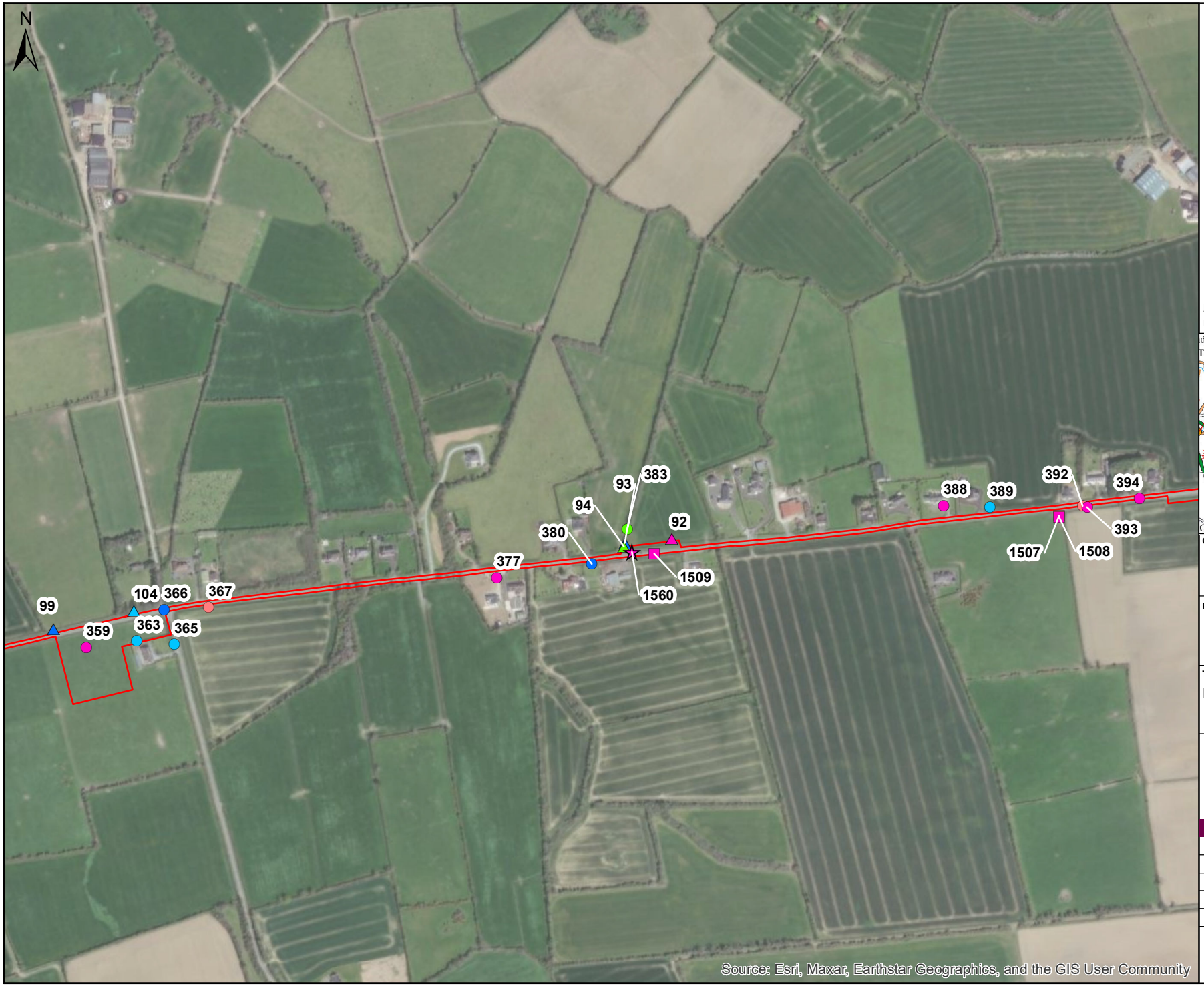

Legend

Planning Application Boundary

Breeding Bird Survey Month

- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data

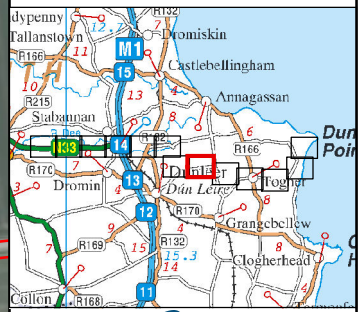

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Figure 1-2
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 8 of 13

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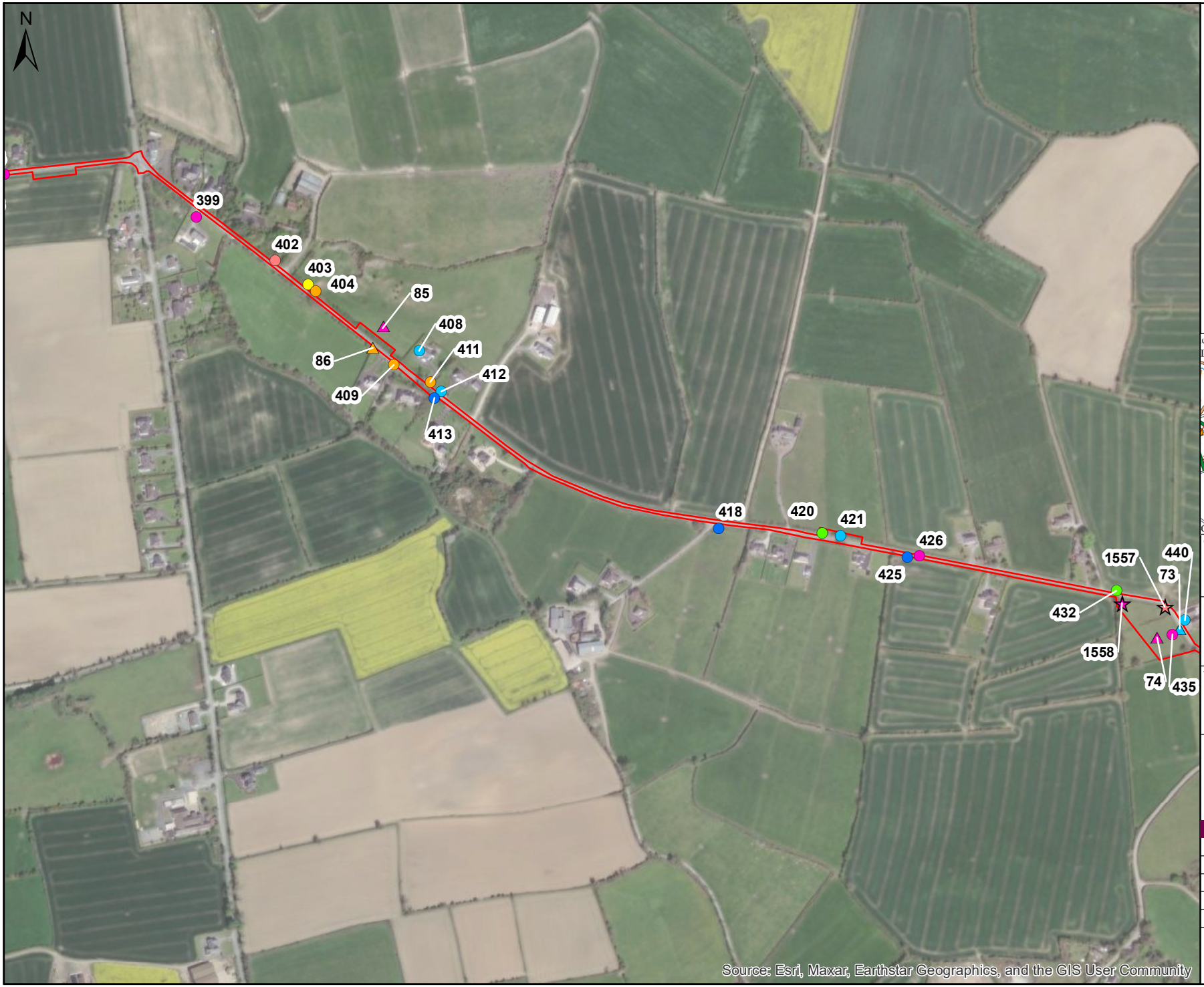


Legend

Planning Application Boundary

Breeding Bird Survey Month

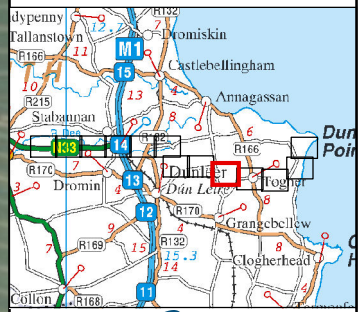
- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data



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ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 9 of 13

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Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

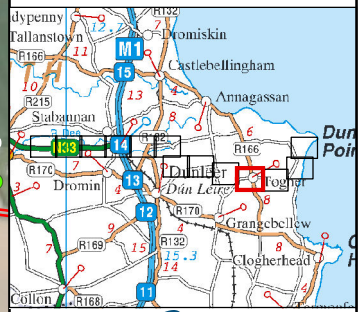
- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 10 of 13

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Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3087F03
Approved By: CC	
Scale: 1:7,000 @A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

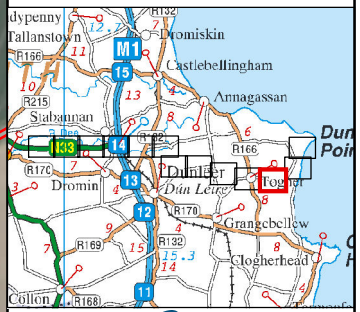
- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
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Project

Oriel Wind Farm Project

Title

Figure 1-2
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 11 of 13

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Issue Details

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Approved By: CC	
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

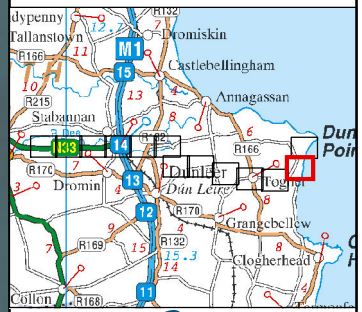
- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 12 of 13

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Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3087F03
Approved By: CC	
Scale: 1:7,000 @A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/02/2024	

Legend

Planning Application Boundary

Breeding Bird Survey Month

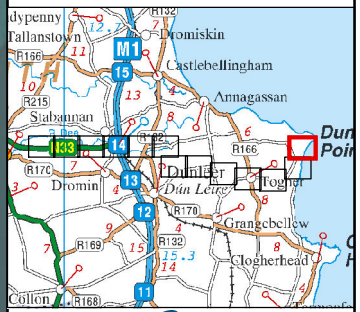
- April
- May
- June
- July

BTO Code

BH	LI
CA	MP
GC	S.
GR	SD
HG	SG
HM	SL
HS	WW
KF	Y.

Refer to Appendix A for corresponding Map ID No

Data Sources: OWL, Surveyed Data



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Project

Oriel Wind Farm Project

Title

Figure 1-2:
Breeding Bird Survey Results 2023 (Amber and Red listed species)
Map 13 of 13

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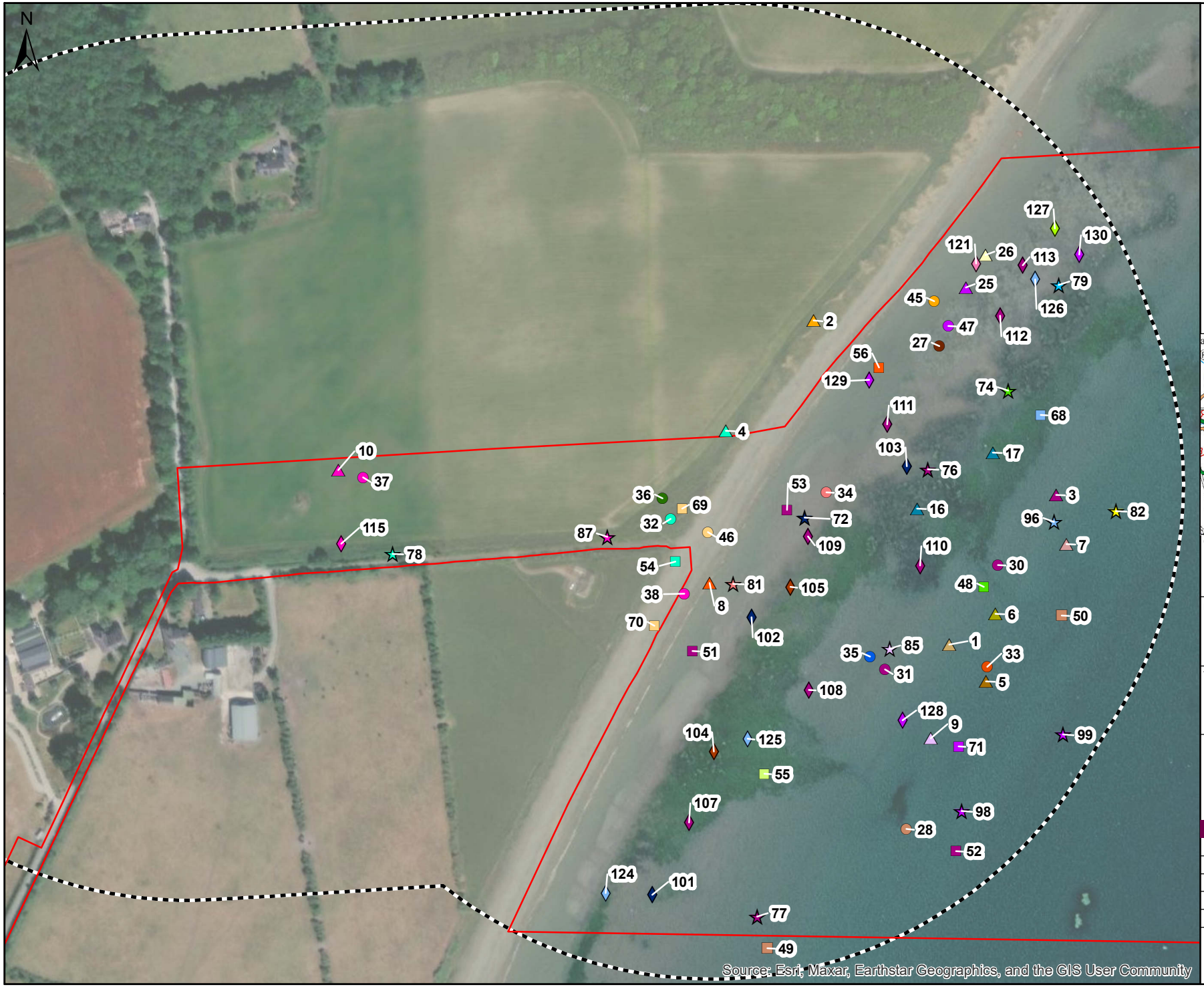
Scale: 1:7,000 @ A4	**Projection:** ITM (IRENET95)
Date: 15/02/2024	Geographic Co-ordinates: ETRS89



Legend

Planning Application Boundary

300 m buffer

Intertidal Bird Survey Month

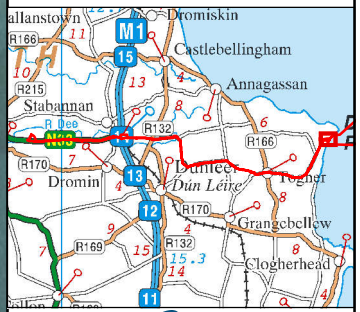
- April
- May
- June
- July
- August

BTO Code

AF	ET	LI	RP
BH	GR	MP	RS
CA	GX	OC	S.
CM	H.	RH	SL
CN	HG	RK	SU
CU	KI	RM	TE

Refer to Appendix B for corresponding Map ID No

Data Sources: OWL, Surveyed Data



Client

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Project

Oriel Wind Farm Project

Title

Figure 1-3: Intertidal Bird Survey Results - 2023

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Issue Details

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Approved By: CC	
Scale: 1:3,500 @ A4	**Projection:** ITM (IRENET95) Geographic Co-ordinates: ETRS89
Date: 15/03/2024	

Amphibians and reptiles

Common frog was the only amphibian or reptile returned from the desk study within the ZoI. No specific amphibian and reptile surveys were conducted; therefore, the absence of field study records of the species was expected.

Although no common frog (spawn/tadpole/froglet/adult) or smooth newts (spawn/larvae/juvenile/adult) were encountered during the field study, suitable habitats for common frog (damp vegetation, ponds, and hedgerows) and smooth newt (standing water, open water pools, and wet grassland) were recorded. These species are considered likely to be present within the onshore substation site and onshore cable route.

No common lizard individuals were encountered during the field study, and their suitable habitats (woods/scrub with basking sites on south facing slopes) were not recorded. This species is considered unlikely to occur within the onshore substation site and onshore cable route.

Invertebrates

Terrestrial

A single species of butterfly and a bumble bee were noted from the desk study. These comprised of the wood white *Leptidea sinapsis* butterfly and a red-tailed bumblebee *Bombus lapidaries*. No specific terrestrial invertebrate surveys were conducted, and no notable species were recorded while completing the field study; although, several individual painted lady *Cynthia cardui* butterflies were noted within neutral grassland (GS1) habitat.

In terms of EU protected species, marsh fritillary *Euphydryas aurinia* colonies can occur in a wide variety of habitats including some of those encountered at the onshore substation site and cable corridor (e.g. neutral grassland). However, the presence of its food plant devil's-bit scabious *Succisa pratensis,* an essential habitat component to its lifecycle, was not recorded from the onshore substation site and cable corridor.

Freshwater aquatic

A total of 8 sites were assessed for freshwater aquatic invertebrate potential (Figure 1-4). A review of desk study records indicates that the nearest record for white clawed crayfish is from the third order River Dee, approximately 18.5 km upstream of the onshore substation site and cable corridor. Table 1-13 summarises the freshwater aquatic invertebrate results for these sites.

Table 1-13: Freshwater aquatic invertebrate survey results.

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-1 / Rock 06 Stream	**Survey Results** A 2 minute pond sweep revealed the stream was dominated by pollution tolerant species including Gammarus *Gammarus* sp. which dominated the sample, meniscus midges *Dixa* sp., and riffle bugs - Vellidae which were common, and water-hog louse *Asellus aquaticus*, aquatic worm - Lumbriculidae, New Zealand mud snail *Potamopyrgus antipodarum*, non-biting midges - Chironomidae, biting midges - Ceratopogonidae, river limpet *Ancylus fluviatilis*, marsh beetle - Scirtidae and flatworm - Platyhelminthes which were few. A single cased caddis fly of the family Limnephilidae was also recorded. Dense instream vegetation would indicate nutrient enrichment. A bio-index assessment and SSRS were not calculated due to the absence of relatively fast flowing habitat in the stream. Dissolved oxygen was measured at 91.8% and 9.64 mg/l. Temperature was 13.3°C, pH was 7.4 and conductivity was relatively high at 905 µS/cm. Crayfish habitat suitability was rated as 'none' due to the silty substrate with no gravels or boulders, very low depth of water and very dense vegetation choking the stream.	Q4 (Good); Year= 2020; Station= 150 m d/s old Rly Br (LHS).

