HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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Wylfa Newydd

Horizon Nuclear Power

Chough Baseline Report

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Author:	Jonathan Jackson
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Jacobs U.K. Limited

Kenneth Dibben House
Enterprise Road, Southampton Science Park
Chilworth, Southampton SO16 7NS
United Kingdom
T +44 (0)23 8011 1250
F +44 (0)23 8011 1251
www.jacobs.com

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Executive Summary

Horizon Nuclear Power Wylfa Ltd. (Horizon) is currently planning to develop a new Nuclear Power Station on the north coast of Anglesey to the east of the town of Cemaes. Proposed works will involve the development of a large area of land currently being used for agriculture called the Wylfa Newydd Development Area and Associated Development sites, including highways improvements, park and ride facilities, a logistics centre and compensation for effects on Sites of Special Scientific Interest (SSSI). This includes habitats such as improved grassland, traditional field boundaries, streams, ditches, marshland and scrub.

This report focusses on red-billed chough (*Pyrrhocorax pyrrhocorax*) in relation to the Wylfa Newydd Development. This species is afforded protection through its inclusion on Schedule 1 of the Wildlife and Countryside Act 1981 and Annex I of the Birds Directive. Chough is also listed as a priority species in accordance with Section 7 of the Environment (Wales) Act 2016, as well as being listed on the Anglesey Local Biodiversity Action Plan. The species is closely associated with short, usually coastal grassland and restricted to the west of the UK. Wales supports over 75% of the estimated UK population.

The purpose of this report is to bring together all available data from records held by conservation organisations, and survey data in order to establish a baseline on which future impact assessments for the Project can be formed. This includes establishing a likelihood of functional links with sites designated for the chough population they support currently, and sites that might be designated in the future. This also includes a review of the likely pathways to effect that any development might have e.g. habitat loss or disturbance, and how they might interact with the species throughout the breeding and non-breeding seasons.

The conclusions from this report are based on Anglesey-wide data searches, reviews of the SPA network, and survey data gathered between November 2009 and July 2017. These surveys comprised 281 walked transects; and 64 vantage point surveys, completed during 52 individual months. These data show that in population terms, the Wylfa Newydd Development Area regularly supports up to two pairs of chough in the breeding period, and their offspring prior to dispersal. Data from the non-breeding season show that the Wylfa Newydd Development Area generally supports a maximum of six birds.

The report used the information and data gathered above to establish whether there were any functional links between the Wylfa Newydd Development Area and Associated Development sites, and Special Protection Areas (SPAs) designated for chough. Three possible functional links were identified, but none were significant. The possible functional links identified and associated assessments of significance are described below:

1) Breeding adult chough from the Glannau Ynys Gybi / Holy Island Coast SPA potentially using the Wylfa Newydd Development Area and Associated Development sites during the breeding season.
    - There was no evidence in the survey data to suggest that breeding adult chough from the Glannau Ynys Gybi / Holy Island Coast SPA forage in the Wylfa Newydd Development Area during the breeding season. This is also supported by evidence from several studies which suggest that the foraging range during the breeding season is considerably smaller than the distance separating the Wylfa Newydd Development Area and Associated Development sites, and would typically be less than 1 km from nests. It is therefore considered that this does not form a functional link.
2) The conservation objectives of Glannau Ynys Gybi / Holy Island Coast SPA being reliant on chough recruitment from within the Wylfa Newydd Development Area.
    - Studies reviewed in this report show that the Wylfa Newydd Development Area is within the recruitment range of the Glannau Ynys Gybi / Holy Island Coast SPA (and the Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands and Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island), and a functional link therefore exists. However, the proportion of the populations that this level of immigration would represent is not significant. This is also considered to be the case outlined by Thorpe & Young (2009). The functional linkage is therefore not considered to be significant.
3) Chough from the Glannau Ynys Gybi / Holy Island Coast SPA potentially using the Wylfa Newydd Development Area and Associated Development sites during the non-breeding season.
    - The Wylfa Newydd Development Area and the Associated Development sites are within the maximum foraging range of chough from the Glannau Ynys Gybi / Holy Island Coast SPA during the non-breeding season, and therefore a functional linkage exists. This is based on Cross and Stratford (2015a) data showing that birds will travel up to 25 km from non-breeding roosts. This is corroborated

by evidence from Adrienne Stratford (*pers. comm.*) showing that a single non-breeding chough fledged from the Holy Island / Glannau Ynys Gybi SPA (in 2015) was sighted in the study area in November (2016), and from survey data recording the same bird in January, February and March (2017). A functional linkage therefore exists, but based on the evidence of only one non-breeding bird using the habitats within the Wylfa Newydd Development Area and the negligible value of habitats within the Associated Development sites to winter foraging chough, it is not considered to be significant.

1. Introduction

1.1 Overview of the Wylfa Newydd Project

Horizon Nuclear Power Wylfa Ltd. (Horizon) is currently planning to develop a new Nuclear Power Station on Anglesey as identified in the National Policy Statement (NPS) for Nuclear Power Generation (EN-6) (Department of Energy and Climate Change, 2011) within an area known as the Wylfa Newydd Development Area. The overall development is described as the 'Project' in this report.

The Project comprises the proposed new Nuclear Power Station (Wylfa Newydd Power Station) and associated plant and ancillary structures and features, together with all of the Associated Development (see Section 1.4.2) needed to support its delivery and operation. This includes highway improvements, worker accommodation, specialist training facilities, radioactive waste storage buildings, ancillary structures, offices and coastal developments. The coastal developments will include a Cooling Water System, breakwater, and a Marine Off-Loading Facility.

The Project will require a number of applications to be made under different legislation to different regulators. As a nationally significant infrastructure project under the *Planning Act 2008*, the construction and operation must be authorised by an application for development consent.

Jacobs UK Ltd. (Jacobs) was commissioned by Horizon to undertake a full ecological survey programme within the study area (see Section 1.4). This work has included the gathering of baseline data to inform the various applications, assessments and permits that will be submitted for the Project.

1.2 Aims and objectives

The aim of this report is to present baseline information on red-billed chough (hereafter 'chough') (*Pyrrhocorax pyrrhocorax*) sufficient to support the Environmental Impact Assessment and Habitats Regulations Assessment for the Project. The information presented forms the basis for assessment of significance of ecological impacts on chough potentially arising as a result of the Project, and is intended for use in investigating potential pathways for likely significant effects on European sites for which chough is a qualifying feature.

This report does not provide any form of impact assessment or mitigation design, as these will be presented within consenting documents required for the Project e.g. Environmental Statement chapters and Reports to inform Habitats Regulations Assessments.

1.3 Introduction to chough

The chough is the smallest of the crow family in the UK and is identified by its black plumage and distinctive red bill and legs (Mullarney *et al.*, 1999). Chough is restricted to the west of the British Isles and is known for foraging on coastal grassland in particular, and nesting on cliffs and occasionally in buildings. The species is also known for aggregating in large flocks during the winter and using inland upland habitats to forage for invertebrate prey. The legal protection afforded to chough is summarised in Appendix A.

1.4 Description of the study area

1.4.1 Wylfa Newydd Development Area

As well as presenting desk study information on chough in a regional context, this report provides survey data collected on chough within the Wylfa Newydd Development Area and from within a 500 m survey buffer zone of its boundary; the 'study area' (Figure 1.1). The study area boundary was set at a distance of 500 m beyond the Wylfa Newydd Development Area based on it being a probable maximum distance at which terrestrial habitats could be affected by the Project. It was also selected to provide a degree of context to results from within the Wylfa Newydd Development Area itself, and identify where important ecological connectivity was present with areas of similar habitat nearby.

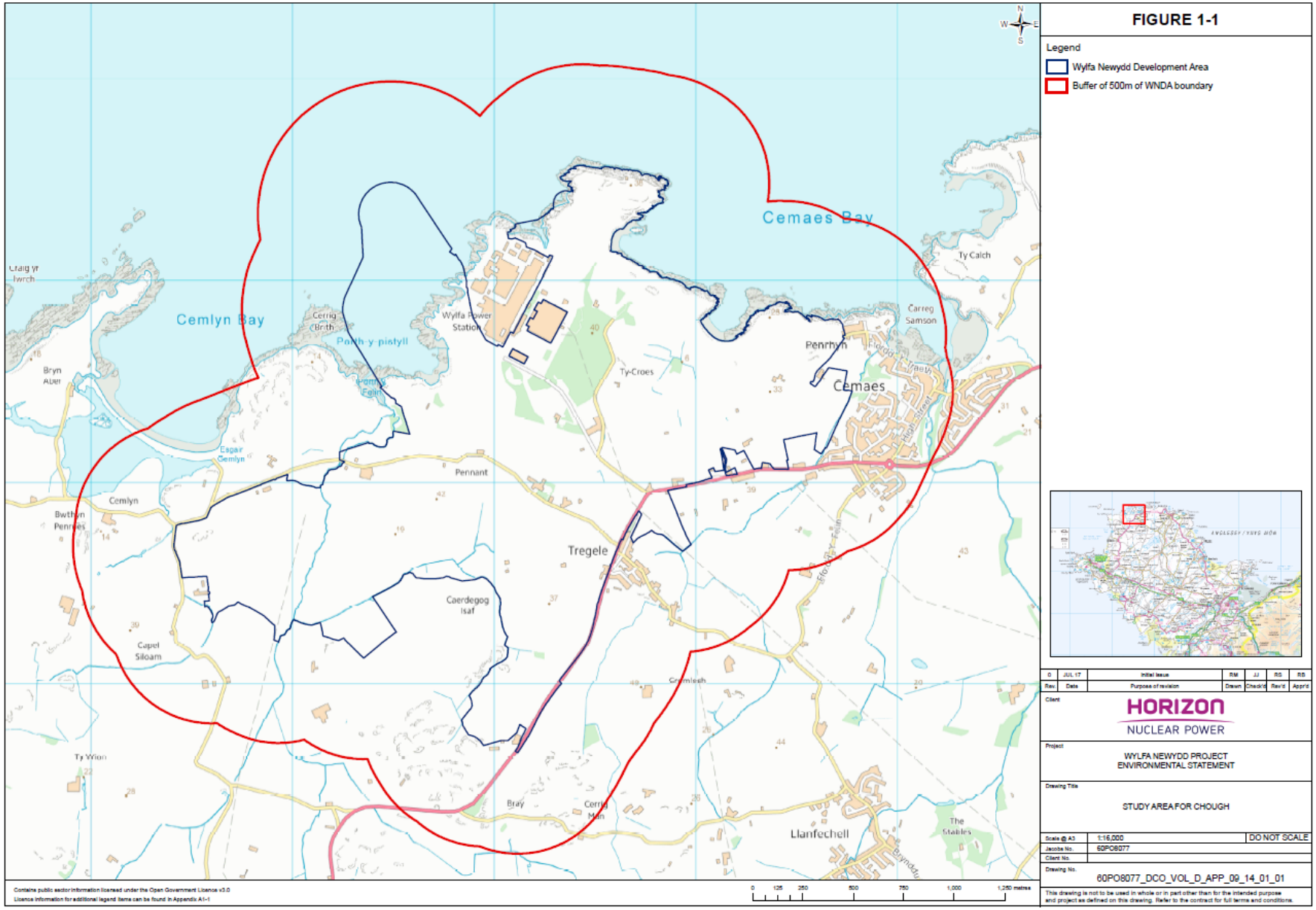

Figure 1.1: The study area

The Wylfa Newydd Development Area covers an area of approximately 380 ha. It is bounded to the north by the coast and the existing Magnox power station (the Existing Power Station). To the east, it is separated from Cemaes by a narrow corridor of agricultural land. The A5025 and residential properties define part of the south-east boundary, with a small parcel of land spanning the road to the north-east of Tregele. To the south and west, the Wylfa Newydd Development Area abuts agricultural land, and to the west it adjoins the coastal hinterland.

Historically the majority of the land use within the Wylfa Newydd Development Area has been for agricultural purposes with fields of improved and semi-improved grassland managed for grazing by sheep and cattle. These fields are bordered by a mixture of species-poor hedges, cloddiau (traditional stone-faced earth banks), lines of scrub and fences. The Wylfa Newydd Development Area also includes Tre'r Gof SSSI which forms a basin mire system with some wet woodland and rush pasture. Surrounding the Existing Power Station and in other small isolated pockets are areas of plantation woodland and broadleaved semi-natural woodland, three of which are ancient woodland sites. Wetland habitats in the Wylfa Newydd Development Area include heavily modified streams, ditches and ponds, many of which are ephemeral in nature.

Habitats of particular importance to chough are the areas of short coastal grassland formed on thin soils in the northern areas of the Wylfa Newydd Development Area. The most extensive areas of coastal grassland are found on Wylfa Head which itself comprises two distinct areas – the west side of Wylfa Head supports short maritime grassland grazed by rabbits (*Oryctolagus cuniculus*), and the east side consists of a mosaic of at least four plant communities including maritime heath, cliff and grassland habitats. This area is particularly important as it is the closest area of foraging habitat to the chough nest sites on the cliffs of Wylfa Head and in buildings within the Existing Power Station complex.

1.4.2 Associated Development sites

Lying to the south of the Wylfa Newydd Development Area, between it and the A55 corridor, is the series of smaller Associated Development sites:

- Cefn Coch (Offline Highway Improvements);
- Llanfaethlu (Offline Highway Improvements);
- Llanfachraeth (Offline Highway Improvements);
- Valley (Offline Highway Improvements);
- Dalar Hir (Park and Ride facility);
- Parc Cybi (Logistics Centre);
- Cae Canol-dydd (SSSI compensation);
- Cors Gwawr (SSSI compensation); and
- Ty-du (SSSI compensation).

The Highway improvement, park and ride, and logistics centre sites predominantly comprise areas of improved and semi-improved grassland, smaller areas of marshy grassland, stone walls and hedgerows (Jacobs 2013, Jacobs 2014d, Jacobs 2017a, Jacobs 2017b) and are included in this report to enable an assessment of the implications of their loss/modification on chough populations in the region. The SSSI compensation sites predominantly comprise rich-fen and improved grassland.

1.5 Consultation

Jacobs has been involved with consultation on the Project with regard to terrestrial ecological receptors since 2013. This has included engagement with, among others, Natural Resources Wales, the Cross and Stratford Welsh Chough Project, Isle of Anglesey County Council, the National Trust, North Wales Wildlife Trust and the Royal Society for the Protection of Birds (RSPB).

Key milestones in these consultations were the Pre-Application Consultation Stage One in late 2014, Wylfa Project Update in early 2016, Pre-Application Consultation Stage Two in summer 2016, and a Section 61Z consultation to the first submission of the *Town and Country Planning Act 1990* application for site preparation

and clearance works in October 2016. The topics raised during the consultation as part of the Section 61Z process are summarised in Appendix B.

Jacobs met with RSPB, Adrienne Stratford and Horizon representatives on 16 March 2017 to discuss and clarify availability of further data on chough (especially records from the non-breeding season), chough habitat management planning and interpretation of evidence with respect to assessments.

Workshops covering ornithology issues including those pertinent to chough were held with non-governmental organisations in October 2016 and June 2017. Information on baseline data collected and potential implications of the Project was presented by Jacobs.

Natural Resources Wales were also invited to comment on the Wylfa Newydd Project following submission of a draft Development Consent Order application, including Environmental Statements and technical appendices in the Autumn of 2017. Their responses have influenced the production of this revision.