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-2 / River Dee at N33 bridge crossing	**Survey Results** A macroinvertebrate sample was not collected as the River Dee could not be entered at this location due to fast flow and water depth. Physiochemical parameters were recorded using field probes 370 m downstream. Dissolved oxygen was measured at 89.5% and 8.8 mg/l. Temperature was 16.5°C, pH was 7.99 and conductivity was 513 µS/cm. Visibilty was poor due to turbidity, however crayfish habitat suitability was estimated to be 'good' due to the presence of deep water, overhanging vegetation and the presence of coarse substrate within the river.	Q3-4 (Moderate); Year= 2006; Station= DEE New Br u/s Drumgoolestown Br.
A-3 / River Dee at Drumcar Bridge	**Survey Results** The macroinvertebrate sample recorded 25 taxa in total, with Group C (pollution tolerant) taxa forming most of the sample. Two Group A (pollution sensitive) taxa were present in few numbers – the flat-bodied mayflies *Ecdyonurus* sp. and *Heptagenia* sp.. Three Group B (less pollution sensitive) taxa were few, namely the cased caddis flies *Lepidostoma hirtum* and *Sericostoma personatum* and the mayfly *Alainites muticus*. The Group C taxon black fly - Simuliidae dominated the sample, whereas the Group C mayfly taxon *Seratella ignita* was common. It must be noted that water levels were elevated at the time of sampling. The bio-index species composition inferred a Q-value of 3-4 (moderate status). Dissolved oxygen was measured at 92.7% and 8.95 mg/l. Temperature was 17.2 °C, pH was 8.02 and conductivity was 502 µS/cm. High coloured water and turbidity made substrate difficult to assess. However, a review of aerial imagery indicates there are areas of gravels present downstream of the bridge. Where the macroinvertebrate sample was taken the substrate was cobble/coarse gravel dominated. No crayfish were present in the kick-sample. Due to the presence of soft banks, overhanging vegetation, aquatic vegetation, submerged tree roots and coarse substrate, a habitat rating of 'very good' was assigned for crayfish.	4 (Good); Year= 2020; Station = Br. At Drumcar.
A-4 / Newhall 06 Stream	**Survey Results** The macroinvertebrate sample recorded 15 taxa in total, with Group C (pollution tolerant) taxa forming most of the sample. No Group A (pollution sensitive) taxa were recorded. Three Group B (less pollution sensitive) taxa were recorded in small numbers, namely the cased caddis flies of the families Limnephilidae and Glossosomatidae, and the species *Sericostoma personatum*. The Group C taxon *Gammarus* sp. was recorded in excessive numbers. The Group D (very pollution tolerant) taxon *Asellus aquaticus* was numerous. The Group C taxa mayflies *Baetis rhodani/atlanticus*, riffe beetles *Elmis aenea* and Chironomidae were common. A bio-index assessment was not appropriate in this small 1st order stream and therefore an SSRS was deemed more suitable. A score of 3.2 was calculated indicating that the stream is "At Risk". Dissolved oxygen was measured at 102.8% and 10.3 mg/l. Temperature was 15.1°C, pH was 7.64 and conductivity was 632 µS/cm. No crayfish were collected in the kick-sample. Based on the moderate siltation, high turbidity, presence of coarse substrate and overhanging vegetation a crayfish habitat appraisal rating of 'poor' was assigned.	4 (Good); Year= 2020; Station = Br. At Drumcar.

Site code / name	Freshwater aquatic invertebrate results	EPA assigned Q-value (closest monitoring station)
A-8 / Salterstown Stream downstream Site 6	**Survey Results** The macroinvertebrate sample recorded 14 taxa in total, with Group C taxa dominating the sample. No Group A taxa were recorded. Three Group B (less pollution sensitive) taxa were recorded in small numbers, namely the cased caddis flies Limnephilidae and *Sericostoma personatum* and the mayfly *Alainites muticus*. The Group C taxon *Gammarus* sp. was recorded in excessive numbers. An SSRS of 5.6 was calculated, indicating that the stream is ”At Risk”. Dissolved oxygen was measured at 83% and 8.66 mg/l. Temperature was 13.6°C, pH was 7.70 and conductivity was 621 µS/cm. No crayfish were present within the kick sample. Suitable habitat in the form of tree roots, boulders and cobbles were recorded in the channel, however siltation was evident. Crayfish habitat was rated as ’good’.	No monitoring station connected to this stream.
A-9 / Port 06 Stream	**Survey Results** A 3 minute pond sweep revealed the stream was dominated by pollution tolerant species including *Asellus aquaticus* which was numerous, and *Gammarus* sp., *Potamopyrgus antipodarum*, bivalve molluscs - Sphaeriidae and water mites - Hydracarina which were common. the cased caddis flies Limnephilidae (Group B) were few. Dissolved oxygen was measured at 75.9% and 7.76 mg/l. Temperature was 13.8°C, pH was 7.55 and conductivity was 667 µS/cm.The stream was not suitable for aquatic bio-index assessment, however as glide habitat was recorded within the stream an SSRS was calculated. A score of 0.8 was calculated indicating that the stream is “At Risk”. Given the absence of riffle habtiat sampled (where sensitive taxa are likely to be found), this score should be interpreted with caution. Notwithstanding this limitation, based on satellite imagery the Port Stream appears to be slow-flowing and drain-like throughout it’s length, and therefore the habitat surveyed at this site is likely to be representative of the habitat throughout the system. Crayfish habitat was assigned a rating of ’poor’ due to the presence of soft banks and rooted aquatic vegetation, which could provide some limited habitat.	No monitoring station connected to this stream.
A-10 / Port 06 Stream upstream Site 9	**Survey Results** A macroinvertebrate survey was not collected due to the overgrown channel vegetation, extremely soft silted substrate and stagnant flow recorded. Dissolved oxygen was measured at 56.6% and 5.61 mg/l. Temperature was 15.5°C, pH was 7.04 and conductivity was relatively high at 929 µS/cm.Crayfish habitat was assigned a rating of none.	No monitoring station connected to this stream.
A-11 / Broadlough Stream	**Survey Results** A 2 minute pond sweep of the drain, where accessible, revealed the macroinvertebrate community was dominated by pollution tolerant species including *Gammarus* sp., *Asellus aquaticus*, Chironomidae and Platyhelminthes. A total of 10 taxa were recorded. An aquatic bio-index assessment and SSRS were not calculated due to the absence of relatively fast flowing habitat in the stream. Dissolved oxygen was measured at 79.8% and 8.21 mg/l. Temperature was 14.2°C, pH was 7.56 and conductivity was relatively high at 1001 µS/cm. Crayfish habitat was assigned a rating of none.	Q4 (Good); Year= 2020; Station= 150 m d/s old Rly Br (LHS).

* Crayfish Plague Outbreaks Update August 2019. National Parks and Wildlife & the Marine Institute. Available from http://www.biodiversityireland.ie/wordpress/wp-content/uploads/CRAYFISH-PLAGUE-NPWS-UPDATE-Number-5_August-2019.pdf. Accessed February 2020.

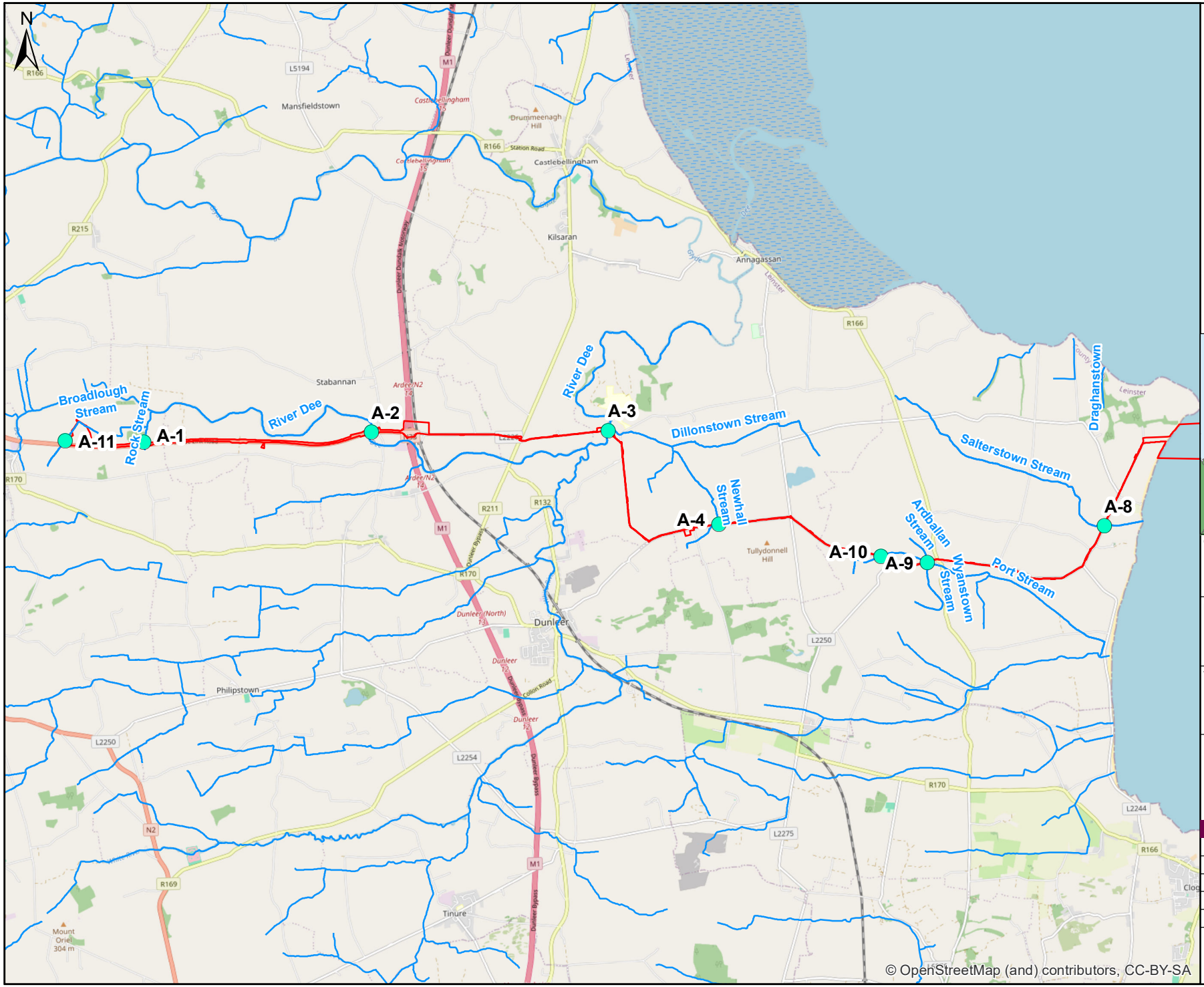
Fish

A total of 8 sites were assessed for salmonid fish potential. The site code, watercourse name (EPA), and salmonid fish assessment results are detailed in Table 1-14.

Table 1-14: Salmonid fish assessment results.

Site code / name	Salmonid fish assessment results
A-1 / Rock 06 Stream	**Survey Results** Good spawning substrates were not present. Salmonid and lamprey spawning habitat was rated as 'None' due to high siltation, no riffle/ glide /pool habitat sequence present and no gravels. The stream has been modified into a drainage ditch with no habitat characteristics suitable for adult salmonid or lamprey spawning. For juvenile salmonids there was no overhanging vegetation, no coarse substrate and flow was slow. The substrate consisted of 100% silt. These conditions are not representative of juvenile salmonid habitat and a rating of 'None' was assigned. Lamprey nursery habitat was rated as 'Fair'. Shallow slow flowing water with silted areas were present. Dense aquatic vegetation in sections are indicative of nutrient enrichment. There are limited unvegetated silted areas and nursery habitat is sub-optimal. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.
A-2 / River Dee at N33 bridge crossing	**Survey Results** Conditions for undertaking fish habitat appraisals at this site were suboptimal due to high flow conditions and poor visibility. Nevertheless, some instream habtiats were visible so a tentative assessment was made. Salmonid and lamprey adult and spawning habitat was assessed as 'Fair' due to the presence of some gravel habitat as well as deep pool and glide habitat for resting adults. Juvenile salmonid habitat was rated as 'Fair' due to the presence of suitable cover and coarse substrate. As the survey was carried out from a bridge, possible lamprey nursery habtiat (e.g. silty deposits along the river margins) was diffiult to see so an assessment was not made.
A-3 / River Dee at Drumcar Bridge	**Survey Results** Salmonid adult and spawning was rating as 'Very Good' due to the presence of cobble/gravel spawning habitat, resting pools for adults and low siltation within the gravels. Juvenile salmonid habitat was also rated as 'Very Good' due to the presence of areas of shallow, fast flowing water and coarse substrate. Cover was noted in the form of aquatic vegetation and overhanging vegetation. Lamprey spawning habtiat was rated as 'very good' due to the presence of cobble/gravel spawning habitat, resting pools for adults and low siltation within the gravels. Lamprey nursery was rated as 'Very Good' due to the presence of deep silty deposits along the river margins. A lamprey was captured within the kick-net during the macroinvertebrate sample collection.
A-4 / Newhall 06 Stream	**Survey Results** Salmonid and lamprey spawning habitat was assigned a rating of 'None-Poor'. Juvenile salmonid habitat was rated as 'Fair', due to the presence of fast flowing water over coarse substrate, and cover in the form of overhanging vegetation. It should be noted that water quality at this stream (at risk) is likely to affect juvenile salmonids and lamprey should they occur in this stream. Lamprey nursery habitat potential was assigned a rating of 'None-Poor'. There were no silted areas of slow backwater within the survey reach, only small areas of silty deposits within the stream channel were noted.
A-8 / Salterstown Stream downstream Site 6	**Survey Results** Salmonid spawning and adult habtiat for this stream was rated as 'Fair', due to the presece of cobble and gravel spawning habitat and resting pools for adults. The stream is more suited to brown trout as opposed to salmon due to it's small size. It is worth noting, however, that low dissolved oxygen levels (83%) and an SSRS of 4 are indicative of pollution. Heavy siltation of the gravels was also noted. Juvenile salmonid habitat was rated as 'Good' due to the presence of shallow, fast flowing water, cover in the form of overhanging vegetation and coarse substrate. Lamprey nursery habtiat within the stream was limited and no areas with deep silt/sandy deposits suitable for ammocetes was noted. A rating of 'None-Poor' was assigned.
A-9 / Port 06 Stream	**Survey Results** Salmonid and lamprey adult and spawning habitat was rated as 'None'. The stream was heavily vegetated and silted, with no suitable spawning habitat. The substrate was 100% silt. Juvenile salmonid habtiat was also assigned a rating of 'None' due to the slow flowing and silty nature of the stream. Lamprey nursery habitat was assigned a rating of 'Good' due to the presence of a deep silt layer in the channel and slow flowing water. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.

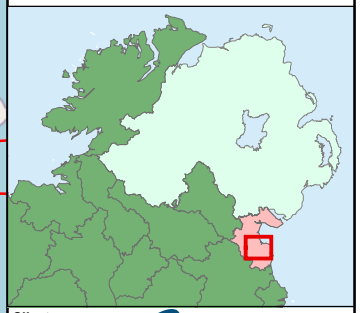
Site code / name	Salmonid fish assessment results
A-10 / Port 06 Stream upstream Site 9	**Survey Results** There is no potential for salmonids or lamprey at any life stage at the site surveyed and a habitat rating of None was assigned. The stream was stagnant, drain-like and choked with aquatic vegetation. DO was measured at 56.6%.
A-11 / Broadlough Stream	**Survey Results** Salmonid and lamprey adult and spawning habitat was rated as 'None'. The stream was heavily vegetated and silted, with no suitable spawning habitat. The substrate was 100% silt. Juvenile salmonid habtiat was also assigned a rating of 'None' due to the slow flowing and silty nature of the stream. Lamprey nursery habitat was assigned a rating of 'None-poor' due to the presence of a deep silt layer and slow-stagnant flow in the channel. Whether lamprey actually occur within the channel is questionable, however, as no suitable spawning habtiat was noted on the day of survey.



Legend

- Planning Application Boundary
- Rivers
- Aquatic Survey Sites

Data Sources: OWL, EPA, Surveyed Data



Client

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

Project

Oriel Wind Farm Project

Title

Figure 1-4: Aquatic Ecology Survey Sites

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Issue Details

Drawn By: NR	**Project No.** MDR1520b
Checked By: HF	**File Ref:** MDR1520bArc3005F05
Approved By: CC	
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Date: 15/02/2024	

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A.1 Breeding Bird Survey Data 2023

Table 1: BTO Species Codes.

BTO Code	Common name	Scientific name
B.	Blackbird	*Turdus merula*
BC	Blackcap	*Sylvia atricapilla*
BF	Bullfinch	*Pyrrhula pyrrhula*
BH	Black-headed gull	*Chroicocephalus ridibundus*
BT	Blue tit	*Cyanistes caeruleus*
BZ	Buzzard	*Buteo buteo*
CA	Cormorant	*Phalacrocorax carbo*
CC	Chiffchaff	*Phylloscopus collybita*
CD	Collard dove	*Streptopelia decaocto*
CH	Chaffinch	*Fringilla coelebs*
CT	Coal tit	*Periparus ater*
D.	Dunnock	*Prunella modularis*
GC	Goldcrest	*Regulus regulus*
GO	Goldfinch	*Carduelis carduelis*
GR	Greenfinch	*Chloris chloris*
GT	Great tit	*Parus major*
HC	Hooded crow	*Corvus corone*
HG	Herring gull	*Larus argentatus*
HM	House martin	*Delichon urbicum*
HS	House sparrow	*Passer domesticus*
JD	Jackdaw	*Corvus monedula*
KF	Kingfisher	*Alcedo atthis*
LI	Linnet	*Linaria cannabina*
LT	Long-tailed tit	*Aegithalos caudatus*
M.	Mistle thrush	*Turdus viscivorus*
MG	Magpie	*Pica pica*
MH	Moorhen	*Gallinula chloropus*
MP	Meadow pipit	*Pipit Anthus pratensis*
PH	Pheasant	*Phasianus colchicus*
PW	Pied wagtail	*Motacilla alba yarrelli*

BTO Code	Common name	Scientific name
R.	Robin	*Erithacus rubecula*
RB	Reed bunting	*Emberiza schoeniclus*
RO	Rook	*Corvus frugilegus*
S.	Skylark	*Alauda arvensis*
SC	Stonechat	*Saxicola torquatus*
SD	Stock dove	*Columba oenas*
SG	Starling	*Sturnus vulgaris*
SH	Sparrowhawk	*Accipiter nisus*
SL	Swallow	*Hirundo rustica*
ST	Song thrush	*Turdus philomelos*
SW	Sedge warbler	*Acrocephalus schoenobaenus*
TC	Treecreeper	*Certhia familiaris*
WH	Whitethroat	*Sylvia communis*
WM	Whimbrel	*Numenius phaeopus*
WP	Woodpigeon	*Columba palumbus*
WR	Wren	*Troglodytes troglodytes*
WW	Willow warbler	*Phylloscopus trochilus*
Y.	Yellowhammer	*Emberiza citrinella*

Table 2: Breeding Bird Survey - Weather Data.