2. Methodology

2.1 Desk study methods

A comprehensive data search and literature review (desk study) was carried out to provide information on chough at a site, local, county and national scale. This included a search for designated sites for which chough is a qualifying species, purchase of data from Cofnod (the North Wales Environmental Information Service), gathering of information on chough numbers, distribution and movements from RSPB and acknowledged experts, and a review of SPA information. Primary sources of data and information included:

- JNCC SPA data and 3rd review of UK SPA network;
- Chough SPAs in Wales – RSPB 2009 report to Countryside Council for Wales;
- The Cross and Stratford Welsh Chough Project;
- Cofnod data from within the boundary of the Wylfa Newydd Development Area and from a search area including records up to 2.5 km of the boundary of the Wylfa Newydd Development Area were sought in 2015. A second data request in 2017 included the details of all records of chough held by Cofnod from the whole of Anglesey;

Results of the desk study are presented in Section 3 below, with associated figures in Appendix C. These outputs, combined with the results of surveys carried out in the study area during the period 2009 to 2017 provide a comprehensive source of baseline information on abundance, distribution, movements and habitat usage of chough in the study area, and sets this information against a wider context to inform the EcIA and HRA assessments required by the Project.

For the Associated Development sites, the Phase 1 habitat studies referred to in Section 1.4.2 above were used to identify areas of habitat potentially suitable for foraging chough. For the SSSI compensation sites, national vegetation classification survey results were used to identify habitat potentially suitable for foraging chough.

2.2 Survey methods

2.2.1 Breeding birds survey methods 2010-2014

Breeding bird surveys were completed in the vicinity of the Wylfa Newydd Development Area between 2010 and 2014. These were walkover transect surveys for all bird species, following methods described in Bibby *et al.* (2000) and Gilbert *et al.* (1998). The number of transects and routes taken evolved between 2010 and 2014 as the study area changed, most notably to include areas within a 500 m buffer from the boundary of the Wylfa Newydd Development Area. Transect routes are shown in figures in Appendix D.

The transects were designed to give good views of all fields, hedgerows, scrub, woodland, coastal heath and grassland, water bodies / watercourses and, where possible, cliffs present in the study area. Each transect was surveyed once per month in the breeding season as listed in Table 2.1.

Additionally, chough were searched for specifically in 2012 during breeding birds surveys, in habitats suitable for chough nest sites such as cliffs, caves and old buildings, using methods described by Monaghan *et al.* (1989). This effort focussed on areas close to the coastline including Wylfa Head, Cerrig Brith and Porth yr Ogof.

Table 2.1: Surveyed months for breeding birds in the study area 2010 – 2014

Breeding season	Survey months	Reference
2010	March – May	Arup, 2012a
2011	March – May	Arup, 2012a
2012	April – June	Arup, 2013a
2013	April – July	Jacobs, 2014a
2014	April – July	Jacobs, 2014b

In 2013 monthly vantage point surveys between April and July were also completed (Jacobs, 2014a). These watches involved surveyors remaining in one location and recording all birds seen within 250 m; a distance largely governed by local topography (see Section 4.1.4). The timing of each watch (16 watches in total) was for one hour before sunrise until two hours after and for a second period of one hour before sunset until one hour after. Locations of the vantage points (seven locations in total) are shown in Figure 6.14, Appendix D.

2.2.2 Wintering birds survey methods 2009-2015

Wintering bird surveys were completed (for all species) between 2009 and 2015. The methodology followed that described in Bibby *et al.* (2000) and Gilbert *et al.* (1998). Two transects were walked in winters 2009/2010 to 2012/2013. Six transects were surveyed in 2013/2014 and 2014/2015 as the study area was expanded to include a 500 m buffer zone around the boundary of the Wylfa Newydd Development Area. Transect routes are shown in figures in Appendix E.

Transects were designed to give good views of all fields, hedgerows, scrub, woodland, coastal heath and grassland, water bodies or watercourses present. Each transect was surveyed once per month as listed in Table 2.2.

Table 2.2: Surveyed months for over-wintering birds in the study area 2009 – 2015

Breeding season	Survey months	Reference
2009 – 2010	November – March	Arup, 2012b
2010 – 2011	October – March	Arup, 2012b
2012 – 2013	October – March	Arup, 2013b
2013 – 2014	October – March	Jacobs, 2014c
2014 – 2015	October – March	Jacobs, 2015

Vantage point surveys were also carried out in winter 2009-2010, 2010-2011 and 2012-2013 (Arup, 2012b and 2013b). Bird flight observations were recorded from four vantage points selected to provide maximum cover of the proposed development area. Surveys comprised 30-minute fixed point observations from each vantage point during each survey visit. All species flying over were mapped and the activity recorded. Locations of the vantage points are shown in figures in Appendix E.

2.2.3 Species-specific chough surveys 2017

Non-breeding season

Surveys specifically for chough were completed within the Wylfa Newydd Development Area between January and March 2017, in accordance with methods recommended by the RSPB. These surveys were carried out to provide further information on the numbers and distribution of chough within the Wylfa Newydd Development Area and the use the birds make of the habitats therein during the winter period. Methods comprised the following:

i. Fortnightly walked transects following routes similar to those previously used by Jacobs for over-wintering and breeding bird surveys for the study area since 2013 (Figure 6.21, Appendix H).

ii. Recording numbers of chough, their location and behaviour.

iii. Recording details of any colour bands visible on chough legs.

iv. Recording the following habitat variables in all fields in the study area:

- number and type of livestock present;
- approximate sward height within three categories (0 = 0-5 cm, 1 = 5-10 cm, 2 = >10 cm);
- broad habitat classification (e.g. pasture, arable, heath); and
- any land management operations (e.g. ploughing, manure dressing or cutting).

Breeding season

Surveys specifically for chough were undertaken within the Wylfa Newydd Development Area during the breeding season, April – July 2017. As well as continuing the transect surveys described above, methods were based on the pursuit approach described in Whitehead *et al.* (2005). These surveys are intended to establish how much time is spent foraging within specific habitats by birds with active nests and / or dependent young. These surveys comprised 24 hours at Trwyn Pencarreg (three days of surveys for eight hours per day – four VPs per day last two hours each) and 50 hours at Wylfa Head (six days of surveys for eight hours per day – four VPs per day last two hours each (plus one extra two-hour VP)), with surveys proportionally longer at Wylfa Head to capture the larger visible area. In total 37 two-hour VPs were completed.

Surveys were timed to coincide with specific stages of the breeding cycle, with a set amount of effort applied to each stage within pre-defined temporal windows during daylight hours. The four stages of the breeding cycle were:

1) Incubation – mid-April to early May
2) Early chicks – early May to mid-May
3) Late chicks – mid-May to early June
4) Post-fledging – early June to end July

The time windows used within each stage (all +/- 1hr) were:

- 06:30-08:30
- 09:00-11:00
- 11:30-13:30
- 14:00-16:00

A minimum of six of the above listed time windows were observed during each of the four stages of the breeding cycle. Time spent by birds in the following habitat types (where applicable) was recorded:

- rock, cliff, scree, buildings and stone walls;
- improved and semi-improved agricultural grassland (grazed);
- coastal heath and heath / grass mixtures (grazed);
- coastal grassland (grazed);
- dry heathland and dwarf shrub heaths (grazed);
- improved and semi-improved agricultural grassland (ungrazed);
- coastal heath and heath / grass mixtures (ungrazed);
- coastal grassland (ungrazed);
- dry heathland and dwarf shrub heaths (ungrazed);
- improved and semi-improved agricultural grassland (mown);
- wet heath (grazed and ungrazed);
- paths (bare ground and worn swards associated with Public Rights of Way);
- burned areas;
- bracken; and
- cloddiau (traditional stock boundaries consisting of stone-faced earth banks).

2.3 Defining functional linkages

One of the purposes of this report is to establish whether there are any functional linkages between the chough and habitats within the Wylfa Newydd Development Area and Associated Development sites, and the wider regional population associated with SPAs designated for chough.

For the purposes of this report, the following definition of functional linkage from Natural England (Chapman and Tyldesley, 2016) has been used:

"…the term 'functional linkage' refers to the role or 'function' that land or sea beyond the boundary of a European site might fulfil in terms of supporting the populations for which the site was designated or classified. Such an area of land or sea is therefore 'linked' to the site in question because it provides a (potentially important) role in maintaining or restoring a protected population at favourable conservation status."

3. Desk study results

This section presents the results obtained from data searches and literature reviews.

3.1 UK population data

Provisional estimates of the UK chough population in 2014 show that there are 215 breeding pairs in Wales (78%), 19 breeding pairs in Scotland (19%), seven breeding pairs in England (3%) and one breeding pair in Northern Ireland (<1%) (Hayhow *et al.*, 2015).

3.2 SPAs designated for chough

There are seven SPAs for which chough is given as a reason for designation in Wales based on breeding numbers (112 pairs in total) six of which are also designated for the numbers of over-wintering chough they support (241 birds in total) (see Table 3.1). Table 3.1 also shows six-year mean population data between 2002 and 2007 for each of the seven SPAs in Wales, where available (Thorpe and Young, 2009).

There are further SPAs in Ireland and Scotland, the closest of which is more than 200 km from the study area, that are not discussed further in this report.

Table 3.1: Numbers of chough at UK SPAs - based on data from 1997 (JNCC, 2015a) and six-year means between 2002 and 2007 (Thorpe and Young, 2009)

SPA site name	Distance from the study area (km)	Breeding: 1997 site total pairs (national population %)	Breeding: 2002-2007 mean pairs (national population %)	Non-breeding: 1997 site total birds (national population %)	Non-breeding: 2002-2007 mean individuals (national population %)
Glannau Ynys Gybi / Holy Island Coast	15	18 (5.3)	16 (4.6)	18 (2.6)	8 (0.9)[1]
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands	68	9 (2.7)	9 (2.6)	18 (2.6)	19 (2.0)
Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island	70	12 (3.5)	19 (5.5)	24 (3.5)	25 (2.7)
Craig yr Aderyn / Bird's Rock	97	6 (1.8)	4 (1.2)	55 (8)	16 (1.7)
Ramsey and St. David's Peninsula Coast	176	11 (3.2)	Not available	22 (3.2)	Not available
Skomer and Skokholm	195	4 (1.2)	4 (1.2)	Breeding only	Breeding only
Castlemartin Coast	200	12 (3.5)	Not available	24 (3.5)	Not available

[1] Roost figure only, foraging flock data was not available in the RSPB (2009) report.

3.3 Review of possible SPA and amalgamated SPA populations

This report also recognises the work of Thorpe and Young (2009) and their identification of 14 sites they consider qualify as possible SPAs for breeding and non-breeding populations of chough, as shown in Table 3.2. Thorpe and Young (2009) also suggest an `amalgamated` SPA approach, whereby six much larger SPAs are created in Wales to protect key breeding, foraging and roosting habitats for chough, and to include all existing SPAs and possible SPAs, rather than 21 individual sites. This would comprise amalgamated SPAs at:

- Anglesey Coast;
- Snowdonia;
- Lleyn Coast;
- South Meirionnydd / North to mid-Ceredigion coast;
- South Ceredigion coast; and
- Pembrokeshire coast and islands.

Nearest to the Wylfa Newydd Development Area, the possible Anglesey Coast amalgamated chough SPA consists of an enlarged version of the existing Holy Island SPA and an extension covering the Church Bay / Carmel Head area (Figure 6.5, Appendix C). The suggested size / extent of the Church Bay / Carmel Head possible SPA is shown in Figure 6.6, Appendix C which itself comprises areas for breeding and non-breeding seasons (Figure 6.7 and Figure 6.8 respectively, Appendix C). Known chough foraging locations for both seasons and suggested land management units are illustrated in these figures.

Table 3.2: Numbers of chough at possible breeding and non-breeding SPAs – based on six-year means between 2002 and 2007 (Thorpe and Young, 2009)

SPA site name	Approximate distance from the study area (km)	Breeding: 2002-2007 mean pairs (national population %)	Non-breeding: 2002-2007 mean individuals (roost counts) (national population %)
Church Bay / Carmel Head	There is a small section within the boundary of the study area	5 (1.4)	14 (1.5)
Llanberis / Llanberis Pass	36	5 (1.4)	15 (2.0)
Aberdesach – Dinas Dinlle Coast	36	Non-breeding only	12 (1.3)
Penmaenmawr	37	5 (1.4)	38 (4.0)
Nantlle Valley	40	Non-breeding only	52 (5.5)
Cwm Ystradllyn	44	Non-breeding only	27 (2.9)
North Llyn Coast	44	12 (3.5)	37 (4.0)
Blaenau Ffestiniog	53	6 (1.7)	Breeding only
Traeth Penllech	60	Non-breeding only	13 (1.3)
Tonfannau Quarry	90	2 (0.6)	Breeding only
South Meirionnydd / North Ceredigion Coast	110	Non-breeding only	33 (3.5)
North Ceredigion Coast	110	5 (1.4)	Breeding only
Mid Ceredigion Coast	113	9 (2.6)	Breeding only
South Ceredigion Coast	136	3 (0.9)	10 (1.0)

3.4 UK SPA reviews

In 2016, the JNCC undertook review of all SPAs to further develop guidance and principles to assist the application of UK SPA selection criteria (Stroud *et al.*, 2016). This included an assessment of the adequacy of the SPA network for breeding and non-breeding populations of relevant species (see JNCC 2016a and 2016b for chough appendices within Stroud *et al.*, 2016). A summary of the chough data for Great Britain in this review is provided in Table 3.3.

Table 3.3 Summary of chough data presented in the JNCC Third Review of the status of UK SPAs[2]

Criteria	Breeding (pairs)	Non-breeding (individuals)
Total population	300	930
Population within SPA suite	149	371
Proportion of population within SPA suite	49.7%	39.9%
Long-term trend 1982 – 2002	+39.4%	+56.8%
Short-term trend 1992 – 2002	+28.1%	+38.2%
Overall assessment of sufficiency of SPA suite for:		
Population numbers	Sufficient	Sufficient
Range coverage	Insufficient	Insufficient
Ecological sufficiency	Insufficient	Insufficient

The SPA review includes a projected impact of climate change on the SPA suite. For breeding chough this included modelling impacts using the approaches developed by Pearce-Higgins *et al.* (2011) during the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project. This report found that under a medium emissions scenario, modelled numbers of breeding chough within the SPA suite would increase by 50%, but with a poor degree of confidence. Although not modelled, the non-breeding population was also predicted to increase by the same amount, but with the same poor degree of confidence.

Relevant to this report are the outcomes of the SPA Review Decision Framework regarding cropped habitats, including that:

- chough show fidelity to habitat types and locations;
- crop type determines usage by chough; and
- grazing animal presence and presence of autumn stubble is vital to maintain species usage.

The assessment outcome with regard to cropped habitats is that suitable grassland within 1 km of nests and outside the breeding period should be maintained on the basis of local evidence of regular field usage.

3.5 Associated Development sites

Habitats within the highway improvement, park and ride, and logistics centre sites are primarily improved and semi-improved grasslands, with smaller areas of marshy grassland, stone walls, hedgerows and occasional scrub. The study areas associated with the Off-line Highway Improvement sites (Cefn Coch, Llanfaethlu, Llanfachraeth and Valley) were assessed to be of negligible value for breeding and wintering birds (Jacobs 2017b). Habitats at Parc Cybi and Dalar Hir are similar to the Off-line Highway Improvement sites and are also of negligible value to foraging chough. Parc Cybi grassland habitats are dominated by taller sward heights, unsuitable for foraging chough (Jacobs 2013, 2014d and 2017a). However, small areas of habitat potentially suitable for foraging chough, namely bare ground and short sward grasslands, exist in patches at the Associated Development sites, consequently the eventuality of occasional use of these sites by foraging chough cannot be ruled out.

[2] Primary data sources are not provided in this report.

The SSSI compensation sites are primarily rich-fen (often under or unmanaged), mire and improved grassland habitats with small areas of scrub, ditch and defunct hedgerow. The habitats of all the SSSI compensation sites are all of negligible value to foraging chough and so are not considered further in this report in relation to functional linkage to SPA chough populations.