Date	Time	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Temperature (°C)
30/05/2023	06:00	2	NE	0	0	2	2	0	0	10
30/05/2023	07:00	2	NE	0	0	2	2	0	0	12
30/05/2023	08:00	3	NE	0	0	2	2	0	0	13
30/05/2023	09:00	3	NEE	0	0	2	2	0	0	14
30/05/2023	10:00	3	E	0	0	2	2	0	0	15
30/05/2023	11:00	3	E	0	0	2	2	0	0	16
31/05/2023	06:00	1	N	0	0	2	2	0	0	9
31/05/2023	07:00	2	NNE	0	1	2	2	0	0	12

Date	Time	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Temperature (°C)
31/05/2023	08:00	2	NEE	0	5	2	2	0	0	13
31/05/2023	09:00	3	E	0	7	2	2	0	0	14
31/05/2023	10:00	3	E	0	8	2	2	0	0	15
31/05/2023	11:00	3	E	0	8	2	2	0	0	16
26/06/2023	06:00	3	SW	0	0	2	2	0	0	11
26/06/2023	07:00	3	SWW	0	0	2	2	0	0	12
26/06/2023	08:00	4	SWW	0	0	2	2	0	0	13
26/06/2023	09:00	4	SWW	0	0	2	2	0	0	15
26/06/2023	10:00	4	SW	0	0	2	2	0	0	15
26/06/2023	11:00	4	SW	0	0	2	2	0	0	16
27/06/2023	06:00	3	S	1	8	1	1	0	0	14
27/06/2023	07:00	3	S	0	8	1	1	0	0	15
27/06/2023	08:00	3	SSW	1	8	1	2	0	0	15
27/06/2023	09:00	3	SSW	0	8	2	2	0	0	17
27/06/2023	10:00	4	SW	0	8	2	2	0	0	18
27/06/2023	11:00	4	SW	0	8	2	2	0	0	19
25/07/2023	06:00	2	SW	0	2	2	2	0	0	9
25/07/2023	07:00	2	SW	0	2	2	2	0	0	10
25/07/2023	08:00	2	SW	0	3	2	2	0	0	12
25/07/2023	09:00	2	SW	0	4	2	2	0	0	14
25/07/2023	10:00	3	S	0	5	2	2	0	0	14
25/07/2023	11:00	3	SSE	0	5	2	2	0	0	17
26/07/2023	06:00	2	E	0	5	2	2	0	0	10
26/07/2023	07:00	2	E	0	4	2	2	0	0	11
26/07/2023	08:00	2	E	0	4	2	2	0	0	14
26/07/2023	09:00	3	E	0	3	2	2	0	0	15
26/07/2023	10:00	3	E	0	5	2	2	0	0	15
26/07/2023	11:00	3	NE	0	7	2	2	0	0	14

Table 3: 2023 Breeding Bird Survey Data.

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1	1	25/04/2023	LI	Amber	1			Singing	
2	1	25/04/2023	SC	Green	2			Singing	
3	1	25/04/2023	WR	Green	1			Singing	
4	1	25/04/2023	D.	Green	1			Singing	
5	1	25/04/2023	RB	Green	1			Perched	
6	1	25/04/2023	WM	Green	1			Foraging	
7	1	25/04/2023	R.	Green	1			Perched	
8	1	25/04/2023	LI	Amber	2			Singing	
9	1	25/04/2023	D.	Green	1			Singing	
10	1	25/04/2023	B.	Green	1			Perched	
11	1	25/04/2023	LI	Amber	1			Singing	
12	1	25/04/2023	WP	Green	1			Perched	
13	1	25/04/2023	WR	Green	1			Singing	
14	1	25/04/2023	LI	Amber	1			Perched	
15	1	25/04/2023	LI	Amber	1			Singing	
16	1	25/04/2023	B.	Green	1			Perched	
17	1	25/04/2023	BC	Green	1			Perched	
18	1	25/04/2023	PH	NA	1			On ground	
19	1	25/04/2023	R.	Green	1			Perched	
20	1	25/04/2023	BF	Green	1			Singing	
21	1	25/04/2023	CD	Green	3			Perched	
22	1	25/04/2023	HC	Green	2			Perched	
23	1	25/04/2023	D.	Green	1			Singing	
24	1	25/04/2023	R.	Green	1			Singing	
25	1	25/04/2023	BT	Green	1			Perched	
26	1	25/04/2023	SG	Amber	1			Singing	
27	1	25/04/2023	D.	Green	1			Singing	
28	1	25/04/2023	CD	Green	1			Singing	
29	1	25/04/2023	JD	Green	1			Flying	
30	1	25/04/2023	B.	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
31	1	25/04/2023	GO	Green	1			Perched	
32	1	25/04/2023	ST	Green	1			Singing	
33	1	25/04/2023	R.	Green	1			Singing	
34	1	25/04/2023	CH	Green	1			Singing	
35	1	25/04/2023	WP	Green	1			Perched	
36	1	25/04/2023	B.	Green	1			Perched	
37	1	25/04/2023	WP	Green	1			Perched	
38	1	25/04/2023	WR	Green	1			Singing	
39	1	25/04/2023	HS	Amber	1			Singing	
40	1	25/04/2023	WR	Green	1			Singing	
41	1	25/04/2023	Y.	Red	1			Singing	
42	1	25/04/2023	LI	Amber	2			Perched	
43	1	25/04/2023	B.	Green	1			Singing	
44	1	25/04/2023	WR	Green	1			On ground	
45	1	25/04/2023	SL	Amber	2			Perched	
46	1	25/04/2023	BT	Green	1			Singing	
47	1	25/04/2023	RO	Green	4			On ground	
48	1	25/04/2023	SD	Red	2			Perched	
49	1	25/04/2023	BT	Green	2			Perched	
50	1	25/04/2023	PH	NA	1			On ground	
51	1	25/04/2023	WP	Green	1			Perched	
52	1	25/04/2023	BT	Green	1			Singing	
53	1	25/04/2023	HC	Green	1			On ground	
54	1	25/04/2023	B.	Green	1			Perched	
55	1	25/04/2023	HS	Amber	2			Perched	
56	1	25/04/2023	BC	Green	1			Singing	
57	1	25/04/2023	R.	Green	1			Singing	
58	1	25/04/2023	SG	Amber	1			Perched	
59	1	25/04/2023	BC	Green	1			Singing	
60	1	25/04/2023	MG	Green	1			Perched	
61	1	25/04/2023	B.	Green	1			Perched	
62	1	25/04/2023	BT	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
63	1	25/04/2023	MH	Green	1			Calling	
64	1	25/04/2023	GT	Green	1			Singing	
65	1	25/04/2023	WR	Green	1			Singing	
66	1	25/04/2023	BT	Green	1			Perched	
67	1	25/04/2023	WP	Green	2			Perched	
68	1	25/04/2023	WR	Green	1			Singing	
69	1	25/04/2023	GR	Amber	1			Singing	
70	1	25/04/2023	JD	Green	2			On ground	
71	1	25/04/2023	R.	Green	1			Perched	
72	1	25/04/2023	B.	Green	1			Perched	
73	1	25/04/2023	HS	Amber	1			Perched	
74	1	25/04/2023	SL	Amber	1			Flying	
75	1	25/04/2023	CD	Green	1			Perched	
76	1	25/04/2023	WR	Green	11			Singing	
77	1	25/04/2023	B.	Green	1			Singing	
78	1	25/04/2023	WR	Green	1			Singing	
79	1	25/04/2023	BT	Green	2			Perched	
80	1	25/04/2023	B.	Green	1			Perched	
81	1	25/04/2023	MG	Green	1			Perched	
82	1	25/04/2023	BC	Green	1			Singing	
83	1	25/04/2023	WP	Green	1			Singing	
84	1	25/04/2023	B.	Green	2			Perched	
85	1	25/04/2023	SL	Amber	1			Flying	
86	1	25/04/2023	GR	Amber	1			Singing	
87	1	25/04/2023	WR	Green	1			Singing	
88	1	25/04/2023	CT	Green	1			Singing	
89	1	25/04/2023	WR	Green	1			Singing	
90	1	25/04/2023	BC	Green	1			On ground	
91	1	25/04/2023	B.	Green	1			Singing	
92	1	25/04/2023	SL	Amber	2			Flying	
93	1	25/04/2023	SG	Amber	1			Perched	
94	1	25/04/2023	Y.	Red	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
95	1	25/04/2023	BZ	Green	2			Flying	Circling
96	1	25/04/2023	BF	Green	1			Singing	
97	1	25/04/2023	B.	Green	1			Singing	
98	1	25/04/2023	CH	Green	1			Perched	
99	1	25/04/2023	SG	Amber	2			Perched	
100	1	25/04/2023	B.	Green	1			Singing	
101	1	25/04/2023	CC	Green	1			Singing	
102	1	25/04/2023	WP	Green	1			Perched	
103	1	25/04/2023	RO	Green	15			Perched	Potential rookery
104	1	25/04/2023	HS	Amber	1			Perched	
105	1	25/04/2023	WP	Green	2			Perched	
106	1	25/04/2023	GT	Green	1			Perched	
107	1	25/04/2023	CH	Green	1			Perched	
108	1	25/04/2023	WP	Green	1			Singing	
109	1	25/04/2023	MG	Green	1			Perched	
110	1	25/04/2023	BT	Green	2			Perched	
111	1	25/04/2023	WP	Green	1			Singing	
112	1	25/04/2023	WR	Green	1			Singing	
113	1	25/04/2023	WP	Green	1			Perched	
114	1	25/04/2023	HS	Amber	4			Perched	
115	1	25/04/2023	BF	Green	1			Singing	
116	1	25/04/2023	BT	Green	1			Perched	
117	1	25/04/2023	GR	Amber	1			Singing	
118	1	25/04/2023	WR	Green	1			Singing	
119	1	25/04/2023	HS	Amber	5			Perched	
120	1	25/04/2023	CH	Green	1			Singing	
121	1	25/04/2023	GT	Green	1			Perched	
122	1	25/04/2023	WR	Green	1			Perched	
123	1	25/04/2023	GC	Amber	2			Singing	
124	1	25/04/2023	B.	Green	1			Singing	
125	1	25/04/2023	D.	Green	1			Singing	
126	1	25/04/2023	LI	Amber	2			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
127	1	25/04/2023	BC	Green	1			Singing	
128	1	25/04/2023	WR	Green	1			Singing	
129	1	25/04/2023	B.	Green	2			Perched	
130	1	25/04/2023	WR	Green	1			Singing	
131	1	25/04/2023	R.	Green	1			Singing	
132	1	25/04/2023	BT	Green	1			Singing	
133	1	25/04/2023	M.	Green	1			Singing	
134	1	25/04/2023	BF	Green	1			Singing	
135	1	25/04/2023	GC	Amber	1			Singing	
136	1	25/04/2023	CH	Green	1			Singing	
137	1	25/04/2023	B.	Green	1			Singing	
138	1	25/04/2023	D.	Green	1			Singing	
139	1	25/04/2023	BC	Green	1			Singing	
140	1	25/04/2023	WR	Green	1			Singing	
141	1	25/04/2023	GT	Green	1			Singing	
142	1	25/04/2023	ST	Green	1			Singing	
143	1	25/04/2023	BZ	Green	1			Perched	
144	1	25/04/2023	SL	Amber	1			Flying	
145	1	25/04/2023	TC	Green	1			Perched	
146	1	25/04/2023	WR	Green	1			Singing	
147	1	27/04/2023	HS	Amber	4			Perched	
148	1	27/04/2023	SG	Amber	1			Perched	
149	1	27/04/2023	Y.	Red	2			Singing	
150	1	27/04/2023	WP	Green	1			Perched	
151	1	27/04/2023	R.	Green	1			Singing	
152	1	27/04/2023	BT	Green	1			Perched	
153	1	27/04/2023	GT	Green	1			Perched	
154	1	27/04/2023	GT	Green	1			Perched	
155	1	27/04/2023	WP	Green	1			Singing	
156	1	27/04/2023	CH	Green	1			Singing	
157	1	27/04/2023	WP	Green	2			Perched	
158	1	27/04/2023	R.	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
159	1	27/04/2023	WP	Green	1			Perched	
160	1	27/04/2023	WR	Green	1			Singing	
161	1	27/04/2023	Y.	Red	1			Singing	
162	1	27/04/2023	GT	Green	1			Perched	
163	1	27/04/2023	R.	Green	1			Perched	
164	1	27/04/2023	GT	Green	1			Singing	
165	1	27/04/2023	BC	Green	1			Singing	
166	1	27/04/2023	R.	Green	1			Singing	
167	1	27/04/2023	GC	Amber	1			Singing	
168	1	27/04/2023	BT	Green	1			Perched	
169	1	27/04/2023	CH	Green	1			Perched	
170	1	27/04/2023	WP	Green	1			Perched	
171	1	27/04/2023	WP	Green	1			Singing	
172	1	27/04/2023	BC	Green	1			Singing	
173	1	27/04/2023	CH	Green	1			Perched	
174	1	27/04/2023	WR	Green	1			Singing	
175	1	27/04/2023	CH	Green	1			Singing	
176	1	27/04/2023	WP	Green	3			Perched	
177	1	27/04/2023	R.	Green	1			Singing	
178	1	27/04/2023	BF	Green	1			Perched	
179	1	27/04/2023	BC	Green	1			Singing	
180	1	27/04/2023	BC	Green	1			Singing	
181	1	27/04/2023	PH	NA	1			On ground	
182	1	27/04/2023	B.	Green	1			Perched	
183	1	27/04/2023	WP	Green	2			Perched	
184	1	27/04/2023	GC	Amber	1			Singing	
185	1	27/04/2023	BC	Green	1			Singing	
186	1	27/04/2023	WR	Green	1			Singing	
187	1	27/04/2023	R.	Green	1			Perched	
188	1	27/04/2023	CH	Green	1			Perched	
189	1	27/04/2023	WW	Amber	1			Singing	
190	1	27/04/2023	GO	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
191	1	27/04/2023	WP	Green	3			Perched	
192	1	27/04/2023	BT	Green	1			Perched	
193	1	27/04/2023	R.	Green	1			Perched	
194	1	27/04/2023	SH	Green	1			Perched	
195	1	27/04/2023	LI	Amber	2			Flying	Circling
196	1	27/04/2023	B.	Green	1			Singing	
197	1	27/04/2023	CH	Green	1			Singing	
198	1	27/04/2023	BC	Green	1			Singing	
199	1	27/04/2023	WP	Green	1			Perched	
200	1	27/04/2023	B.	Green	1			Perched	
201	1	27/04/2023	CH	Green	2			Perched	
202	1	27/04/2023	D.	Green	1			Singing	
203	1	27/04/2023	Y.	Red	1			Singing	
204	1	27/04/2023	WW	Amber	1			Singing	
205	1	27/04/2023	GC	Amber	1			Singing	
206	1	27/04/2023	B.	Green	1			Singing	
207	1	27/04/2023	CH	Green	1			Perched	
208	1	27/04/2023	WR	Green	1			Perched	
209	1	27/04/2023	SW	Green	1			Singing	
210	1	27/04/2023	CH	Green	1			Singing	
211	1	27/04/2023	B.	Green	1			Perched	
212	1	27/04/2023	BC	Green	1			Singing	
213	1	27/04/2023	CH	Green	1			Singing	
214	1	27/04/2023	R.	Green	1			Perched	
215	1	27/04/2023	WR	Green	1			Singing	
216	1	27/04/2023	GO	Green	1			Singing	
217	1	27/04/2023	WP	Green	3			Perched	
218	1	27/04/2023	BC	Green	1			Singing	
219	1	27/04/2023	GT	Green	2			Perched	
220	1	27/04/2023	BT	Green	1			Perched	
221	1	27/04/2023	Y.	Red	1			Singing	
222	1	27/04/2023	R.	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
223	1	27/04/2023	WP	Green	1			Perched	
224	1	27/04/2023	WW	Amber	1			Singing	
225	1	27/04/2023	CC	Green	1			Singing	
226	1	27/04/2023	BC	Green	1			Singing	
227	1	27/04/2023	WR	Green	1			Singing	
228	1	27/04/2023	R.	Green	1			Singing	
229	1	27/04/2023	CH	Green	1			Singing	
230	1	27/04/2023	WR	Green	1			Singing	
231	1	27/04/2023	ST	Green	1			Singing	
232	1	27/04/2023	PH	NA	1			On ground	
233	1	27/04/2023	LT	Green	2			Perched	
234	1	27/04/2023	BT	Green	2			Perched	
235	1	27/04/2023	GO	Green	1			Perched	
236	1	27/04/2023	CH	Green	1			Singing	
237	1	27/04/2023	BT	Green	1			Perched	
238	1	27/04/2023	WR	Green	1			Singing	
239	1	27/04/2023	BC	Green	1			Singing	
240	1	27/04/2023	WP	Green	2			Perched	
241	1	27/04/2023	Y.	Red	1			Singing	
242	1	27/04/2023	CH	Green	2			Perched	
243	1	27/04/2023	R.	Green	1			Singing	
244	1	27/04/2023	BT	Green	1			Perched	
245	1	27/04/2023	R.	Green	1			Singing	
246	1	27/04/2023	B.	Green	1			Singing	
247	1	27/04/2023	BC	Green	1			Singing	
248	1	27/04/2023	CH	Green	1			Perched	
249	1	27/04/2023	HC	Green	1			Perched	
250	1	27/04/2023	B.	Green	1			Perched	
251	1	27/04/2023	BF	Green	2			Singing	
252	1	27/04/2023	BC	Green	1			Singing	
253	1	27/04/2023	GT	Green	1			Perched	
254	1	27/04/2023	R.	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
255	1	27/04/2023	WW	Amber	1			Singing	
256	1	27/04/2023	CH	Green	2			Perched	
257	1	27/04/2023	WP	Green	5			Perched	
258	1	27/04/2023	GO	Green	2			Perched	
259	1	27/04/2023	R.	Green	1			Perched	
260	1	27/04/2023	B.	Green	1			Perched	
261	1	27/04/2023	CH	Green	1			Perched	
262	1	27/04/2023	CH	Green	1			Perched	
263	1	27/04/2023	D.	Green	1			Perched	
264	1	27/04/2023	WR	Green	1			Singing	
265	1	27/04/2023	GC	Amber	1			Singing	
266	1	27/04/2023	WP	Green	1			Perched	
267	1	27/04/2023	CH	Green	1			Singing	
268	1	27/04/2023	CH	Green	1			Perched	
269	1	27/04/2023	B.	Green	1			Perched	
270	1	27/04/2023	CH	Green	1			Perched	
271	1	27/04/2023	B.	Green	1			Singing	
272	1	27/04/2023	R.	Green	1			Singing	
273	1	27/04/2023	CH	Green	2			Singing	
274	1	27/04/2023	D.	Green	1			Perched	
275	1	27/04/2023	B.	Green	1			Perched	
276	1	27/04/2023	ST	Green	1			Perched	
277	1	27/04/2023	B.	Green	1			Perched	
278	1	27/04/2023	WP	Green	2			Perched	
279	1	27/04/2023	R.	Green	1			Singing	
280	1	27/04/2023	B.	Green	1			Perched	
281	1	27/04/2023	CD	Green	1			Perched	
282	1	27/04/2023	BT	Green	1			Perched	
283	1	27/04/2023	B.	Green	1			Perched	
284	1	27/04/2023	CH	Green	1			Singing	
285	1	27/04/2023	BT	Green	1			Perched	
286	1	27/04/2023	D.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
287	1	27/04/2023	Y.	Red	1			Singing	
289	1	27/04/2023	Y.	Red	1			Singing	
288	2	30/05/2023	LI	Amber	5			Singing	
290	2	30/05/2023	SL	Amber	4			Flying	Circling
291	2	30/05/2023	CH	Green	1			Singing	
292	2	30/05/2023	SL	Amber	1			Flying	
293	2	30/05/2023	SG	Amber	1			Perched	
294	2	30/05/2023	R.	Green	1			Perched	
295	2	30/05/2023	CH	Green	1			Calling	
296	2	30/05/2023	R.	Green	1			Singing	
297	2	30/05/2023	GO	Green	2			Flying	
298	2	30/05/2023	SL	Amber	3			Flying	
299	2	30/05/2023	GO	Green	3			Perched	
300	2	30/05/2023	WR	Green	1			Singing	
301	2	30/05/2023	R.	Green	1			Perched	
302	2	30/05/2023	B.	Green	1			Perched	
303	2	30/05/2023	WP	Green	2			Perched	
304	2	30/05/2023	R.	Green	1			Singing	
305	2	30/05/2023	GO	Green	1			Singing	
306	2	30/05/2023	GC	Amber	1			Singing	
307	2	30/05/2023	BC	Green	1			Singing	
308	2	30/05/2023	WR	Green	1			Singing	
309	2	30/05/2023	GC	Amber	1			Singing	
310	2	30/05/2023	R.	Green	1			Singing	
311	2	30/05/2023	KF	Amber	2			Flying	Flying up and down river, possible nest in area
312	2	30/05/2023	GO	Green	1			Singing	
313	2	30/05/2023	GT	Green	1			Singing	
314	2	30/05/2023	BT	Green	1			Singing	
315	2	30/05/2023	WR	Green	1			Singing	
316	2	30/05/2023	WR	Green	1			Singing	
317	2	30/05/2023	GC	Amber	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
318	2	30/05/2023	HM	Amber	1			Flying	
319	2	30/05/2023	CH	Green	1			Singing	
320	2	30/05/2023	BC	Green	1			Singing	
321	2	30/05/2023	B.	Green	1			Singing	
322	2	30/05/2023	BZ	Green	1			Perched	
323	2	30/05/2023	WR	Green	1			Singing	
324	2	30/05/2023	WR	Green	2			Singing	
325	2	30/05/2023	PW	Green	1			Flying	
326	2	30/05/2023	WR	Green	1			Singing	
327	2	30/05/2023	SG	Amber	3			Flying	
328	2	30/05/2023	RO	Green	6			Perched	
329	2	30/05/2023	WR	Green	1			Singing	
330	2	30/05/2023	B.	Green	1		Female	Perched	
331	2	30/05/2023	HS	Amber	1			Singing	
332	2	30/05/2023	WR	Green	1			Singing	
333	2	30/05/2023	SL	Amber	1			Flying	
334	2	30/05/2023	GR	Amber	1			Perched	
335	2	30/05/2023	R.	Green	1			Singing	
336	2	30/05/2023	RO	Green	3			Flying	
337	2	30/05/2023	BT	Green	1			Singing	
338	2	30/05/2023	R.	Green	1			Singing	
339	2	30/05/2023	B.	Green	1			Flying	
340	2	30/05/2023	RO	Green	1			Perched	
341	2	30/05/2023	R.	Green	1			Perched	
342	2	30/05/2023	HS	Amber	1			Perched	
343	2	30/05/2023	BT	Green	1			Calling	
344	2	30/05/2023	R.	Green	1			Perched	
345	2	30/05/2023	GC	Amber	1			Singing	
346	2	30/05/2023	JD	Green	1			Perched	
347	2	30/05/2023	WR	Green	1			Singing	
348	2	30/05/2023	SG	Amber	4			Perched	
349	2	30/05/2023	HC	Green	4			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
350	2	30/05/2023	MG	Green	1			Perched	
351	2	30/05/2023	CH	Green	1			Singing	
352	2	30/05/2023	PH	NA	1		Male	On ground	
353	2	30/05/2023	RO	Green	50			Flying	Circling
354	2	30/05/2023	BZ	Green	1			Flying	Circling
355	2	30/05/2023	WH	Green	1			Perched	
356	2	30/05/2023	B.	Green	1			Calling	
357	2	30/05/2023	BC	Green	1			Singing	
358	2	30/05/2023	RO	Green	4			Flying	One carrying food
359	2	30/05/2023	SL	Amber	2			Flying	
360	2	30/05/2023	RO	Green	5			Perched	
361	2	30/05/2023	WR	Green	1			Singing	
362	2	30/05/2023	B.	Green	1			Perched	
363	2	30/05/2023	HS	Amber	16			Perched	
364	2	30/05/2023	GT	Green	1			Singing	
365	2	30/05/2023	HS	Amber	2			Perched	
366	2	30/05/2023	SG	Amber	60			Flying	
367	2	30/05/2023	HM	Amber	2			Flying	
368	2	30/05/2023	B.	Green	1			Singing	
369	2	30/05/2023	GT	Green	1			Singing	
370	2	30/05/2023	BT	Green	1			Calling	
371	2	30/05/2023	WP	Green	2			Perched	
372	2	30/05/2023	R.	Green	1			Singing	
373	2	30/05/2023	RO	Green	3			Perched	
374	2	30/05/2023	HC	Green	2			Perched	
375	2	30/05/2023	CC	Green	1			Singing	
376	2	30/05/2023	RO	Green	1			Flying	
377	2	30/05/2023	SL	Amber	1			Flying	Circling
378	2	30/05/2023	JD	Green	2			Perched	
379	2	30/05/2023	RO	Green	1			Flying	
380	2	30/05/2023	SG	Amber	1			Perched	
381	2	30/05/2023	B.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
382	2	30/05/2023	GO	Green	1			Singing	
383	2	30/05/2023	Y.	Red	1			Singing	
384	2	30/05/2023	B.	Green	1			Singing	
385	2	30/05/2023	WR	Green	1			Singing	
386	2	30/05/2023	WP	Green	1			Perched	
387	2	30/05/2023	R.	Green	1			Singing	
388	2	30/05/2023	SL	Amber	1			Flying	Circling
389	2	30/05/2023	HS	Amber	2			Perched	
390	2	30/05/2023	WR	Green	1			Singing	
391	2	30/05/2023	GO	Green	2			Perched	
392	2	30/05/2023	HM	Amber	1			Flying	
393	2	30/05/2023	SL	Amber	1			Flying	
394	2	30/05/2023	SL	Amber	1			Flying	
395	2	30/05/2023	WR	Green	1			Singing	
396	2	30/05/2023	B.	Green	1			Flying	Carrying food
397	2	30/05/2023	B.	Green	1			Perched	
398	2	30/05/2023	B.	Green	1		Female	Perched	
399	2	30/05/2023	SL	Amber	4			Flying	Circling
400	2	30/05/2023	B.	Green	1			Singing	
401	2	30/05/2023	CH	Green	1			Singing	
402	2	30/05/2023	HM	Amber	1			Flying	
403	2	30/05/2023	GC	Amber	1			Calling	
404	2	30/05/2023	GR	Amber	1			Singing	
405	2	30/05/2023	HC	Green	1			Flying	
406	2	30/05/2023	R.	Green	1			Perched	
407	2	30/05/2023	WP	Green	1			Perched	
408	2	30/05/2023	HS	Amber	3			Perched	
409	2	30/05/2023	GR	Amber	1			Calling	
410	2	30/05/2023	R.	Green	1			Perched	
411	2	30/05/2023	GR	Amber	1			Flying	
412	2	30/05/2023	HS	Amber	1			Singing	
413	2	30/05/2023	SG	Amber	2			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
414	2	30/05/2023	WP	Green	1			Perched	
415	2	30/05/2023	CH	Green	1			Singing	
416	2	30/05/2023	B.	Green	1			Perched	
417	2	30/05/2023	R.	Green	1			Singing	
418	2	30/05/2023	SG	Amber	40			Perched	
419	2	30/05/2023	B.	Green	1			Perched	
420	2	30/05/2023	Y.	Red	1			Perched	
421	2	30/05/2023	HS	Amber	2		Male & Female	Perched	
422	2	30/05/2023	ST	Green	1			Singing	
423	2	30/05/2023	CH	Green	1			Singing	
424	2	30/05/2023	WR	Green	1			Singing	
425	2	30/05/2023	SG	Amber	30	Adults & juveniles		Perched	Mostly juveniles
426	2	30/05/2023	SL	Amber	2			Flying	
427	2	30/05/2023	CH	Green	1			Calling	
428	2	30/05/2023	B.	Green	1			Perched	
429	2	30/05/2023	JD	Green	1			Perched	
430	2	30/05/2023	B.	Green	1			Perched	
431	2	30/05/2023	CH	Green	1		Female	Perched	
432	2	30/05/2023	Y.	Red	1			Singing	
433	2	30/05/2023	WR	Green	1			Singing	
434	2	30/05/2023	JD	Green	1			Flying	
435	2	30/05/2023	SL	Amber	1			Flying	
436	2	30/05/2023	WP	Green	1			Perched	
437	2	30/05/2023	ST	Green	1			Singing	
438	2	30/05/2023	JD	Green	2			Perched	
439	2	30/05/2023	RO	Green	5			Perched	
440	2	30/05/2023	HS	Amber	8			Perched	
441	2	30/05/2023	B.	Green	1			Perched	
442	2	30/05/2023	SL	Amber	1			Perched	
443	2	30/05/2023	RO	Green	2			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
444	2	30/05/2023	HS	Amber	4			Perched	
445	2	30/05/2023	Y.	Red	1			Singing	
446	2	30/05/2023	SL	Amber	2			Flying	
447	2	30/05/2023	HS	Amber	2			Perched	
448	2	30/05/2023	WP	Green	2			Perched	
449	2	30/05/2023	CH	Green	1			Calling	
450	2	30/05/2023	R.	Green	1			Perched	
451	2	30/05/2023	PW	Green	1			Perched	
452	2	30/05/2023	HS	Amber	2			Perched	
453	2	30/05/2023	WR	Green	1			Singing	
454	2	30/05/2023	B.	Green	1			Calling	
455	2	30/05/2023	GC	Amber	1			Singing	
456	2	30/05/2023	GR	Amber	1			Singing	
457	2	30/05/2023	R.	Green	1			Singing	
458	2	30/05/2023	BC	Green	1			Singing	
459	2	30/05/2023	CH	Green	1			Singing	
460	2	30/05/2023	HS	Amber	2		Male & female	Perched	
461	2	30/05/2023	RO	Green	1			Perched	
462	2	30/05/2023	WP	Green	1			Perched	
463	2	30/05/2023	B.	Green	1			Calling	
464	2	30/05/2023	SL	Amber	3			Flying	
465	2	30/05/2023	B.	Green	1			Perched	
466	2	30/05/2023	R.	Green	1			Singing	
467	2	30/05/2023	Y.	Red	1			Calling	
468	2	30/05/2023	B.	Green	1			Flying	
469	2	30/05/2023	SL	Amber	2			Flying	
470	2	30/05/2023	HG	Amber	3			Flying	
471	2	30/05/2023	B.	Green	1			Perched	
472	2	30/05/2023	SL	Amber	3			Flying	
473	2	30/05/2023	PH	NA	2		Male & female	On ground	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
474	2	30/05/2023	WP	Green	1			Perched	
475	2	30/05/2023	Y.	Red	1			Perched	
476	2	30/05/2023	GO	Green	1			Perched	
477	2	30/05/2023	WR	Green	1			Singing	
478	2	30/05/2023	HS	Amber	1			Calling	
479	2	30/05/2023	WR	Green	1			Singing	
480	2	30/05/2023	GC	Amber	1			Singing	
481	2	30/05/2023	ST	Green	1			Singing	
482	2	30/05/2023	Y.	Red	1			Perched	
483	2	30/05/2023	SL	Amber	1			Flying	
484	2	30/05/2023	Y.	Red	1			Singing	
485	2	30/05/2023	M.	Green	1			Perched	
486	2	30/05/2023	BT	Green	1			Perched	
487	2	30/05/2023	MG	Green	1			Flying	
488	2	30/05/2023	Y.	Red	1			Singing	
489	2	30/05/2023	B.	Green	1			Perched	
490	2	30/05/2023	PW	Green	2	Adult & juvenile		Perched	
491	2	30/05/2023	GC	Amber	1			Singing	
492	2	30/05/2023	CH	Green	1			Calling	
493	2	30/05/2023	BT	Green	1			Perched	
494	2	30/05/2023	SL	Amber	10			Flying	Circling
495	2	30/05/2023	HM	Amber	1			Flying	Circling
496	2	30/05/2023	WR	Green	1			Singing	
497	2	30/05/2023	B.	Green	1		Female	Perched	
498	2	30/05/2023	R.	Green	1			Singing	
499	2	30/05/2023	WR	Green	1			Singing	
500	2	30/05/2023	GT	Green	1			Flying	
501	2	30/05/2023	CH	Green	1			Singing	
502	2	30/05/2023	LI	Amber	1			Perched	
503	2	30/05/2023	WP	Green	2			Perched	
504	2	30/05/2023	MG	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
505	2	30/05/2023	Y.	Red	1			Singing	
506	2	30/05/2023	B.	Green	1			On ground	
507	2	30/05/2023	WR	Green	1			Singing	
508	2	30/05/2023	R.	Green	2			Perched	
509	2	30/05/2023	WP	Green	2			Perched	
510	2	30/05/2023	SL	Amber	1			Perched	
511	2	30/05/2023	ST	Green	1			Singing	
512	2	30/05/2023	RO	Green	4			Perched	
513	2	30/05/2023	JD	Green	1			Perched	
514	2	30/05/2023	BT	Green	1			Perched	
515	2	30/05/2023	B.	Green	1			Perched	
516	2	30/05/2023	WH	Green	1			Singing	
517	2	30/05/2023	HS	Amber	6	Adult & juveniles		Perched	
518	2	30/05/2023	Y.	Red	1			Singing	
519	2	30/05/2023	SC	Green	1			Perched	
520	2	30/05/2023	HS	Amber	2			Perched	
521	2	30/05/2023	R.	Green	1			Perched	
522	2	30/05/2023	WP	Green	2			Perched	
523	2	30/05/2023	SL	Amber	2			Flying	
524	2	30/05/2023	B.	Green	1			Perched	
525	2	30/05/2023	MG	Green	7			Perched	
526	2	30/05/2023	WP	Green	1			Perched	
527	2	30/05/2023	B.	Green	1			On ground	
528	2	30/05/2023	SL	Amber	1			Flying	
529	2	30/05/2023	HC	Green	1			Perched	
530	2	30/05/2023	CH	Green	2			Flying	
531	2	30/05/2023	WR	Green	1			Singing	
532	2	30/05/2023	R.	Green	1			Perched	
533	2	30/05/2023	B.	Green	4			Perched	
534	2	30/05/2023	D.	Green	1			Singing	
535	2	30/05/2023	WP	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
536	2	30/05/2023	R.	Green	1			Perched	
537	2	30/05/2023	B.	Green	1			Perched	
538	2	30/05/2023	CH	Green	1			Singing	
539	2	30/05/2023	WR	Green	1			Calling	
540	2	30/05/2023	ST	Green	1			Singing	
541	2	30/05/2023	GR	Amber	1			Perched	
542	2	30/05/2023	WR	Green	1			Singing	
543	2	30/05/2023	CH	Green	1			Singing	
544	2	30/05/2023	BZ	Green	1			Flying	
545	2	30/05/2023	HS	Amber	5			Perched	
546	2	30/05/2023	R.	Green	1			Singing	
547	2	30/05/2023	WR	Green	1			Singing	
548	2	30/05/2023	WP	Green	3			Perched	
549	2	30/05/2023	CH	Green	1			Calling	
550	2	30/05/2023	B.	Green	1			Perched	
551	2	30/05/2023	D.	Green	1			Calling	
552	2	30/05/2023	R.	Green	1			Singing	
553	2	30/05/2023	SL	Amber	1			Flying	
554	2	30/05/2023	WR	Green	1			Singing	
555	2	30/05/2023	B.	Green	2			Perched	
556	2	30/05/2023	GT	Green	1			Perched	
557	2	30/05/2023	WR	Green	1			Singing	
558	2	30/05/2023	D.	Green	1			Perched	
559	2	30/05/2023	LI	Amber	1			Perched	
560	2	30/05/2023	SC	Green	1		Male	Perched	
561	2	30/05/2023	WH	Green	1			Singing	
562	2	30/05/2023	WP	Green	8			On ground	
563	2	30/05/2023	HG	Amber	1			Flying	
564	2	31/05/2023	BC	Green	1			Singing	
565	2	31/05/2023	GR	Amber	1			Singing	
566	2	31/05/2023	BF	Green	2			Perched	
567	2	31/05/2023	B.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
568	2	31/05/2023	CH	Green	1			Singing	
569	2	31/05/2023	B.	Green	1			Perched	
570	2	31/05/2023	BC	Green	1			Singing	
571	2	31/05/2023	CH	Green	1			Perched	
572	2	31/05/2023	BC	Green	1			Singing	
573	2	31/05/2023	WR	Green	1			Singing	
574	2	31/05/2023	BT	Green	1			Perched	
575	2	31/05/2023	D.	Green	1			Singing	
576	2	31/05/2023	B.	Green	1			Singing	
577	2	31/05/2023	CH	Green	1			Singing	
578	2	31/05/2023	CT	Green	1			Perched	
579	2	31/05/2023	Y.	Red	1			Singing	
580	2	31/05/2023	WP	Green	1			Singing	
581	2	31/05/2023	R.	Green	1			Singing	
582	2	31/05/2023	GT	Green	1			Singing	
583	2	31/05/2023	B.	Green	1			Singing	
584	2	31/05/2023	R.	Green	1			Singing	
585	2	31/05/2023	WR	Green	1			Singing	
586	2	31/05/2023	BT	Green	1			Perched	
587	2	31/05/2023	R.	Green	1			Perched	
588	2	31/05/2023	B.	Green	1			Perched	
589	2	31/05/2023	JD	Green	1			Perched	
590	2	31/05/2023	B.	Green	1			Perched	
591	2	31/05/2023	WW	Amber	1			Singing	
592	2	31/05/2023	GT	Green	1			Perched	
593	2	31/05/2023	R.	Green	1			Singing	
594	2	31/05/2023	BC	Green	1			Singing	
595	2	31/05/2023	CH	Green	1			Singing	
596	2	31/05/2023	GT	Green	1			Singing	
597	2	31/05/2023	BC	Green	1			Singing	
598	2	31/05/2023	WR	Green	1			Singing	
599	2	31/05/2023	BT	Green	2			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
600	2	31/05/2023	R.	Green	1			Perched	
601	2	31/05/2023	D.	Green	1			Singing	
602	2	31/05/2023	WP	Green	1			Perched	
603	2	31/05/2023	CH	Green	1			Singing	
604	2	31/05/2023	R.	Green	1			Perched	
605	2	31/05/2023	CC	Green	1			Singing	
606	2	31/05/2023	BF	Green	1			Perched	
607	2	31/05/2023	GT	Green	1			Perched	
608	2	31/05/2023	B.	Green	2			Perched	
609	2	31/05/2023	R.	Green	1			Perched	
610	2	31/05/2023	WR	Green	1			Singing	
611	2	31/05/2023	CH	Green	1			Singing	
612	2	31/05/2023	B.	Green	1			Perched	
613	2	31/05/2023	WP	Green	1			Perched	
614	2	31/05/2023	JD	Green	1			On ground	
615	2	31/05/2023	RO	Green	19			On ground	
616	2	31/05/2023	CH	Green	1			Singing	
617	2	31/05/2023	R.	Green	1			Singing	
618	2	31/05/2023	WR	Green	1			Singing	
619	2	31/05/2023	BT	Green	1			Singing	
620	2	31/05/2023	WR	Green	1			Singing	
621	2	31/05/2023	SW	Green	1			Singing	
622	2	31/05/2023	ST	Green	1			Singing	
623	2	31/05/2023	BC	Green	1			Singing	
624	2	31/05/2023	BC	Green	1			Singing	
625	2	31/05/2023	GT	Green	1			Perched	
626	2	31/05/2023	R.	Green	1			Perched	
627	2	31/05/2023	BT	Green	2			Perched	
628	2	31/05/2023	B.	Green	1			Perched	
629	2	31/05/2023	WR	Green	1			Singing	
630	2	31/05/2023	CH	Green	2			Perched	
631	2	31/05/2023	GT	Green	2			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
632	2	31/05/2023	WR	Green	1			Singing	
633	2	31/05/2023	WP	Green	2			Perched	
634	2	31/05/2023	CC	Green	1			Perched	
635	2	31/05/2023	CA	Amber	1			Perched	
636	2	31/05/2023	CH	Green	1			Singing	
637	2	31/05/2023	MG	Green	1			Singing	
638	2	31/05/2023	BC	Green	1			Singing	
639	2	31/05/2023	WP	Green	2			Perched	
640	2	31/05/2023	WR	Green	1			Singing	
641	2	31/05/2023	B.	Green	1			Singing	
642	2	31/05/2023	D.	Green	1			Singing	
643	2	31/05/2023	BF	Green	1			Calling	
644	2	31/05/2023	BF	Green	1			Calling	
645	2	31/05/2023	CH	Green	1			Singing	
646	2	31/05/2023	D.	Green	1			Flying	
647	2	31/05/2023	B.	Green	1			Calling	
648	2	31/05/2023	GC	Amber	1			Singing	
649	2	31/05/2023	CH	Green	1			Calling	
650	2	31/05/2023	CH	Green	1			Singing	
651	2	31/05/2023	R.	Green	1			Singing	
652	2	31/05/2023	B.	Green	1			Calling	
653	2	31/05/2023	GO	Green	1			Singing	
654	2	31/05/2023	CH	Green	1			Singing	
655	2	31/05/2023	HM	Amber	2			Flying	
656	2	31/05/2023	CH	Green	1			Calling	
657	2	31/05/2023	CH	Green	1			Singing	
658	2	31/05/2023	R.	Green	1			Singing	
659	2	31/05/2023	GC	Amber	1			Singing	
660	2	31/05/2023	R.	Green	1			Singing	
661	2	31/05/2023	WP	Green	1			Perched	
662	2	31/05/2023	WP	Green	1			Perched	
663	2	31/05/2023	R.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
664	2	31/05/2023	Y.	Red	1			Singing	
665	2	31/05/2023	RO	Green	2			Flying	
666	2	31/05/2023	SG	Amber	4			Flying	
667	2	31/05/2023	WP	Green	5			Flying	
668	2	31/05/2023	RO	Green	2			Flying	
669	2	31/05/2023	SL	Amber	2			Flying	
670	2	31/05/2023	HM	Amber	2			Flying	
671	2	31/05/2023	R.	Green	1			Singing	
672	2	31/05/2023	GT	Green	1			Singing	
673	2	31/05/2023	R.	Green	1			Singing	
674	2	31/05/2023	Y.	Red	1			Perched	
675	2	31/05/2023	CH	Green	1			Singing	
676	2	31/05/2023	CH	Green	1			Singing	
677	2	31/05/2023	WR	Green	1			Singing	
678	2	31/05/2023	RO	Green	2			Flying	
679	2	31/05/2023	WR	Green	1			Singing	
680	2	31/05/2023	BC	Green	1			Singing	
681	2	31/05/2023	GC	Amber	1			Singing	
682	2	31/05/2023	WR	Green	1			Singing	
683	2	31/05/2023	WR	Green	1			Singing	
684	2	31/05/2023	WP	Green	1			Flying	
685	2	31/05/2023	Y.	Red	1			Singing	
686	2	31/05/2023	B.	Green	1			Calling	
687	2	31/05/2023	WR	Green	1			Singing	
688	2	31/05/2023	WR	Green	1			Singing	
689	2	31/05/2023	R.	Green	1			Singing	
690	2	31/05/2023	CH	Green	1			Singing	
691	2	31/05/2023	B.	Green	1			Calling	
692	2	31/05/2023	CH	Green	1			Calling	
693	2	31/05/2023	R.	Green	1			Singing	
694	2	31/05/2023	WR	Green	1			Singing	
695	2	31/05/2023	RO	Green	1			Flying	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
696	2	31/05/2023	CH	Green	1			Singing	
697	2	31/05/2023	R.	Green	1			Singing	
698	2	31/05/2023	GT	Green	1			Singing	
699	2	31/05/2023	RO	Green	2			Flying	
700	2	31/05/2023	BC	Green	1			Singing	
701	2	31/05/2023	R.	Green	1			Singing	
702	2	31/05/2023	CH	Green	1			Calling	
703	2	31/05/2023	HC	Green	1			Flying	
704	2	31/05/2023	B.	Green	1			Calling	
705	2	31/05/2023	WR	Green	1			Singing	
706	2	31/05/2023	WR	Green	1			Singing	
707	2	31/05/2023	BC	Green	1			Perched	
708	2	31/05/2023	CH	Green	1			Perched	
709	2	31/05/2023	B.	Green	1			Perched	
710	2	31/05/2023	BC	Green	1			Perched	
711	2	31/05/2023	R.	Green	1			Perched	
712	2	31/05/2023	R.	Green	1			Perched	
713	2	31/05/2023	CH	Green	2			Perched	
714	2	31/05/2023	R.	Green	1			Perched	
715	2	31/05/2023	ST	Green	1			Perched	
716	2	31/05/2023	WP	Green	1			Perched	
717	2	31/05/2023	CH	Green	1			Perched	
718	2	31/05/2023	B.	Green	1			Perched	
719	2	31/05/2023	R.	Green	1			Perched	
720	2	31/05/2023	B.	Green	1			Perched	
721	2	31/05/2023	B.	Green	1			Perched	
722	2	31/05/2023	WP	Green	1			Perched	
723	2	31/05/2023	Y.	Red	1			Perched	
724	2	31/05/2023	GC	Amber	1			Perched	
725	2	31/05/2023	CH	Green	1			Perched	
726	2	31/05/2023	WW	Amber	1			Perched	
727	2	31/05/2023	WP	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
728	2	31/05/2023	B.	Green	1			Perched	
729	2	31/05/2023	WR	Green	1			Perched	
730	2	31/05/2023	Y.	Red	1			Perched	
731	2	31/05/2023	R.	Green	1			Perched	
732	2	31/05/2023	CH	Green	1			Perched	
733	2	31/05/2023	WR	Green	1			Perched	
734	2	31/05/2023	WP	Green	1			Perched	
735	2	31/05/2023	WR	Green	1			Perched	
736	2	31/05/2023	R.	Green	1			Perched	
737	2	31/05/2023	CH	Green	1			Perched	
738	2	31/05/2023	B.	Green	1			Perched	
739	2	31/05/2023	WR	Green	1			Perched	
740	2	31/05/2023	R.	Green	1			Perched	
741	2	31/05/2023	ST	Green	1			Perched	
742	2	31/05/2023	B.	Green	1			Perched	
743	2	31/05/2023	B.	Green	1			Perched	
744	2	31/05/2023	WR	Green	1			Perched	
745	2	31/05/2023	Y.	Red	1			Perched	
746	2	31/05/2023	B.	Green	1			On ground	
747	2	31/05/2023	WP	Green	1			On ground	
748	2	31/05/2023	ST	Green	1			Perched	
749	2	31/05/2023	WR	Green	1			Perched	
750	2	31/05/2023	Y.	Red	1			Perched	
751	2	31/05/2023	CH	Green	1			Perched	
752	2	31/05/2023	CH	Green	1			Perched	
753	2	31/05/2023	B.	Green	1			Perched	
754	2	31/05/2023	B.	Green	1			Perched	
755	2	31/05/2023	BC	Green	1			Perched	
756	2	31/05/2023	B.	Green	1			Perched	
757	2	31/05/2023	JD	Green	1			On ground	
758	2	31/05/2023	CH	Green	1			Perched	
759	2	31/05/2023	R.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
760	2	31/05/2023	WR	Green	1			Perched	
761	2	31/05/2023	WP	Green	1			Perched	
762	2	31/05/2023	R.	Green	1			Perched	
763	2	31/05/2023	RO	Green	1			On ground	
764	2	31/05/2023	B.	Green	1			Perched	
765	2	31/05/2023	GO	Green	2			On ground	
766	2	31/05/2023	Y.	Red	2			Perched	
767	2	31/05/2023	BT	Green	1			Perched	
768	2	31/05/2023	GT	Green	1			Perched	
769	2	31/05/2023	D.	Green	1			On ground	
770	2	31/05/2023	B.	Green	1			On ground	
771	2	31/05/2023	R.	Green	1			Perched	
772	2	31/05/2023	B.	Green	1			Perched	
773	2	31/05/2023	SL	Amber	4			On ground	
774	2	31/05/2023	WP	Green	1			On ground	
775	2	31/05/2023	SL	Amber	1			On ground	
776	2	31/05/2023	BZ	Green	1			Perched	
777	2	31/05/2023	WP	Green	1			Perched	
778	2	31/05/2023	GO	Green	1			Perched	
779	2	31/05/2023	Y.	Red	1			Perched	
780	2	31/05/2023	CH	Green	1			Perched	
781	2	31/05/2023	ST	Green	1			Perched	
782	2	31/05/2023	WR	Green	1			Perched	
783	2	31/05/2023	B.	Green	2			Perched	
784	2	31/05/2023	WP	Green	1			On ground	
785	2	31/05/2023	JD	Green	1			On ground	
786	2	31/05/2023	WR	Green	1			Perched	
787	2	31/05/2023	R.	Green	1			Perched	
788	2	31/05/2023	ST	Green	1			Perched	
789	2	31/05/2023	Y.	Red	1			Perched	
790	2	31/05/2023	WR	Green	1			Perched	
791	2	31/05/2023	BC	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
792	2	31/05/2023	WP	Green	1			Perched	
793	2	31/05/2023	BC	Green	1			Perched	
794	2	31/05/2023	R.	Green	1			Perched	
795	2	31/05/2023	CH	Green	1			Perched	
796	2	31/05/2023	BC	Green	1			Perched	
797	2	31/05/2023	CH	Green	1			Perched	
798	2	31/05/2023	B.	Green	1			Perched	
799	2	31/05/2023	CH	Green	1			Perched	
800	2	31/05/2023	BT	Green	1			Perched	
801	2	31/05/2023	SC	Green	1			On ground	
802	2	31/05/2023	CH	Green	1			Perched	
803	2	31/05/2023	ST	Green	1			Perched	
804	2	31/05/2023	RO	Green	1			On ground	
805	2	31/05/2023	R.	Green	1			Perched	
806	2	31/05/2023	GO	Green	1			On ground	
807	2	31/05/2023	CH	Green	2			Perched	
808	2	31/05/2023	CH	Green	1			Perched	
809	2	31/05/2023	WR	Green	1			Perched	
810	2	31/05/2023	Y.	Red	1			Perched	
811	2	31/05/2023	R.	Green	2			Perched	
812	2	31/05/2023	CH	Green	1			Perched	
813	2	31/05/2023	B.	Green	1			Perched	
814	2	31/05/2023	CH	Green	2			Perched	
815	2	31/05/2023	CH	Green	1			Perched	
816	2	31/05/2023	B.	Green	1			Perched	
817	2	31/05/2023	CH	Green	1			Perched	
818	2	31/05/2023	WR	Green	1			Perched	
819	2	31/05/2023	Y.	Red	1			Perched	
820	2	31/05/2023	MG	Green	1			Perched	
821	2	31/05/2023	CH	Green	1			Perched	
822	2	31/05/2023	B.	Green	1			Perched	
823	2	31/05/2023	B.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
824	2	31/05/2023	CH	Green	2			Perched	
825	2	31/05/2023	R.	Green	1			Perched	
826	2	31/05/2023	B.	Green	1			Perched	
827	2	31/05/2023	WR	Green	1			Perched	
828	2	31/05/2023	R.	Green	1			Perched	
829	2	31/05/2023	CH	Green	1			Perched	
830	2	31/05/2023	GO	Green	2			On ground	
831	2	31/05/2023	WR	Green	1			Perched	
832	2	31/05/2023	CH	Green	1			Perched	
833	2	31/05/2023	WR	Green	1			Perched	
834	2	31/05/2023	Y.	Red	1			Perched	
835	2	31/05/2023	B.	Green	2			On ground	
836	2	31/05/2023	WR	Green	1			Perched	
837	2	31/05/2023	CH	Green	2			Perched	
838	2	31/05/2023	R.	Green	1			Perched	
839	2	31/05/2023	GC	Amber	1			Perched	
840	2	31/05/2023	R.	Green	1			Perched	
841	2	31/05/2023	GC	Amber	1			Perched	
842	2	31/05/2023	WR	Green	1			Perched	
843	2	31/05/2023	R.	Green	1			Perched	
844	2	31/05/2023	B.	Green	1			Perched	
845	2	31/05/2023	R.	Green	1			Perched	
846	2	31/05/2023	ST	Green	1			Perched	
847	2	31/05/2023	CH	Green	1			Perched	
848	2	31/05/2023	R.	Green	1			Perched	
849	2	31/05/2023	WR	Green	1			Perched	
850	2	31/05/2023	WR	Green	1			Perched	
851	2	31/05/2023	GC	Amber	1			Perched	
852	2	31/05/2023	BC	Green	1			Perched	
853	2	31/05/2023	CH	Green	1			Perched	
854	2	31/05/2023	D.	Green	1			Perched	
855	2	31/05/2023	WR	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
856	2	31/05/2023	B.	Green	1			Perched	
857	2	31/05/2023	B.	Green	1			Perched	
858	2	31/05/2023	CH	Green	1			Perched	
859	2	31/05/2023	WR	Green	1			Singing	
860	2	31/05/2023	R.	Green	1			Calling	
861	2	31/05/2023	R.	Green	1			Singing	
862	2	31/05/2023	WR	Green	1			Singing	
863	2	31/05/2023	RO	Green	70			On ground	
864	2	31/05/2023	B.	Green	1			Calling	
865	2	31/05/2023	BC	Green	1			Singing	
866	2	31/05/2023	B.	Green	1			Flying	
867	2	31/05/2023	B.	Green	1			Calling	
868	2	31/05/2023	CH	Green	1			Singing	
869	2	31/05/2023	Y.	Red	1			Singing	
870	2	31/05/2023	B.	Green	1			Calling	
871	2	31/05/2023	GC	Amber	1			Singing	
872	2	31/05/2023	B.	Green	1			Calling	
873	2	31/05/2023	B.	Green	1			Singing	
874	2	31/05/2023	SL	Amber	1			Flying	
875	2	31/05/2023	R.	Green	1			Singing	
876	2	31/05/2023	CH	Green	1			Calling	
877	2	31/05/2023	B.	Green	1			Calling	
878	2	31/05/2023	GC	Amber	1			Singing	
879	2	31/05/2023	R.	Green	1			Calling	
880	2	31/05/2023	WR	Green	1			Singing	
881	2	31/05/2023	WW	Amber	1			Singing	
882	2	31/05/2023	CH	Green	2			Calling	
883	2	31/05/2023	WR	Green	1			Singing	
884	2	31/05/2023	RO	Green	1			Flying	
885	2	31/05/2023	B.	Green	1			Perched	
886	2	31/05/2023	R.	Green	1			Singing	
887	2	31/05/2023	BC	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
888	2	31/05/2023	B.	Green	1			Calling	
889	2	31/05/2023	R.	Green	1			Calling	
890	2	31/05/2023	CH	Green	1			Singing	
891	2	31/05/2023	WW	Amber	1			Singing	
892	2	31/05/2023	B.	Green	1			Singing	
893	2	31/05/2023	CH	Green	1			Singing	
894	2	31/05/2023	CC	Green	1			Singing	
895	2	31/05/2023	R.	Green	1			Singing	
896	2	31/05/2023	BC	Green	1			Singing	
897	2	31/05/2023	B.	Green	1			Calling	
898	2	31/05/2023	CH	Green	1			Singing	
899	2	31/05/2023	JD	Green	8			Flying	
900	2	31/05/2023	BC	Green	1			Perched	
901	2	31/05/2023	GO	Green	1			Singing	
902	2	31/05/2023	WR	Green	1			Singing	
903	2	31/05/2023	R.	Green	1			Calling	
904	2	31/05/2023	Y.	Red	1			Singing	
905	2	31/05/2023	SC	Green	1			Flying	
906	2	31/05/2023	Y.	Red	1			On ground	
907	2	31/05/2023	RO	Green	2			Flying	
908	2	31/05/2023	WP	Green	1			Flying	
909	2	31/05/2023	BZ	Green	1			Perched	
910	2	31/05/2023	CH	Green	1			Singing	
911	2	31/05/2023	B.	Green	1			Perched	
912	2	31/05/2023	CH	Green	1			Calling	
913	2	31/05/2023	B.	Green	1			Singing	
914	2	31/05/2023	Y.	Red	1			Calling	
915	2	31/05/2023	CH	Green	1			Calling	
916	2	31/05/2023	Y.	Red	1			Singing	
917	2	31/05/2023	CH	Green	1			Calling	
918	2	31/05/2023	D.	Green	1			Singing	
919	2	31/05/2023	GC	Amber	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
920	2	31/05/2023	WR	Green	1			Singing	
921	2	31/05/2023	R.	Green	1			Perched	
922	2	31/05/2023	D.	Green	1			Perched	
923	2	31/05/2023	WP	Green	1			Perched	
924	2	31/05/2023	JD	Green	21			Perched	
925	2	31/05/2023	HS	Amber	4			Perched	
926	2	31/05/2023	HM	Amber	1			Flying	
927	2	31/05/2023	SL	Amber	4			Flying	Circling
928	2	31/05/2023	JD	Green	1			Flying	
929	2	31/05/2023	B.	Green	1			Singing	
930	2	31/05/2023	HC	Green	1			Perched	
931	2	31/05/2023	SG	Amber	4	2 adult & 2 juvenile		Perched	
932	2	31/05/2023	B.	Green	1			Perched	
933	2	31/05/2023	PW	Green	1			Flying	
934	2	31/05/2023	SL	Amber	4			Flying	Circling
935	2	31/05/2023	B.	Green	2			Flying	
936	2	31/05/2023	SG	Amber	2			Flying	
937	2	31/05/2023	RO	Green	5			Perched	
938	2	31/05/2023	B.	Green	1			Singing	
939	2	31/05/2023	Y.	Red	1			Singing	
940	2	31/05/2023	B.	Green	1			Calling	
941	2	31/05/2023	HM	Amber	1			Flying	
942	2	31/05/2023	RO	Green	1			Flying	
943	2	31/05/2023	SG	Amber	1			Flying	
944	2	31/05/2023	SL	Amber	1			Flying	
945	2	31/05/2023	R.	Green	1			Singing	
946	2	31/05/2023	B.	Green	1			Flying	
947	2	31/05/2023	R.	Green	1			Calling	
948	2	31/05/2023	CH	Green	1			Calling	
949	2	31/05/2023	WP	Green	2			Perched	
950	2	31/05/2023	RO	Green	1			Flying	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
951	2	31/05/2023	CH	Green	1			Calling	
952	2	31/05/2023	HS	Amber	2			Perched	
953	2	31/05/2023	R.	Green	1			Perched	
954	2	31/05/2023	SL	Amber	1			Flying	Circling
955	2	31/05/2023	Y.	Red	1			Singing	
956	3	26/06/2023	GC	Amber	1			Singing	
957	3	26/06/2023	WR	Green	1			Singing	
958	3	26/06/2023	WP	Green	1			Singing	
959	3	26/06/2023	PH	NA	1			Calling	
960	3	26/06/2023	SL	Amber	2			Perched	
961	3	26/06/2023	SL	Amber	3			Perched	Perched then flew N
962	3	26/06/2023	BT	Green	2	Adult		Calling	
963	3	26/06/2023	WR	Green	1			Singing	
964	3	26/06/2023	B.	Green	1	Adult	Male	Calling	Flew from one hedgerow to other
965	3	26/06/2023	PH	NA	1		Female	Calling	
966	3	26/06/2023	Y.	Red	1	Adult	Male	Calling	
967	3	26/06/2023	SG	Amber	30	20 adult & 10 juvenile		Perched	
968	3	26/06/2023	M.	Green	1			Perched	Perched then flew S
969	3	26/06/2023	LI	Amber	1	Adult		Singing	
970	3	26/06/2023	BT	Green	2	Adult & juvenile			Perched then flew E
971	3	26/06/2023	WR	Green	1			Singing	
972	3	26/06/2023	S.	Amber	2			Singing in flight	
973	3	26/06/2023	SC	Green	1		Male	Perched	
974	3	26/06/2023	WR	Green	1			Singing	
975	3	26/06/2023	MP	Green	1			Singing	
976	3	26/06/2023	LI	Amber	2			Flying	Into vegetation
977	3	26/06/2023	WR	Green	1			Calling	
978	3	26/06/2023	B.	Green	1	Adult	Male	Flying	Into vegetation
979	3	26/06/2023	D.	Green	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
980	3	26/06/2023	B.	Green	2		Female		
981	3	26/06/2023	Y.	Red	1	Adult	Male	Perched	
982	3	26/06/2023	WR	Green	1			Singing	
983	3	26/06/2023	HC	Green	3	2 Adult & 1 juvenile		On ground	
984	3	26/06/2023	WR	Green	1			Singing	
985	3	26/06/2023	CH	Green	1			Calling	
986	3	26/06/2023	WP	Green	1			Perched	
987	3	26/06/2023	Y.	Red	1			Singing	
988	3	26/06/2023	B.	Green	1			On ground	
989	3	26/06/2023	PH	NA	1			Calling	
990	3	26/06/2023	WR	Green	1			Singing	
991	3	26/06/2023	HM	Amber	1			Perched	
992	3	26/06/2023	SL	Amber	2			Perched	
993	3	26/06/2023	WR	Green	1			Singing	
994	3	26/06/2023	CH	Green	1			Singing	
995	3	26/06/2023	ST	Green	1			Singing	
996	3	26/06/2023	JD	Green	6			Calling	
997	3	26/06/2023	SL	Amber	4			Flying	Circling barn
998	3	26/06/2023	Y.	Red	1			Singing	
999	3	26/06/2023	LI	Amber	1			Perched	
1000	3	26/06/2023	WR	Green	1			Singing	
1001	3	26/06/2023	WR	Green	1			Singing	
1002	3	26/06/2023	GC	Amber	1			Singing	
1003	3	26/06/2023	Y.	Red	1			Perched	
1004	3	26/06/2023	HS	Amber	1		Male	Perched	
1005	3	26/06/2023	PW	Green	1			On ground	
1006	3	26/06/2023	CH	Green	1			Singing	
1007	3	26/06/2023	WR	Green	1			Singing	
1008	3	26/06/2023	ST	Green	1			Singing	
1009	3	26/06/2023	HS	Amber	1			Flying	Into vegetation
1010	3	26/06/2023	WR	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1011	3	26/06/2023	Y.	Red	1			Singing	
1012	3	26/06/2023	ST	Green	1			Singing	
1013	3	26/06/2023	B.	Green	1		Male	Perched	
1014	3	26/06/2023	SL	Amber	1			Perched	
1015	3	26/06/2023	WR	Green	1			Singing	
1016	3	26/06/2023	WP	Green	1			Perched	
1017	3	26/06/2023	WR	Green	1			Singing	
1018	3	26/06/2023	GT	Green	1			Singing	
1019	3	26/06/2023	WR	Green	1			Singing	
1020	3	26/06/2023	BC	Green	1			Singing	
1021	3	26/06/2023	WR	Green	1			Singing	
1022	3	26/06/2023	WP	Green	40			Flying	Circling
1023	3	26/06/2023	Y.	Red	1			Singing	
1024	3	26/06/2023	WR	Green	1			Singing	
1025	3	26/06/2023	CD	Green	1			Perched	
1026	3	26/06/2023	B.	Green	1		Female	Foraging	Carrying food
1027	3	26/06/2023	SL	Amber	1			Perched	
1028	3	26/06/2023	HS	Amber	1			Perched	
1029	3	26/06/2023	WP	Green	1			Perched	Perched then flew W
1030	3	26/06/2023	GR	Amber	1			Calling	
1031	3	26/06/2023	SL	Amber	1			Perched	
1032	3	26/06/2023	WR	Green	1			Calling	
1033	3	26/06/2023	BT	Green	1			Singing	
1034	3	26/06/2023	JD	Green	2			Calling	
1035	3	26/06/2023	BF	Green	1			Calling	Calling in response to nearby BF
1036	3	26/06/2023	BF	Green	1			Calling	
1037	3	26/06/2023	LI	Amber	1			Perched	
1038	3	26/06/2023	B.	Green	1			Perched	
1039	3	26/06/2023	R.	Green	1			Singing	
1040	3	26/06/2023	B.	Green	1		Male		
1041	3	26/06/2023	LI	Amber	3			Flying	Into vegetation
1042	3	26/06/2023	WR	Green	1			Calling	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1043	3	26/06/2023	CH	Green	1			Calling	
1044	3	26/06/2023	WR	Green	1			Singing	
1045	3	26/06/2023	SL	Amber	1			Perched	
1046	3	26/06/2023	Y.	Red	1			Singing	
1047	3	26/06/2023	HS	Amber	1			On ground	
1048	3	26/06/2023	CH	Green	1			Singing	
1049	3	26/06/2023	S.	Amber	1			Singing in flight	
1050	3	26/06/2023	B.	Green	1		Male		
1051	3	26/06/2023	B.	Green	1			Calling	
1052	3	26/06/2023	HS	Amber	3			Perched	
1053	3	26/06/2023	HS	Amber	1			Perched	
1054	3	26/06/2023	WR	Green	1			Singing	
1055	3	26/06/2023	WR	Green	1			Singing	
1056	3	26/06/2023	HS	Amber	10			Perched	Flew from other hedgerow and landed
1057	3	26/06/2023	PW	Green	1			Perched	
1058	3	26/06/2023	WR	Green	1			Singing	
1059	3	26/06/2023	B.	Green	1		Male	Perched	
1060	3	26/06/2023	CD	Green	1			Perched	
1061	3	26/06/2023	WW	Amber	1			Singing	
1062	3	26/06/2023	WR	Green	1			Singing	
1063	3	26/06/2023	CC	Green	1			Singing	
1064	3	26/06/2023	MP	Green	2				
1065	3	26/06/2023	WP	Green	1			Perched	
1066	3	26/06/2023	MG	Green	1			On ground	
1067	3	26/06/2023	WR	Green	1			Singing	
1068	3	26/06/2023	B.	Green	1			Calling	
1069	3	26/06/2023	WR	Green	1			Singing	
1070	3	26/06/2023	WP	Green	4			Perched	
1071	3	26/06/2023	PW	Green	1	Juvenile		Foraging	
1072	3	26/06/2023	SG	Amber	15			Perched	
1073	3	26/06/2023	PW	Green	1	Adult		On ground	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1074	3	26/06/2023	LI	Amber	5			On ground	
1075	3	26/06/2023	B.	Green	1	Adult	Male	Foraging	
1076	3	26/06/2023	HS	Amber	6			Singing	
1077	3	26/06/2023	SG	Amber	1			Perched	
1078	3	26/06/2023	BT	Green	1			Flying	Into vegetation
1079	3	26/06/2023	WR	Green	1			Singing	
1080	3	26/06/2023	GO	Green	1			Singing	
1081	3	26/06/2023	GO	Green	2			Singing	
1082	3	26/06/2023	WR	Green	1			Singing	
1083	3	26/06/2023	WR	Green	1			Singing	
1084	3	26/06/2023	ST	Green	1			Singing	
1085	3	26/06/2023	BZ	Green	1			Perched	
1086	3	26/06/2023	WR	Green	1			Singing	
1087	3	26/06/2023	GC	Amber	1			Singing	
1088	3	26/06/2023	WP	Green	1			Calling	
1089	3	26/06/2023	BC	Green	1			Singing	
1090	3	26/06/2023	GC	Amber	1			Singing	
1091	3	26/06/2023	BC	Green	1			Singing	
1092	3	26/06/2023	WR	Green	1			Singing	
1093	3	26/06/2023	WR	Green	1			Singing	
1094	3	26/06/2023	GO	Green	1			Singing	
1095	3	26/06/2023	WR	Green	1			Singing	
1096	3	26/06/2023	WP	Green	1			Singing	
1097	3	26/06/2023	GO	Green	1			Singing	
1098	3	26/06/2023	GO	Green	3			Singing	
1099	3	26/06/2023	HS	Amber	4			Singing	
1100	3	26/06/2023	PW	Green	1			Perched	
1101	3	26/06/2023	HM	Amber	6			Flying	Circling
1102	3	26/06/2023	SL	Amber	6			Flying	Circling
1103	3	26/06/2023	WR	Green	1			Singing	
1104	3	26/06/2023	CH	Green	1			Calling	
1105	3	26/06/2023	SG	Amber	1			Perched	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1106	3	26/06/2023	CH	Green	1		Male	Singing	
1107	3	26/06/2023	WR	Green	1			Singing	
1108	3	26/06/2023	Y.	Red	1			Singing	
1109	3	26/06/2023	PH	NA	1			Calling	
1110	3	26/06/2023	ST	Green	1			Singing	
1111	3	26/06/2023	GC	Amber	1			Singing	
1112	3	26/06/2023	LI	Amber	1				
1113	3	26/06/2023	R.	Green	1			Calling	
1114	3	26/06/2023	HM	Amber	1			Flying	Circling
1115	3	26/06/2023	WP	Green	1			Perched	
1116	3	26/06/2023	Y.	Red	1			Singing	
1117	3	26/06/2023	CC	Green	1			Singing	
1118	3	26/06/2023	BC	Green	1			Singing	
1119	3	26/06/2023	BT	Green	1			Calling	
1120	3	26/06/2023	GC	Amber	1			Singing	
1121	3	26/06/2023	Y.	Red	1			Singing	
1122	3	26/06/2023	BC	Green	1			Singing	
1123	3	26/06/2023	BC	Green	1			Singing	
1124	3	26/06/2023	CH	Green	1			Calling	
1125	3	26/06/2023	BT	Green	1			Calling	
1126	3	26/06/2023	CH	Green	1	Adult	Male	Singing	Moved from wire into hedgerow
1127	3	26/06/2023	WP	Green	1			Perched	
1128	3	26/06/2023	BT	Green	1			Calling	
1129	3	26/06/2023	BT	Green	1			Singing	
1130	3	26/06/2023	CC	Green	1			Singing	
1131	3	26/06/2023	BC	Green	1			Singing	
1132	3	26/06/2023	R.	Green	1			Calling	
1133	3	26/06/2023	WP	Green	1			Singing	
1134	3	26/06/2023	BT	Green	1			Calling	
1135	3	26/06/2023	GC	Amber	1			Singing	
1136	3	26/06/2023	B.	Green	1			Singing	
1137	3	26/06/2023	Y.	Red	1			Calling	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1138	3	26/06/2023	WR	Green	1			Singing	
1139	3	26/06/2023	WR	Green	1			Singing	
1140	3	26/06/2023	R.	Green	1			Calling	
1141	3	26/06/2023	BT	Green	1			Singing	
1142	3	26/06/2023	GC	Amber	1			Singing	
1143	3	26/06/2023	BT	Green	1			Calling	
1144	3	26/06/2023	Y.	Red	1			Singing	
1145	3	26/06/2023	B.	Green	1	Adult	Female	Calling	
1146	3	26/06/2023	BC	Green	1			Singing	
1147	3	26/06/2023	BT	Green	1			Calling	
1148	3	26/06/2023	BT	Green	1			Singing	
1149	3	26/06/2023	B.	Green	1			Calling	
1150	3	27/06/2023	WR	Green	1			Singing	
1151	3	27/06/2023	CH	Green	1			Calling	
1152	3	27/06/2023	B.	Green	1			Calling	
1153	3	27/06/2023	B.	Green	1			Calling	
1154	3	27/06/2023	BT	Green	1			Calling	
1155	3	27/06/2023	BT	Green	1			Calling	
1156	3	27/06/2023	CH	Green	1			Singing	
1157	3	27/06/2023	B.	Green	1			Singing	
1158	3	27/06/2023	Y.	Red	1			Singing	
1159	3	27/06/2023	WR	Green	1			Singing	
1160	3	27/06/2023	R.	Green	1			Calling	
1161	3	27/06/2023	GO	Green	1			Calling	
1162	3	27/06/2023	B.	Green	1			Calling	
1163	3	27/06/2023	WR	Green	1			Singing	
1164	3	27/06/2023	WR	Green	1			Singing	Possibly same wren
1165	3	27/06/2023	HC	Green	1			Perched	
1166	3	27/06/2023	SG	Amber	1			Flying	Circling
1167	3	27/06/2023	GC	Amber	1			Singing	
1168	3	27/06/2023	WR	Green	1			Singing	
1169	3	27/06/2023	WR	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1170	3	27/06/2023	WR	Green	1			Singing	
1171	3	27/06/2023	BC	Green	1			Singing	
1172	3	27/06/2023	WR	Green	1			Singing	
1173	3	27/06/2023	GC	Amber	1			Singing	
1174	3	27/06/2023	CH	Green	1			Singing	
1175	3	27/06/2023	HM	Amber	1			Flying	Circling
1176	3	27/06/2023	GO	Green	1			Singing	
1177	3	27/06/2023	BC	Green	1			Singing	
1178	3	27/06/2023	R.	Green	1			Calling	
1179	3	27/06/2023	BC	Green	1			Singing	
1180	3	27/06/2023	WR	Green	1			Singing	
1181	3	27/06/2023	R.	Green	1			Calling	
1182	3	27/06/2023	CH	Green	2			Singing	
1183	3	27/06/2023	WP	Green	1			Singing	
1184	3	27/06/2023	Y.	Red	1			Singing	
1185	3	27/06/2023	WR	Green	1			Singing	
1186	3	27/06/2023	R.	Green	1			Calling	
1187	3	27/06/2023	BC	Green	1			Singing	
1188	3	27/06/2023	BC	Green	1			Singing	Different bird to nearby record
1189	3	27/06/2023	WR	Green	1			Singing	Different bird, singing simultaneously - territory defence
1190	3	27/06/2023	BT	Green	1			Calling	
1191	3	27/06/2023	WR	Green	1			Singing	
1192	3	27/06/2023	B.	Green	1			Calling	
1193	3	27/06/2023	WR	Green	1			Singing	Different bird, singing simultaneously - territory defence
1194	3	27/06/2023	WR	Green	1			Singing	
1195	3	27/06/2023	WR	Green	1			Singing	
1196	3	27/06/2023	CH	Green	1			Singing	
1197	3	27/06/2023	BT	Green	1			Singing	
1198	3	27/06/2023	CH	Green	1			Singing	
1199	3	27/06/2023	CH	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1200	3	27/06/2023	Y.	Red	1			Singing	
1201	3	27/06/2023	WR	Green	1			Singing	
1202	3	27/06/2023	WP	Green	1			Singing	
1203	3	27/06/2023	CH	Green	1			Singing	
1204	3	27/06/2023	BT	Green	1			Calling	
1205	3	27/06/2023	BC	Green	1			Singing	
1206	3	27/06/2023	SL	Amber	2			Flying	Circling
1207	3	27/06/2023	WR	Green	1			Singing	
1208	3	27/06/2023	WP	Green	2			Perched	
1209	3	27/06/2023	BC	Green	1			Singing	
1210	3	27/06/2023	B.	Green	1		Male		
1211	3	27/06/2023	Y.	Red	1			Singing	
1212	3	27/06/2023	BC	Green	1			Singing	
1213	3	27/06/2023	WR	Green	1			Singing	
1214	3	27/06/2023	B.	Green	1			Calling	
1215	3	27/06/2023	B.	Green	1			Calling	
1216	3	27/06/2023	BT	Green	2			Calling	
1217	3	27/06/2023	R.	Green	1			Calling	
1218	3	27/06/2023	BT	Green	1			Singing	
1219	3	27/06/2023	BC	Green	1			Singing	
1220	3	27/06/2023	CH	Green	1			Singing	
1221	3	27/06/2023	WR	Green	1			Singing	
1222	3	27/06/2023	BT	Green	1			Calling	
1223	3	27/06/2023	ST	Green	1			Singing	
1224	3	27/06/2023	WR	Green	1			Calling	
1225	3	27/06/2023	S.	Amber	1			Singing	
1226	3	27/06/2023	CH	Green	1			Singing	
1227	3	27/06/2023	CA	Amber	1			Perched	
1228	3	27/06/2023	CH	Green	1			Singing	
1229	3	27/06/2023	BC	Green	1			Singing	
1230	3	27/06/2023	WR	Green	1			Singing	
1231	3	27/06/2023	GC	Amber	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1232	3	27/06/2023	Y.	Red	1			Calling	
1233	3	27/06/2023	BC	Green	1			Singing	Possibly same bird
1234	3	27/06/2023	WR	Green	1			Singing	Different bird to nearby record
1235	3	27/06/2023	R.	Green	1			Calling	
1236	3	27/06/2023	WR	Green	1			Singing	Different bird to nearby record
1237	3	27/06/2023	WR	Green	1			Singing	
1238	3	27/06/2023	WW	Amber	1			Singing	
1239	3	27/06/2023	WR	Green	1			Singing	Possibly same bird
1240	3	27/06/2023	CH	Green	1			Singing	
1241	3	27/06/2023	WW	Amber	1			Singing	
1242	3	27/06/2023	CH	Green	1			Calling	
1243	3	27/06/2023	S.	Amber	1			Singing	
1244	3	27/06/2023	GO	Green	1			Singing	
1245	3	27/06/2023	SW	Green	2			Calling	
1246	3	27/06/2023	BC	Green	1			Singing	
1247	3	27/06/2023	R.	Green	1			Calling	
1248	3	27/06/2023	B.	Green	1			Calling	
1249	3	27/06/2023	CH	Green	1			Singing	
1250	3	27/06/2023	B.	Green	1			Calling	
1251	3	27/06/2023	Y.	Red	1			Calling	
1252	3	27/06/2023	Y.	Red	1			Singing	Perched on tower
1253	3	27/06/2023	B.	Green	1			Calling	
1254	3	27/06/2023	R.	Green	1			Calling	
1255	3	27/06/2023	B.	Green	1			Calling	
1256	3	27/06/2023	CH	Green	1			Singing	
1257	3	27/06/2023	GC	Amber	1			Singing	
1258	3	27/06/2023	R.	Green	1			Calling	Different bird to nearby record
1259	3	27/06/2023	WR	Green	1			Singing	
1260	3	27/06/2023	BT	Green	1			Singing	
1261	3	27/06/2023	LT	Green	1			Calling	
1262	3	27/06/2023	CH	Green	1			Calling	
1263	3	27/06/2023	CH	Green	2			Calling	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1264	3	27/06/2023	BT	Green	1			Calling	
1265	3	27/06/2023	WP	Green	1			Singing	
1266	3	27/06/2023	CH	Green	1			Singing	
1267	3	27/06/2023	GC	Amber	1			Singing	
1268	3	27/06/2023	GT	Green	1			Calling	
1269	3	27/06/2023	BC	Green	1			Singing	
1270	3	27/06/2023	BC	Green	1			Singing	
1271	3	27/06/2023	BT	Green	1			Calling	
1272	3	27/06/2023	CH	Green	1			Singing	
1273	3	27/06/2023	CH	Green	1			Calling	Different bird to nearby record
1274	3	27/06/2023	Y.	Red	1			Singing	Different bird to nearby record
1275	3	27/06/2023	WR	Green	1			Calling	
1276	3	27/06/2023	M.	Green	1	Juvenile		Perched	
1277	3	27/06/2023	WR	Green	1			Singing	
1278	3	27/06/2023	GT	Green	1			Calling	
1279	3	27/06/2023	WR	Green	1			Singing	
1280	3	27/06/2023	GC	Amber	1			Singing	
1281	3	27/06/2023	CH	Green	1			Calling	
1282	3	27/06/2023	CH	Green	1			Calling	
1283	3	27/06/2023	WR	Green	1			Singing	
1284	3	27/06/2023	CH	Green	1			Singing	
1285	3	27/06/2023	WR	Green	1			Singing	
1286	3	27/06/2023	B.	Green	1			Calling	
1287	3	27/06/2023	CH	Green	1			Singing	
1288	3	27/06/2023	WR	Green	1			Singing	
1289	3	27/06/2023	CH	Green	1			Singing	Different bird to nearby record
1290	3	27/06/2023	R.	Green	1			Calling	
1291	3	27/06/2023	WR	Green	1			Singing	
1292	3	27/06/2023	BC	Green	1			Singing	
1293	3	27/06/2023	Y.	Red	1			Singing	
1294	3	27/06/2023	Y.	Red	1			Singing	
1295	3	27/06/2023	WW	Amber	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1296	3	27/06/2023	Y.	Red	1			Singing	
1297	3	27/06/2023	BC	Green	1			Singing	
1298	3	27/06/2023	CH	Green	1			Calling	
1299	3	27/06/2023	Y.	Red	1			Singing	
1300	3	27/06/2023	BC	Green	1			Singing	
1301	3	27/06/2023	WR	Green	1			Singing	
1302	3	27/06/2023	WP	Green	1			Perched	
1303	3	27/06/2023	WR	Green	1			Singing	
1304	3	27/06/2023	B.	Green	1			Singing	
1305	3	27/06/2023	WR	Green	1			Singing	
1306	3	27/06/2023	BC	Green	1			Singing	
1307	3	27/06/2023	R.	Green	1			Calling	
1308	3	27/06/2023	BC	Green	2		Male & Female	Perched	
1309	3	27/06/2023	WR	Green	1			Singing	Possibly same bird
1310	3	27/06/2023	GO	Green	1			Singing	
1311	3	27/06/2023	B.	Green	1			Singing	
1312	3	27/06/2023	CH	Green	1			Singing	
1313	3	27/06/2023	B.	Green	1			Calling	
1314	3	27/06/2023	CH	Green	1			Calling	
1315	4	25/07/2023	R.	Green	1			Flying	Into vegetation
1316	4	25/07/2023	B.	Green	2		Male & Female	Foraging	
1317	4	25/07/2023	GO	Green	1			Perched	
1318	4	25/07/2023	R.	Green	1			Calling	
1319	4	25/07/2023	CH	Green	1			Singing	
1320	4	25/07/2023	GO	Green	2			Singing	
1321	4	25/07/2023	WR	Green	1			Singing	
1322	4	25/07/2023	LI	Amber	9			Perched	
1323	4	25/07/2023	SG	Amber	5			Perched	
1324	4	25/07/2023	SC	Green	1		Male	Calling	
1325	4	25/07/2023	MP	Green	1			Calling	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1326	4	25/07/2023	SC	Green	1		Female	Perched	
1327	4	25/07/2023	GO	Green	3			Flying	Circling
1328	4	25/07/2023	R.	Green	1			Calling	
1329	4	25/07/2023	B.	Green	1			Calling	
1330	4	25/07/2023	Y.	Red	1			Singing	
1331	4	25/07/2023	R.	Green	1			On ground	
1332	4	25/07/2023	WR	Green	1			Singing	
1333	4	25/07/2023	B.	Green	1			On ground	
1334	4	25/07/2023	R.	Green	1			Calling	
1335	4	25/07/2023	GT	Green	1			Perched	
1336	4	25/07/2023	BC	Green	1			Singing	
1337	4	25/07/2023	SL	Amber	2			Perched	
1338	4	25/07/2023	BC	Green	1			Singing	
1339	4	25/07/2023	Y.	Red	1			Singing	
1340	4	25/07/2023	SG	Amber	11	7 adult & 4 juvenile		Perched	
1341	4	25/07/2023	WR	Green	1			Singing	
1342	4	25/07/2023	HS	Amber	1		Male	Foraging	
1343	4	25/07/2023	R.	Green	1			Flying	Into vegetation
1344	4	25/07/2023	Y.	Red	1			Singing	On wire
1345	4	25/07/2023	HS	Amber	4			Singing	
1346	4	25/07/2023	SL	Amber	3			Perched	
1347	4	25/07/2023	HS	Amber	1			Perched	
1348	4	25/07/2023	Y.	Red	1			Singing	
1349	4	25/07/2023	HM	Amber	2			Perched	
1350	4	25/07/2023	SL	Amber	2			Perched	
1351	4	25/07/2023	SL	Amber	5			Flying	Circling
1352	4	25/07/2023	SL	Amber	4			Flying	Circling
1353	4	25/07/2023	Y.	Red	1			Flying	Into vegetation
1354	4	25/07/2023	D.	Green	1			Perched	
1355	4	25/07/2023	BT	Green	1			Calling	
1356	4	25/07/2023	Y.	Red	1			Singing	Singing to another bird