3.6 Breeding data from the study area

3.6.1 Numbers of birds and productivity

Surveys, from 2007 to 2015, as part of the Cross and Stratford Welsh Chough Project within the study area have comprised nest surveys and ringing of chicks (Cross and Stratford, 2015b). Additional data for 2016 and 2017 was provided by Adrienne Stratford to Jacobs (*pers. comm.*). The project has identified four nesting sites (Nest Sites A and B are within buildings forming parts of infrastructure for the existing power station, and Nest Sites C and D are on sea-cliffs around Wylfa Head as shown in Figure 3.1) that have been monitored each year during this period. In this period, nesting has been attempted by one or sometimes two pairs of chough, and 37 chicks have been ringed before fledging (up until 2017) (see Table 3.3). During this time there have been a total of 17 breeding attempts. Breeding was successful on 12 of the 17 occasions and therefore (when successful) the average number per year of choughs successfully fledged is three.

Table 3.4: Study area chough nest site data 2007 to 2017 from Cross and Stratford (2015b) and Adrienne Stratford to Jacobs (*pers. comm.*)

Nest site	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Nest Site A	-	-	-	2	4	1	4	3	0	-	-
Nest Site B	-	-	0	-	-	-	-	-	-	-	-
Nest Site C	0	0	4	-	2	0	2	4	-	-	-
Nest Site D	-	-	-	4	-	-	-	-	-	3	4
Total number of ringed chicks	0	0	4	6	6	1	6	7	0	3	4
Total number of occupied nests	1	1	2	2	2	2	2	2	2	1	1

In 2015, 2016 and again in 2017, only one nest site was occupied (Nest site D). No young were fledged in 2015 – the preferred nest site was disturbed by a number of nearby anglers early in the breeding season, causing the adult pair to relocate the nest site to a less favourable location, which was subsequently washed out by wave action. Three birds were fledged in 2016 and four birds were ringed, and fledged, in 2017 (Adrienne Stratford, *pers. comm.*).

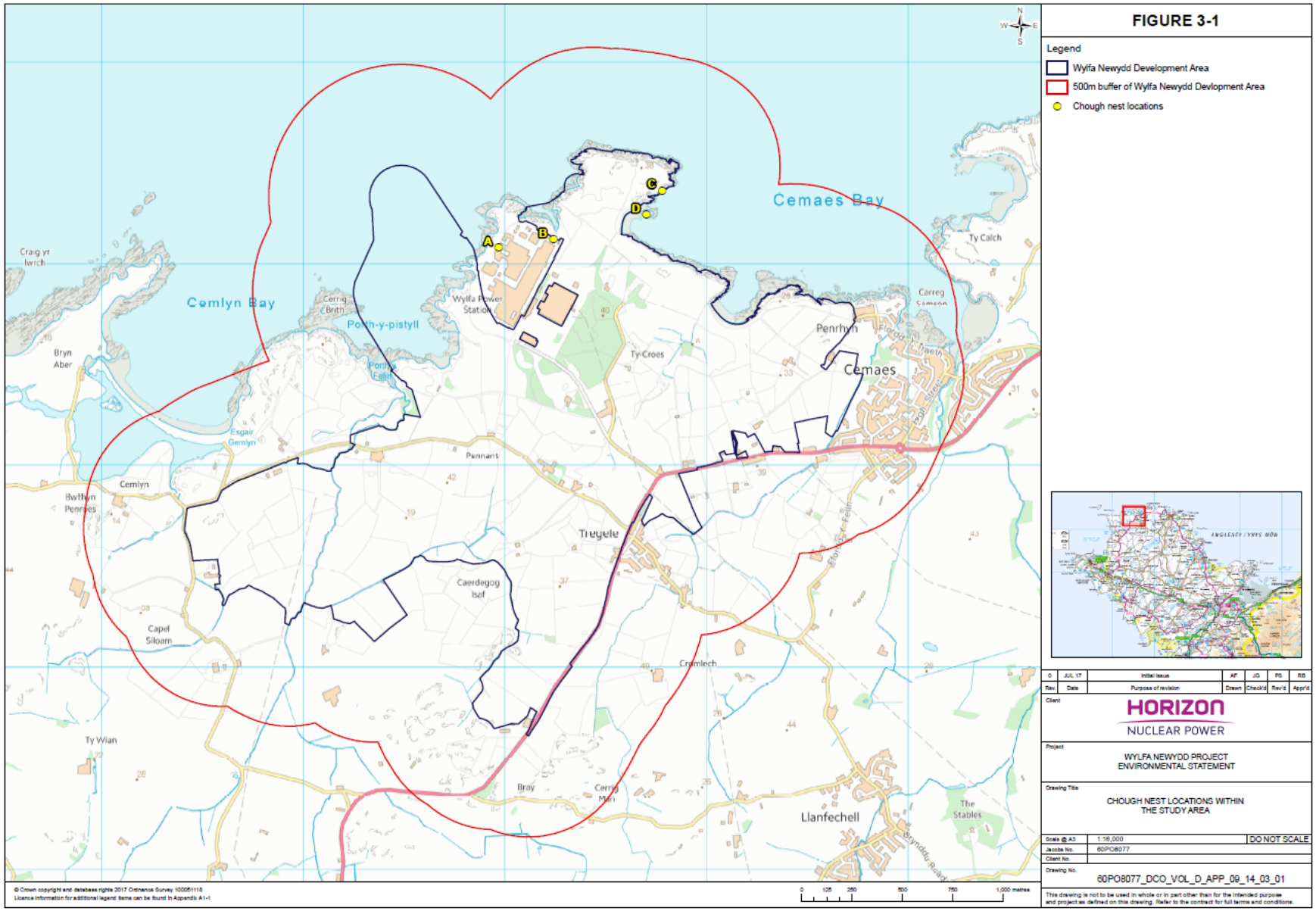

Figure 3.1: Chough nest locations within the study area

3.6.2 Colour-marked Wylfa Head breeding adult chough

To date, five adult choughs that have bred on Wylfa Head have had colour rings (fitted when these birds were juveniles, as part of other projects) which enabled the Cross and Stratford Welsh Chough Project to determine the locations of their natal nest sites and other aspects of their life history. This was possible for four of the birds, as summarised in table 3.5. This information shows that the colour-ringed adults observed breeding in the study area did not originate from within an SPA for which chough is a qualifying species. All four birds originated from locations elsewhere on Anglesey.

Table 3.5: Location of natal origin of colour-ringed adult breeding birds observed on Wylfa Head

Nest site (location of observations made within study area)	Sex	Years recorded	Four-figure grid square of natal origin	Distance and direction of natal nest from Wylfa Head (km)
Nest Site A	Male	2010-2013	SH4793	13 (east)
Nest Site C	Female	2007-2017	SH2988	8 (southwest)
Nest Site C	Male	2008-2015	SH4490	10 (east-southeast)
Nest Site C	Male	2008-2012	SH4793	13 (east)

The female bird listed above is known from ringing information (Right leg: Yellow / Black, Left leg: Red / BTO) (BTO = British Trust for Ornithology) to have been ringed as a juvenile at a nest site near Church Bay in 2004. Welsh Chough Project data from 40 sightings of this bird all originate from Wylfa Head, Cemlyn, Carmel Head and Church Bay.

3.6.3 Dispersal of Wylfa Head fledged chough

Of the 30 colour-ringed choughs from Wylfa Head nests between 2007 and 2015, 21 have been re-sighted following fledging (Stratford, 2015) and nine were not seen again (these were presumed to have died in the first few months after fledging) (see Figure 3.2). The maximum distance at which a ringed chough was sighted was approximately 35 km south of its natal site (one individual at Fort Belan), but most sightings were made within 10 km of Wylfa Head.

Within the 21 sightings, two were from within the boundary of the Holy Island / Glannau Ynys Gybi SPA. There is therefore considered to be a functional linkage between the Holy Island / Glannau Ynys Gybi SPA and the Wylfa Newydd Development Area. The significance of this functional linkage is discussed in Section 5.3.