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1357	4	25/07/2023	GR	Amber	1			Calling	
1358	4	25/07/2023	GR	Amber	1			Calling	
1359	4	25/07/2023	Y.	Red	1			Singing	
1360	4	25/07/2023	GO	Green	2			Perched	
1361	4	25/07/2023	LI	Amber	5			Perched	
1362	4	25/07/2023	CH	Green	1			Calling	
1363	4	25/07/2023	Y.	Red	1			Perched	
1364	4	25/07/2023	GR	Amber	1			Perched	
1365	4	25/07/2023	SL	Amber	1			Perched	
1366	4	25/07/2023	SL	Amber	3			Flying	Circling
1367	4	25/07/2023	B.	Green	1		Female	Foraging	Carrying food
1368	4	25/07/2023	HS	Amber	1			Singing	
1369	4	25/07/2023	R.	Green	1			Singing	
1370	4	25/07/2023	HS	Amber	1	Adult	Male	Perched	
1371	4	25/07/2023	RO	Green	2			Perched	
1372	4	25/07/2023	GC	Amber	1			Calling	
1373	4	25/07/2023	HS	Amber	4			Singing	In scrub, most likely more than 4
1374	4	25/07/2023	R.	Green	1			Perched	
1375	4	25/07/2023	GO	Green	1			Singing	
1376	4	25/07/2023	GR	Amber	1			Singing	
1377	4	25/07/2023	Y.	Red	1			Singing	
1378	4	25/07/2023	Y.	Red	1			Perched	
1379	4	25/07/2023	B.	Green	1			Perched	
1380	4	25/07/2023	WR	Green	1			Singing	
1381	4	25/07/2023	B.	Green	1		Male	Foraging	
1382	4	25/07/2023	WP	Green	1			Singing	
1383	4	25/07/2023	WR	Green	1			Singing	
1384	4	25/07/2023	GO	Green	1			Singing	
1385	4	25/07/2023	GO	Green	3			Perched	
1386	4	25/07/2023	WW	Amber	1			Singing	
1387	4	25/07/2023	GC	Amber	1			Calling	
1388	4	25/07/2023	WR	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1389	4	25/07/2023	R.	Green	1			Calling	
1390	4	25/07/2023	CH	Green	1			Singing	
1391	4	25/07/2023	GO	Green	1			Calling	
1392	4	25/07/2023	WR	Green	1			Singing	
1393	4	25/07/2023	B.	Green	1			Calling	
1394	4	25/07/2023	CH	Green	1			Calling	
1395	4	25/07/2023	R.	Green	1			Calling	
1396	4	25/07/2023	GO	Green	3			Singing	
1397	4	25/07/2023	CT	Green	3			Foraging	
1398	4	25/07/2023	BT	Green	1			Calling	
1399	4	25/07/2023	GO	Green	1			Singing	
1400	4	25/07/2023	RO	Green	14			Perched	
1401	4	25/07/2023	HS	Amber	1			Calling	
1402	4	25/07/2023	GO	Green	2			Perched	
1403	4	25/07/2023	WR	Green	1			Singing	
1404	4	25/07/2023	SG	Amber	45	Adult & juvenile		Perched	
1405	4	25/07/2023	CH	Green	1			Singing	
1406	4	25/07/2023	GO	Green	1			Singing	
1407	4	25/07/2023	WR	Green	1			Singing	
1408	4	25/07/2023	GR	Amber	1			Calling	
1409	4	25/07/2023	LI	Amber	1			Perched	
1410	4	25/07/2023	B.	Green	1			Calling	
1411	4	25/07/2023	Y.	Red	1			Perched	
1412	4	25/07/2023	CH	Green	1			Calling	
1413	4	25/07/2023	LI	Amber	3			Perched	
1414	4	25/07/2023	GR	Amber	1			Calling	
1415	4	25/07/2023	BT	Green	2			Calling	
1416	4	25/07/2023	CH	Green	1			Calling	
1417	4	25/07/2023	B.	Green	1			Calling	
1418	4	25/07/2023	WR	Green	1			Calling	
1419	4	25/07/2023	BC	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1420	4	25/07/2023	BT	Green	1			Singing	
1421	4	25/07/2023	CH	Green	2			Calling	Both Calling
1422	4	25/07/2023	BT	Green	1			Calling	
1423	4	25/07/2023	MG	Green	1			Calling	
1424	4	25/07/2023	Y.	Red	1		Male	Perched	
1425	4	25/07/2023	BZ	Green	1			Calling	Perched in tree
1426	4	25/07/2023	WR	Green	1			Singing	
1427	4	25/07/2023	BC	Green	1			Singing	
1428	4	25/07/2023	MP	Green	1			Foraging	
1429	4	26/07/2023	WR	Green	1			Singing	
1430	4	26/07/2023	WR	Green	1			Singing	
1431	4	26/07/2023	WR	Green	1			Singing	Different bird to nearby record
1432	4	26/07/2023	R.	Green	1			Calling	
1433	4	26/07/2023	Y.	Red	1			Singing	
1434	4	26/07/2023	WP	Green	1			Calling	
1435	4	26/07/2023	R.	Green	1			Calling	
1436	4	26/07/2023	R.	Green	1			Calling	
1437	4	26/07/2023	R.	Green	1			Calling	
1438	4	26/07/2023	WR	Green	1			Singing	
1439	4	26/07/2023	CH	Green	1			Singing	
1440	4	26/07/2023	Y.	Red	1			Singing	Different bird, singing simultaneously - territory defence
1441	4	26/07/2023	Y.	Red	1			Singing	Different bird, singing simultaneously - territory defence
1442	4	26/07/2023	WR	Green	1			Singing	
1443	4	26/07/2023	CH	Green	1			Singing	
1444	4	26/07/2023	WP	Green	1			Calling	
1445	4	26/07/2023	BT	Green	1			Singing	
1446	4	26/07/2023	Y.	Red	1			Singing	
1447	4	26/07/2023	GC	Amber	1			Singing	
1448	4	26/07/2023	GC	Amber	1			Singing	
1449	4	26/07/2023	WR	Green	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1450	4	26/07/2023	CH	Green	1			Calling	
1451	4	26/07/2023	CH	Green	1			Calling	
1452	4	26/07/2023	WR	Green	1			Singing	
1453	4	26/07/2023	CC	Green	1			Singing	
1454	4	26/07/2023	BT	Green	1			Calling	
1455	4	26/07/2023	WR	Green	1			Singing	
1456	4	26/07/2023	R.	Green	1			Calling	
1457	4	26/07/2023	SH	Green	3	Juvenile		Calling	Potential nest. Three birds Callinging, all seen flying in and out of Treeline
1458	4	26/07/2023	B.	Green	1			Calling	
1459	4	26/07/2023	Y.	Red	1			Singing	
1460	4	26/07/2023	WR	Green	1			Singing	
1461	4	26/07/2023	Y.	Red	1			Perched	
1462	4	26/07/2023	CT	Green	1			Singing	
1463	4	26/07/2023	Y.	Red	2			Perched	Different bird to nearby records (2)
1464	4	26/07/2023	CH	Green	1			Calling	
1465	4	26/07/2023	WR	Green	1			Singing	
1466	4	26/07/2023	BT	Green	1			Singing	
1467	4	26/07/2023	WR	Green	1			Singing	
1468	4	26/07/2023	BT	Green	1			Calling	
1469	4	26/07/2023	GT	Green	1			Calling	
1470	4	26/07/2023	BC	Green	1			Singing	
1471	4	26/07/2023	WR	Green	1			Singing	
1472	4	26/07/2023	Y.	Red	1			Singing	
1473	4	26/07/2023	WR	Green	1			Singing	
1474	4	26/07/2023	R.	Green	1			Calling	
1475	4	26/07/2023	WP	Green	1			Calling	
1476	4	26/07/2023	Y.	Red	1			Singing	
1477	4	26/07/2023	R.	Green	1			Calling	
1478	4	26/07/2023	Y.	Red	1			Singing	
1479	4	26/07/2023	WR	Green	1			Singing	
1480	4	26/07/2023	Y.	Red	1			Singing	

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1481	4	26/07/2023	Y.	Red	1			Singing	
1482	4	26/07/2023	R.	Green	1			Calling	
1483	4	26/07/2023	WR	Green	1			Singing	
1484	4	26/07/2023	B.	Green	1			Calling	
1485	4	26/07/2023	R.	Green	1			Calling	
1486	4	26/07/2023	R.	Green	1			Calling	
1487	4	26/07/2023	MG	Green	1			Calling	
1488	4	26/07/2023	GT	Green	1			Calling	
1489	4	26/07/2023	WW	Amber	1			Singing	
1490	4	26/07/2023	Y.	Red	1			Singing	
1491	4	26/07/2023	B.	Green	1			Calling	
1492	4	26/07/2023	BT	Green	2			Singing	
1493	4	26/07/2023	WR	Green	1			Singing	
1494	4	26/07/2023	WR	Green	1			Singing	
1495	4	26/07/2023	B.	Green	1			Calling	
1496	4	26/07/2023	PH	NA	3	1 Adult & 2 juvenile		On ground	
1497	4	26/07/2023	WR	Green	1			Singing	
1498	3	26/06/2023	SL	Amber	3			Flying	West
1499	3	26/06/2023	SL	Amber	3			Flying	Back and forth
1500	3	26/06/2023	HM	Amber	1			Flying	East
1501	3	26/06/2023	SL	Amber	1			Flying	Northwest
1502	3	26/06/2023	SL	Amber	3			Flying	Northeast
1503	3	26/06/2023	WP	Green	30			Flying	West
1504	3	26/06/2023	JD	Green	2			Flying	West
1505	3	26/06/2023	WP	Green	5			Flying	North
1506	3	26/06/2023	MG	Green	1			Flying	South
1507	3	26/06/2023	HM	Amber	1			Flying	West
1508	3	26/06/2023	SL	Amber	1			Flying	West
1509	3	26/06/2023	SL	Amber	1			Flying	Southwest
1510	3	26/06/2023	B.	Green	1			Flying	Southest
1511	3	26/06/2023	SL	Amber	1			Flying	Southwest