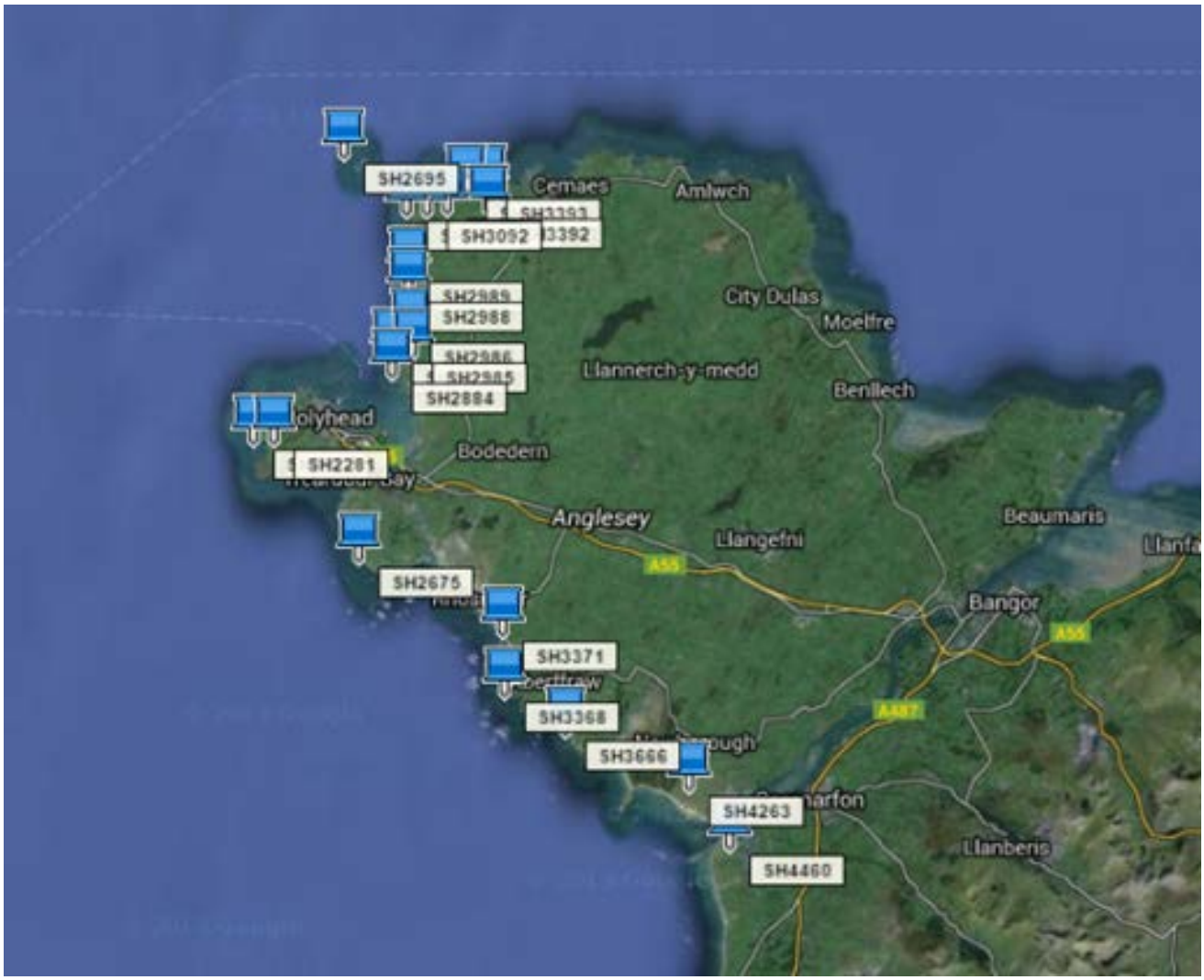

Figure 3.2: All sightings of chough ringed as juveniles at Wylfa Head since 2007 (from Stratford, 2015)

3.7 Data from other studies

3.7.1 Dispersal distances

A second source of information on the dispersal distances of chough in North Wales comes from an extensive study completed on chough nesting on the Llyn Peninsula (Cross and Stratford, 2015a). This included those birds nesting within the Aberdaron Coast and Bardsey Island SPA and the Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands SPA. The information from the Llyn Peninsula study includes data gathered between 1991 and 2014 from 1,281 chicks ringed as part of the study. Of these ringed birds, 115 were subsequently identified as being breeding adults, 94 of which remained in the Llyn Peninsula to nest and 21 moved outside of the area.

The study showed that dispersal distance of birds from where they fledged on the Llyn Peninsula to where they then went on to breed shows a steady decline (against numbers of individuals) beyond a peak of 15-20 km for females to a maximum of 75 km, and for males a peak of 0-5 km (see Figure 3.3) to a maximum of 45 km. Overall, the mean dispersal distance of chicks fledged from natal nesting sites on the Llyn Peninsula to breeding sites elsewhere was 23.2 km for females (n=61) and 10.1 km for males (n=54).

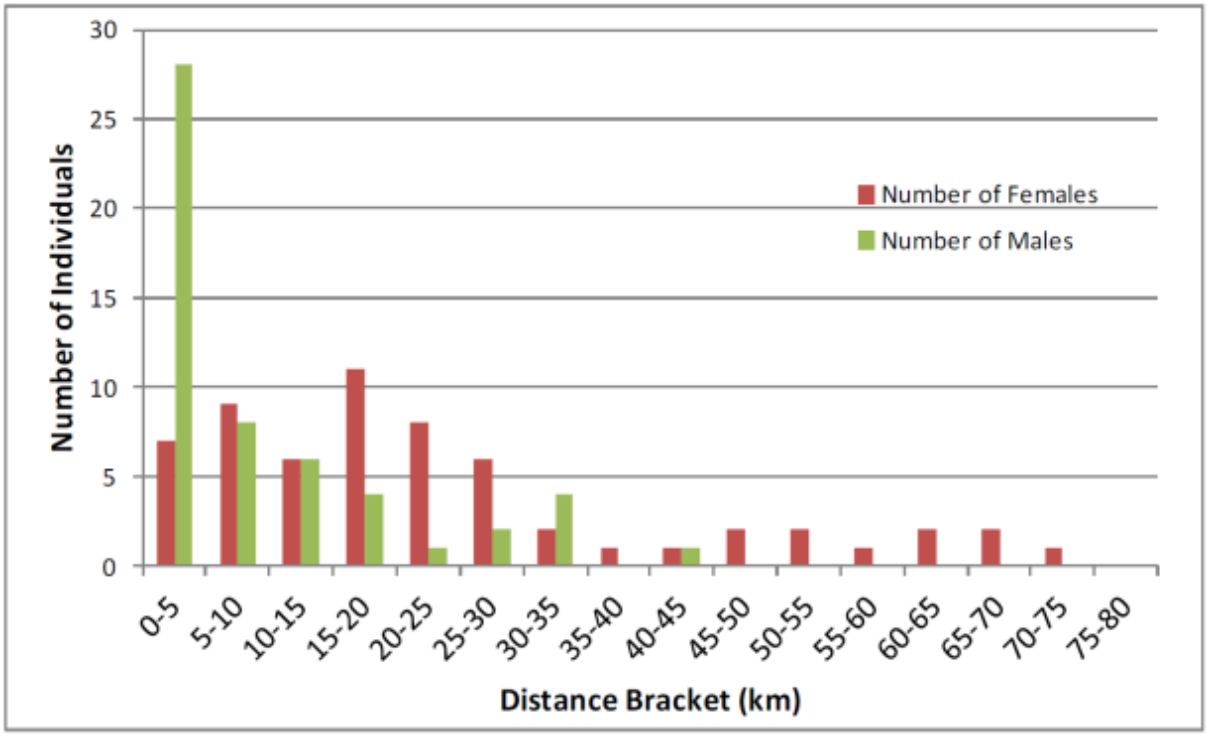

Figure 3.3: Dispersal distances in chough from Llyn Peninsula natal sites (from Cross and Stratford, 2015a)

The data show that the maximum distance at which choughs fledged from nests on the Llyn Peninsula survived to breed, did so in locations within 75 km of their natal nests. Choughs fledged from the study area are therefore unlikely to breed in SPAs beyond 75 km, and the study area is unlikely to receive choughs coming from SPAs outside of the same distance. A similar pattern was found by Johnston *et al.* (2007) in a UK-wide study, whereby potential new populations were generally established within 50 km of existing colonies.