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1512	3	26/06/2023	SL	Amber	1			Flying	East
1513	3	26/06/2023	SL	Amber	2			Flying	Northeast
1514	3	26/06/2023	HM	Amber	3			Flying	East
1515	3	26/06/2023	HM	Amber	1			Flying	Southwest
1516	3	26/06/2023	SL	Amber	2			Flying	Northwest
1517	3	26/06/2023	PW	Green	1			Flying	North
1518	3	26/06/2023	SL	Amber	1			Flying	North
1519	3	26/06/2023	SL	Amber	1			Flying	South
1520	3	26/06/2023	SL	Amber	1			Flying	Northeast
1521	3	26/06/2023	JD	Green	2			Flying	Southeast
1522	3	26/06/2023	SL	Amber	2			Flying	East
1523	3	26/06/2023	SL	Amber	3			Flying	Southeast
1524	3	26/06/2023	RO	Green	2			Flying	Northeast
1525	3	26/06/2023	SL	Amber	1			Flying	Southwest
1526	3	26/06/2023	GO	Green	2	Adult		Flying	Northeast
1527	3	26/06/2023	B.	Green	1		Male	Flying	East
1528	3	26/06/2023	RO	Green	1			Flying	Southest
1529	3	27/06/2023	B.	Green	1		Female	Flying	East
1530	3	27/06/2023	RO	Green	2			Flying	South
1531	3	27/06/2023	B.	Green	1		Male	Flying	South
1532	3	27/06/2023	B.	Green	1		Male	Flying	North. Carrying food.
1533	3	27/06/2023	SL	Amber	1			Flying	West
1534	3	27/06/2023	HM	Amber	4			Flying	Northwest
1535	3	27/06/2023	R.	Green	1			Flying	South. Flew into hedgerow
1536	3	27/06/2023	B.	Green	1		Male	Flying	North
1537	3	27/06/2023	GO	Green	1			Flying	Northeast
1538	3	27/06/2023	RO	Green	2			Flying	Southwest
1539	3	27/06/2023	WP	Green	2			Flying	Southwest
1540	3	27/06/2023	SL	Amber	1			Flying	Southeast
1541	3	27/06/2023	GO	Green	1			Flying	South
1542	3	27/06/2023	SG	Amber	3			Flying	Southeast
1543	3	27/06/2023	SL	Amber	2			Flying	North and south