3.7.2 Regional numbers of breeding chough

Using maximum chough dispersal distances discussed above (75 km) to broadly demarcate the region within which the study area sits (as shown in Figure 3.4), it is estimated that the total number of breeding pairs of chough in the region is approximately 96. This is based on approximately 60 pairs of chough breeding on the Llyn Peninsula (Cross and Stratford, 2015a), and data from The Anglesey Biodiversity Action Plan stating that there are approximately 36 pairs of chough on Anglesey in total (which includes the 18 pairs breeding within the Holy Island / Glannau Ynys Gybi SPA).

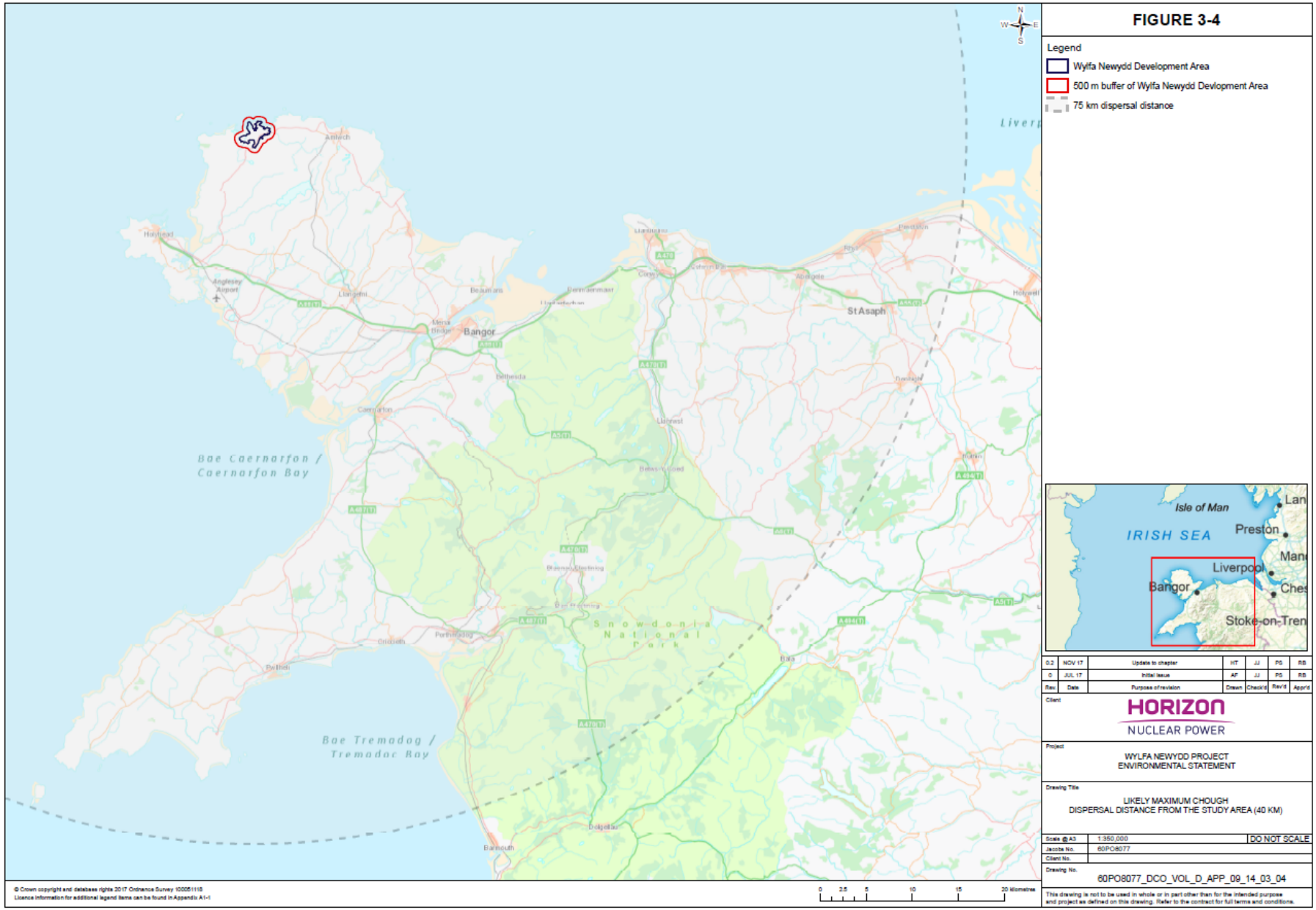

Figure 3.4: Likely maximum chough dispersal distance from the study area (75 km)

3.7.3 Other records of marked birds within the study area

During the 2017 winter chough surveys, leg ring information was recorded where possible. One of the birds sighted during each month of these surveys (Right leg: Blue / Red, Left leg: Red / BTO) was ringed as a (probable female) juvenile at a nest site in the Rhoscolyn area, within the Holy Island / Glannau Ynys Gybi SPA, in 2015 (Adrienne Stratford, *pers. comm.*), and was also seen within the study area near the Existing Power Station outfall by Adrienne Stratford in November 2016. This bird was recorded in the study area in November, January, February and March of winter 2016-17. This bird has also been recorded at Carmel Head and Church Bay. This indicates a functional link between the SPA and the Wylfa Newydd Development Area, which is discussed in Section 5.3.

3.8 Cofnod data

Data from Cofnod provided to Jacobs in 2015 from within the boundary of the Wylfa Newydd Development Area and from a search area including records up to 2.5 km of the boundary of the Wylfa Newydd Development Area show that chough are well recorded in the area, with over 70 sightings of the species between 1981 and 2015.

An additional search was completed of records held by Cofnod for the whole of Anglesey in 2017. This returned 2,170 records which are shown on the following figures presented in Appendix C:

- Figure 6.1 – Records of chough in the breeding season (1 April to 31 July) for the whole of Anglesey
- Figure 6.2 – Records of chough in the non-breeding (1 August to 31 March) for the whole of Anglesey
- Figure 6.3 – Records of chough in the breeding season (1 April to 31 July) in the vicinity of the study area
- Figure 6.4 – Records of chough in the non-breeding season (1 August to 31 March) in the vicinity of the study area.

Figure 6.1 shows that there were records of chough in the breeding season mainly from the west and north coasts of Anglesey, with the highest numbers of records from the west coast of Holy Island. There were no records of chough numbering more than 10 birds on the north coast.

Figure 6.2 shows records of chough in the non-breeding season reasonably evenly distributed around the north, east and west coasts of Anglesey. Within these records there were two instances where more than 11 choughs were seen, one on the Skerries and one in the vicinity of Traeth Ynys y Fydlyn. These records are 7.6 km and 5 km from the Wylfa Newydd Development Area respectively.

Figure 6.3 shows 12 records of chough from the vicinity of the study area in the breeding season, with counts of chough ranging from one to eight individuals. None of the records were from within the Wylfa Newydd Development Area.

Figure 6.4 shows seven records from the vicinity of the study area in the non-breeding season, with counts ranging from one to three individuals. None of the records were from within the Wylfa Newydd Development Area.

There are no records of chough within the Associated Development sites. The closest record is from the winter period of a small group of birds approximately 1.5km northwest of the Llanfaethlu Off-line Highway Improvements site.

Cofnod data originate from a variety of observers and are not systematically gathered. Locations of records are therefore likely to be biased towards well-used parking locations and walking routes typically used by submitters of records. Mapped results are shown to the nearest grid reference provided and are not always indicative of the precise location of the record.

4. Study area survey results

4.1 Breeding bird survey results

4.1.1 Breeding bird survey results 2010

Excerpts from the 2010 breeding bird survey results are provided in Appendix D (from Arup, 2012a). These show that during eight walked transects between March and May, chough were sighted on four occasions, as shown on Figure 6.10. The numbers of choughs recorded during these sightings is not available in the Arup report.

4.1.2 Breeding bird survey results 2011

Excerpts from the 2011 breeding bird survey results are provided in Appendix D (from Arup, 2012a). These show that during eight walked transects between March and May, chough were sighted on two occasions, as shown on Figure 6.10. The numbers of choughs recorded during these sightings is not available in the Arup report.