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1544	3	27/06/2023	SL	Amber	1			Flying	North
1545	3	27/06/2023	SL	Amber	1			Flying	South
1546	4	25/07/2023	HM	Amber	3			Flying	East
1547	4	25/07/2023	SL	Amber	1			Flying	West
1548	4	25/07/2023	GO	Green	10			Flying	Northwest
1549	4	25/07/2023	SG	Amber	30			Flying	Northeast
1550	4	25/07/2023	MP	Red	1			Flying	Southwest
1551	4	25/07/2023	HG	Amber	3			Flying	Southeast
1552	4	25/07/2023	HS	Amber	1			Flying	Northwest
1553	4	25/07/2023	HM	Amber	3			Flying	Northwest
1554	4	25/07/2023	SL	Amber	1			Flying	Southeast
1555	4	25/07/2023	CD	Green	1			Flying	South
1556	4	25/07/2023	SL	Amber	1			Flying	Northwest
1557	4	25/07/2023	HM	Amber	3			Flying	East
1558	4	25/07/2023	SL	Amber	3			Flying	South
1559	4	25/07/2023	PW	Green	1			Flying	Southwest
1560	4	25/07/2023	SL	Amber	1			Flying	North. Flew into scrub and landed
1561	4	25/07/2023	SL	Amber	1			Flying	East
1562	4	25/07/2023	SL	Amber	2			Flying	Southeast
1563	4	25/07/2023	GO	Green	1			Flying	West
1564	4	25/07/2023	WP	Green	1			Flying	Southwest
1565	4	25/07/2023	CA	Amber	1			Flying	North
1566	4	25/07/2023	BZ	Green	3			Flying	North over woodland, one landed in tree to the north, two flew back south into wooded area. Possible nests in vicinity, alarm sounds from all three. Flew from road and landed in different trees
1567	4	25/07/2023	SL	Amber	1			Flying	Southest
1568	4	25/07/2023	HS	Amber	1			Flying	South
1569	4	25/07/2023	SL	Amber	1			Flying	West
1570	4	25/07/2023	B.	Green	1			Flying	Northwest. Flew from field into hedgerow.
1571	4	25/07/2023	GO	Green	2			Flying	West

ID	Survey No.	Date	BTO	BOCCI	No.	Age	Sex	Activity	Comment
1572	4	26/07/2023	GO	Green	2			Flying	Northwest
1573	4	26/07/2023	BH	Amber	5			Flying	Southwest
1574	4	26/07/2023	RO	Green	3			Flying	South
1575	4	26/07/2023	HM	Amber	2			Flying	Northwest
1576	4	26/07/2023	GO	Green	2			Flying	Northwest
1577	4	26/07/2023	SL	Amber	1			Flying	North
1578	4	26/07/2023	SL	Amber	1			Flying	South
1579	4	26/07/2023	WP	Green	2			Flying	Southeast
1580	4	26/07/2023	SL	Amber	1			Flying	East
1581	4	26/07/2023	GO	Green	2			Flying	South

A.2 Intertidal Survey Data 2023

Table 1: BTO Species Codes.

BTO Code	Common name	Scientific name
H.	Grey heron	*Ardea cinerea*
RP	Ringed plover	*Charadrius hiaticula*
GR	Greenfinch	*Chloris Chloris*
RH	Red-throated diver	*Gavia stellata*
OC	Oystercatcher	*Haematopus ostralegus*
SL	Swallow	*Hirundo rustica*
HG	Herring gull	*Larus argentatus*
LI	Linnet	*Linaria cannabina*
RM	Red-breasted merganser	*Mergus serrator*
GX	Northern gannet	*Morus bassana*
CA	Cormorant	*Phalacrocorax carbo*
TE	Sandwich tern	*Thalasseus sandvicensis*
RK	Redshank	*Tringa totanus*
S.	Skylark	*Alauda arvensis*
MP	Meadow pipit	*Anthus pratensis*
ET	Little egret	*Egretta garzetta*
CM	Common gull	*Larus canus*
SU	Shelduck	*Tadorna tadorna*
CU	Curlew	*Numenius arquata*
AF	Little tern	*Sterna albifrons*
CN	Common tern	*Sterna hirundo*
BH	Black-headed gull	*Chroicocephalus ridibundus*
RS	Roseate tern	*Sterna dougallii*
KI	Kittiwake	*Rissa tridactyla*

Table 2: 2023 Intertidal Bird Survey - Weather Data.

		Precipitation		Cloud	Wind conditions		Sea conditions			Solar/tidal conditions				Disturbances
Date	Time	Rain, snow, hail or none	Fog / mist	Cover	Strength	Direction	Sea state	Swell height	Glare	High Tide	Low Tide	Sunrise	Sunset	Human activity
24/04/2023	11:46	Rain – 1	0	7	4	NE	1	0.1	0	**14:46**	08:28 / 20:50	06:05	20:43	Walkers – 4 Dogs - 2
	12:46	0	0	8	3	NE	3	0.5	0					
	13:46	Rain – 1	0	7	3	NE	3	0.6	0					
	14:46	Rain – 1	0	6	3	NE	2	0.3	0					
	15:46	0	0	7	3	NE	1	0.1	0					
	16:46	0	0	5	3	NE	1	0.1	0					
17/05/2023	13:25	0	0	3	3	SW	1	0.5	Right - 1	10:19 / 22:55	03:55 / **16:25**	05:20	21:24	Walkers – 3 Dogs – 1 Horseback riders - 2 Bait digger - 1
	14:25	0	0	2	3	SSW	1	0.5	0					
	15:25	0	0	3	3	SSW	1	0.5	0					
	16:25	0	0	3	2	SSW	1	0.5	0					
	17:25	0	0	3	2	SSW	1	0.5	0					
	18:25	0	0	4	2	SSW	1	0.5	0					
21/06/2023	11:26	0	0	3	2	SW	1	0.1	0	**14:26**	08:00 / 20:11	04:57	21:52	Walkers – 9 Dogs – 3 Swimmers - 1 Angler – 1 Powered boat - 1
	12:26	0	0	3	3	WSW	1	0.1	0					
	13:26	0	0	4	3	SW	2	0.5	0					
	14:26	0	0	5	4	SW	2	0.5	0					
	15:26	0	0	4	3	SW	2	0.5	0					
	16:26	0	0	4	3	SW	2	0.5	0					
20/07/2023	10:44	1	0	7	2	NW	1	0.1	0	**13:44**	07:30 / 19:42	05:22	21:36	Walkers – 6 Dogs – 1 Swimmers - 7 Powered boat - 1
	11:44	2	0	8	2	NW	1	0.1	1					
	12:44	0	0	7	2	NW	1	0.1	1					
	13:44	0	0	5	2	NW	1	0.1	0					
	14:44	0	0	6	2	NW	1	0.1	1					
	15:44	0	0	5	2	NW	1	0.1	0					
10/08/2023	10:15	0	0	3	4	SE	2	0.3	0	06:57 / 19:40	00:29 / **13:15**	05:55	21:00	Walkers – 7 Dogs – 1 Swimmers - 1
	11:15	0	0	1	4	SE	2	0.3	0					
	12:15	0	0	2	5	SE	2	0.4	0					

		Precipitation		Cloud	Wind conditions		Sea conditions			Solar/tidal conditions				Disturbances
Date	Time	Rain, snow, hail or none	Fog / mist	Cover	Strength	Direction	Sea state	Swell height	Glare	High Tide	Low Tide	Sunrise	Sunset	Human activity
	13:15	0	0	2	5	SSE	2	0.5	0					
	14:15	0	0	3	5	SSE	2	0.5	0					
	15:15	0	0	3	5	SSE	3	0.7	0					

Table 3: 2023 Intertidal Bird Survey Data.

ID	Survey No.	Date	BTO Code	BOCCI	No.	Activity	Direction / location	Comments
1	1	24/04/2023	CA	Amber	3	Hunting	In sea	N/A
2	1	24/04/2023	GR	Amber	1	Flying	Hedgerow	N/A
3	1	24/04/2023	HG	Amber	4	Flying	N	N/A
4	1	24/04/2023	LI	Amber	4	Perched	Hedgerow	N/A
5	1	24/04/2023	GX	Amber	3	Feeding	In sea	Plunge feeding
6	1	24/04/2023	RM	Amber	16	Rafting	In sea	N/A
7	1	24/04/2023	RH	Amber	2	Hunting	In sea	N/A
8	1	24/04/2023	RP	Amber	5	Foraging	On shore	N/A
9	1	24/04/2023	TE	Amber	5	Flying	N	N/A
10	1	24/04/2023	SL	Amber	1	Flying	SE	N/A
11	1	24/04/2023	B.	Green	1	Perched	In tree	N/A
12	1	24/04/2023	B.	Green	1	Perched	In tree	N/A
13	1	24/04/2023	B.	Green	2	Perched	Hedgerow	N/A
14	1	24/04/2023	B.	Green	1	Perched	Hedgerow	N/A
15	1	24/04/2023	GB	Green	2	Flying	SSW	N/A
16	1	24/04/2023	H.	Green	1	Floating	In sea	N/A
17	1	24/04/2023	H.	Green	1	Flying	NE	N/A
18	1	24/04/2023	ST	Green	1	Perched	Hedgerow	N/A
19	1	24/04/2023	SC	Green	2	Perched	Hedgerow	N/A
20	1	24/04/2023	WM	Green	11	Foraging	Intertidal	N/A
21	1	24/04/2023	WP	Green	1	Flying	NE	N/A
22	1	24/04/2023	WR	Green	1	Perched	Hedgerow	N/A
23	1	24/04/2023	Grey seal	N/A	1	Swimming	In sea	Outside 300 m buffer
24	1	24/04/2023	PH	N/A	1	Foraging	In field	N/A
25	1	24/04/2023	OC	Red	20	Foraging	Intertidal	N/A
26	1	24/04/2023	RK	Red	2	Foraging	Intertidal	N/A
27	2	17/05/2023	CM	Amber	2	Foraging	Intertidal	N/A
28	2	17/05/2023	CA	Amber	3	Flying	SSW	N/A
29	2	17/05/2023	CA	Amber	5	Hunting	In sea	Outside 300 m buffer

30	2	17/05/2023	HG	Amber	1	Loafing	In sea	N/A
31	2	17/05/2023	HG	Amber	13	Loafing	Intertidal	N/A
32	2	17/05/2023	LI	Amber	5	Perched	Hedgerow	N/A
33	2	17/05/2023	GX	Amber	1	Searching	Over sea	Observed hunting outside buffer to the East
34	2	17/05/2023	RP	Amber	1	Foraging	Intertidal	Not seen to bring anything back to a nest etc
35	2	17/05/2023	SU	Amber	1	Flying	SSW	N/A
36	2	17/05/2023	S.	Amber	1	Singing	Hedgerow	N/A
37	2	17/05/2023	SL	Amber	2	Flying	NNW	Over and around field
38	2	17/05/2023	SL	Amber	2	Flying	NNE	Around beach
39	2	17/05/2023	B.	Green	1	Calling	Hedgerow	Male
40	2	17/05/2023	B.	Green	1	Singing	Hedgerow	Male
41	2	17/05/2023	GB	Green	1	Flying	NNE	N/A
42	2	17/05/2023	GB	Green	3	Loafing	Intertidal	N/A
43	2	17/05/2023	HC	Green	1	Feeding	Intertidal	Dropping shells to crack
44	2	17/05/2023	HC	Green	1	Foraging	Intertidal	Dropping shells to crack
45	2	17/05/2023	ET	Green	1	Foraging	Intertidal	N/A
46	2	17/05/2023	MP	Red	1	Foraging	Intertidal	Foraging in rocks along shore, turning seaweed
47	2	17/05/2023	OC	Red	107	Foraging	Intertidal	N/A
48	3	21/06/2023	CN	Amber	1	Calling	Flying NNE	Flying and calling
49	3	21/06/2023	CA	Amber	1	Hunting	In sea	N/A
50	3	21/06/2023	CA	Amber	1	Flying	SSE	N/A
51	3	21/06/2023	HG	Amber	1	Flying	SSW	N/A
52	3	21/06/2023	HG	Amber	8	Loafing	In sea	Loafing after following trawler. Trawler went East
53	3	21/06/2023	HG	Amber	24	Flying	NE	N/A
54	3	21/06/2023	LI	Amber	2	Flying	WSW	N/A
55	3	21/06/2023	AF	Amber	1	Calling	Flying SSW	Flying SSW and calling
56	3	21/06/2023	RP	Amber	2	Calling	Flying NNE	Flying and calling - disturbed by surveyor
57	3	21/06/2023	B.	Green	1	Calling	Hedgerow	Male
58	3	21/06/2023	BZ	Green	1	Calling	Flying N	Calling and flying over Northern Fields - Peak 2
59	3	21/06/2023	BZ	Green	1	Calling	Flying S	Calling and flying over Northern Fields - Peak 2
60	3	21/06/2023	GO	Green	3	Calling	Hedgerow	N/A
61	3	21/06/2023	GB	Green	1	Foraging	On shore	N/A

62	3	21/06/2023	GB	Green	2	Loafing	In sea	Loafing after following trawler. Trawler went East
63	3	21/06/2023	HC	Green	1	Flying	SW	N/A
64	3	21/06/2023	PW	Green	1	Flying	NNE	N/A
65	3	21/06/2023	SC	Green	1	Perched	Hedgerow	Male
66	3	21/06/2023	WP	Green	1	Perched	In tree	N/A
67	3	21/06/2023	WR	Green	1	Singing	Hedgerow	N/A
68	3	21/06/2023	CU	Red	4	Calling	Flying SSE	Flying and calling
69	3	21/06/2023	MP	Red	1	Singing	Flying NNW	Flying and singing
70	3	21/06/2023	MP	Red	1	Foraging	On shore	Foraging in rocks along shore, turning seaweed
71	3	21/06/2023	OC	Red	3	Calling	Flying SSW	Flying and calling
72	4	20/07/2023	BH	Amber	1	Loafing	Intertidal	N/A
73	4	20/07/2023	GV	Red	4	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
74	4	20/07/2023	CN	Amber	4	Feeding	SSW	Plunge feeding
75	4	20/07/2023	CN	Amber	45	Roosting	Intertidal	Outside 300m buffer Part of the large flock of >300: assoc 2
76	4	20/07/2023	HG	Amber	1	Loafing	In sea	N/A
77	4	20/07/2023	HG	Amber	2	Flying	SSW	N/A
78	4	20/07/2023	LI	Amber	2	Flying	ENE	Flying and calling
79	4	20/07/2023	RM	Amber	6	Roosting	In sea	Females or juveniles either rafting or roosting
80	4	20/07/2023	RM	Amber	43	Roosting	In sea	Outside 300 m buffer Females and/or juveniles
81	4	20/07/2023	RP	Amber	4	Foraging	Intertidal	N/A
82	4	20/07/2023	RS	Amber	1	Feeding	SSW	Plunge feeding
83	4	20/07/2023	RS	Amber	5	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
84	4	20/07/2023	SM	Amber	5	Flying	Circling	Outside 300m buffer Possible nest. No entry observed
85	4	20/07/2023	TE	Amber	5	Feeding	SSW	Plunge feeding
86	4	20/07/2023	TE	Amber	50	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
87	4	20/07/2023	SL	Amber	3	Flying	N	N/A
88	4	20/07/2023	B.	Green	1	Calling	Hedgerow	N/A

89	4	20/07/2023	BZ	Green	1	Calling	N	Calling and flying
90	4	20/07/2023	GO	Green	1	Calling	Hedgerow	N/A
91	4	20/07/2023	GB	Green	5	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
92	4	20/07/2023	MG	Green	1	Perched	In tree	N/A
93	4	20/07/2023	WM	Green	56	Flying	SSW	Large flock flying S from Dunany point - assoc 1
94	4	20/07/2023	WM	Green	50	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
95	4	20/07/2023	WR	Green	1	Singing	Hedgerow	N/A
96	4	20/07/2023	CU	Red	1	Calling	SSW	Flying and calling
97	4	20/07/2023	CU	Red	50	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
98	4	20/07/2023	OC	Red	18	Flying	NNE	N/A
99	4	20/07/2023	OC	Red	103	Flying	SSW	Large flock flying S from Dunany point - assoc 1
100	4	20/07/2023	OC	Red	100	Roosting	Intertidal	Outside 300 m buffer Part of the large flock of >300: assoc 2
101	5	10/08/2023	BH	Amber	4	Foraging	Intertidal	N/A
102	5	10/08/2023	BH	Amber	2	Foraging	Intertidal	N/A
103	5	10/08/2023	BH	Amber	2	Foraging	Intertidal	N/A
104	5	10/08/2023	CM	Amber	1	Foraging	Intertidal	N/A
105	5	10/08/2023	CM	Amber	1	Foraging	Intertidal	N/A
106	5	10/08/2023	CN	Amber	1	Hunting	In sea	Outside 300 m buffer Plunge feeding. ~2km East at sea
107	5	10/08/2023	HG	Amber	3	Foraging	Intertidal	N/A
108	5	10/08/2023	HG	Amber	2	Loafing	Intertidal	N/A
109	5	10/08/2023	HG	Amber	1	Roosting	Intertidal	N/A
110	5	10/08/2023	HG	Amber	1	Loafing	In sea	N/A
111	5	10/08/2023	HG	Amber	3	Foraging	Intertidal	N/A
112	5	10/08/2023	HG	Amber	1	Roosting	Intertidal	N/A
113	5	10/08/2023	HG	Amber	6	Foraging	Intertidal	N/A
114	5	10/08/2023	GX	Amber	1	Hunting	In sea	Outside 300 m buffer Plunge feeding. ~2km East at sea
115	5	10/08/2023	SL	Amber	2	Calling	NE	Flying and calling

116	5	10/08/2023	GB	Green	1	Roosting	Intertidal	N/A
117	5	10/08/2023	GB	Green	2	Foraging	Intertidal	N/A
118	5	10/08/2023	HC	Green	1	Flying	N	N/A
119	5	10/08/2023	HC	Green	1	Foraging	Intertidal	N/A
120	5	10/08/2023	HC	Green	1	Foraging	Intertidal	N/A
121	5	10/08/2023	ET	Green	1	Foraging	Intertidal	N/A
122	5	10/08/2023	SC	Green	3	Perched	Hedgerow	Juveniles
123	5	10/08/2023	WM	Green	1	Foraging	Intertidal	Calling
124	5	10/08/2023	CU	Red	2	Foraging	Intertidal	Calling while foraging
125	5	10/08/2023	CU	Red	1	Foraging	Intertidal	Calling while foraging
126	5	10/08/2023	CU	Red	1	Foraging	Intertidal	N/A
127	5	10/08/2023	KI	Red	1	Roosting	Intertidal	N/A
128	5	10/08/2023	OC	Red	8	Calling	NNE	Calling and flying
129	5	10/08/2023	OC	Red	1	Foraging	Intertidal	N/A
130	5	10/08/2023	OC	Red	36	Foraging	Intertidal	N/A