4.1.3 Breeding bird survey results 2012

Excerpts from the 2012 breeding bird survey results are provided in Appendix D (from Arup, 2013a). The results from the eight transects between April and July have not been provided in any detail other than a brief description of pairs of chough being seen regularly around the eastern side of Wylfa Head and flight across to the north of the Existing Power Station west towards Cerrig Brith.

4.1.4 Breeding bird survey results 2013

Excerpts from the 2013 breeding bird survey are provided in Appendix D. These data show that from 21 transect surveys, chough were recorded on five occasions. These records comprised sightings from Wylfa Head (four birds), pasture west of Nanortman cottage (two birds), Porth-y-wylfa (one bird), pasture west of Tregele (two birds) and pasture southwest of Cafnan Farm (two birds). The average number of chough seen during any one of the five sightings was 2.2.

There were also 16 vantage point (VP) surveys targeting certain key species (woodcock, snipe, merlin and goshawk) undertaken in the study area during which all other birds were recorded incidentally. These surveys did not did not record chough on any occasion.

4.1.5 Breeding bird survey results 2014

Excerpts from the 2014 breeding bird surveys are provided in Appendix D. These data show that from 24 transects (six transects walked monthly for four months between April and July) choughs were recorded on seven occasions, with 19 being the total number of chough seen. The peak number of choughs seen at any one time was six (Transect 4 in the vicinity of Cafnan Farm), and the average number of chough seen during any of the seven sightings was 2.7 birds.

4.1.6 Chough breeding season transect survey results 2017

Details of the breeding season 2017 species-specific chough surveys are provided in Appendix D. The breeding season transect surveys in 2017 covered a total of 211 fields. Choughs were recorded a total of 14 times during these surveys, of which 10 observations were of birds using the habitats within the survey area. The other four observations were of birds flying over. Choughs were recorded in seven different fields, as shown in Figure 6.22. All but one of these sightings were from Wylfa Head, with up to five birds recorded together. The remaining record was of six birds just east of Cemlyn Lagoon – the peak count during the transect surveys. All chough sightings were in short sward grassland habitats and adjacent areas of rocky outcrop.

4.1.7 Chough breeding season pursuit survey results 2017

The full results from the chough breeding season pursuit surveys 2017 are provided in Appendix G. These show that during 74 hours of survey (37 VP watches), there were 107 separate periods of chough behaviour observed (pursuits) from 19 different fields within the study area. The average number of chough seen was 2.3. The maximum count from these surveys was 10 un-ringed choughs (from Land Parcel 181, see Figure 6.24), which comprised of Improved and semi-improved agricultural grassland (ungrazed). This group was only recorded once and was of unknown origin – none of these birds were the resident breeding pair or their 2017 offspring. The most frequently visited area was Land Parcel 146, where chough activity represented 63.54% of chough minutes from both Wylfa Head birds. This was located to the east of the existing power station and to the north of the Tre'r Gof SSSI (see Figure 6.24).

Whilst the distribution of habitat use (core foraging area) is identified by field and by broad habitat type, the results of plotting specific locations of foraging behaviour has identified a number of small patches of habitat where foraging is concentrated (see Figure 25). Whilst the core foraging area can be calculated by field area, the actual area of land that chough forage in is much smaller and focussed on small patches of very specific microhabitat patches.

The habitats used most frequently at Trwyn Pencarreg had a habitat mosaic of Rock, cliff, scree, buildings and stone walls / Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way (33.5% of chough minutes at Trwyn Pencarreg) (see Table 6.20). Whilst these were not being grazed during the summer breeding survey period, all had been grazed over the winter and generally had short sward heights.

The habitats used most frequently at Wylfa Head had a combination of Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way) (42.1% of chough minutes at Wylfa Head) (see Table 6.21). These again were ungrazed but generally had short sward heights after grazing during the winter.

Overall the surveys showed that the majority of sightings involved the pair of chough and their juveniles that bred on Wylfa Head (90 of 107), and that Coastal Grassland, albeit ungrazed, was the habitat type represented most frequently in the land parcels that chough were most regularly seen.

4.2 Wintering bird survey results

4.2.1 Wintering bird survey results 2009-2010

Excerpts from the 2009-2010 wintering bird survey results are provided in Appendix E (from Arup, 2012b). These show that during 20 walked transects between November 2009 and March 2010 (including incidental sightings during other surveys), choughs were sighted on three occasions. Single choughs were sighted twice on Wylfa Head incidentally and a flock of four were seen to the east of the water treatment works south of Wylfa Head (Figure 6.16). No choughs were recorded during the 10 vantage point surveys.

4.2.2 Wintering bird survey results 2010-2011

Excerpts from the 2010-2011 wintering bird survey results are provided in Appendix E (from Arup, 2012b). These show that during 24 walked transects between October 2010 and March 2011, chough were sighted on nine occasions as shown in Figure 6.18. These included chough being seen in pairs on three occasions in pasture fields west of Caedegog Isaf Farm. In the data presented in this report, this is the first instance of chough being present in areas of habitat away from coastal grassland. The remaining records, including a peak count of four, are from habitats in close association with coastal grassland around Wylfa Head and short grassland east of the Existing Power Station. No choughs were recorded during the 12 vantage point surveys.

4.2.3 Wintering bird survey results 2012-2013

Excerpts from the 2012-2013 wintering bird survey results are provided in Appendix E (from Arup, 2013b). Although unclear from the data provided, the Arup (2013b) report describes a summary of the findings. During the 12 transects, choughs were recorded on 15 occasions with a maximum count of four individuals from 11

different locations. The locations are shown in Figure 6.19 and include Wylfa Head, fields south of Cafnan Farm, and grassland south of Porth-y-pistyll.

4.2.4 Wintering bird survey results 2013-2014

Excerpts from the 2013-2014 wintering bird survey are provided in Appendix E (from Jacobs, 2014c). These data show that from 36 transects choughs were recorded on 13 occasions, with 34 being the total number of records. The peak number of chough seen at any one time was six (Transect 2 in the vicinity of Porth-y-pistyll), and the average number of chough during any of the 13 sightings was 2.6 birds.

4.2.5 Wintering bird survey results 2014-2015

Excerpts from the 2013-2014 wintering bird survey are provided in Appendix E (from Jacobs, 2015b). These data show that from 36 transects choughs were recorded on seven occasions, with 17 being the total number of chough records. The peak number of chough seen was four. This figure was recorded on Transect 1 in the vicinity of Wylfa Head and Transect 4 in pasture in the vicinity of Cafnan Farm. The average number of chough during any of the seven sightings was 2.4 birds.

4.2.6 Chough survey results winter 2017

Details of the winter 2017 species-specific chough surveys are provided in Appendix E. The wintering chough surveys in 2017 covered a total of 211 fields. Choughs were recorded using the habitats within the survey area a total of 10 times, from five of these fields as shown in Figure 6.21. These comprised three sightings from the grassland to the east of Cemlyn Lagoon with a peak count of four choughs (three using the habitats within the survey area, and a fourth flying over), and seven sightings from Wylfa Head with a peak count of three choughs. All sightings were in short sward grassland habitats adjacent to the coast.

4.3 Summary of chough records from breeding and wintering bird surveys

Table 4.1 provides a high-level summary of the data on chough following the breeding and wintering bird surveys in chronological order. These show that there have been a total of 52 months of survey of the study area, during which time there have been 281 transects walked and 64 vantage point surveys completed. Where averages are available, the average number of chough seen per sighting in a given year ranges from two to three birds, and peak counts for each sighting range from two to ten birds.

Table 4.1: Summary of all data from transect and VP surveys

Season	Months	Survey type	No. of transects / VPs	No. of sightings	Average count per sighting	Peak count within one sample
2009 – 2010 Wintering	Nov – Mar (5)	Transects	20	3	2	4
2009 – 2010 Wintering	Nov – Mar (5)	VPs	10	0	N/A	N/A
2010 Breeding	Mar – May (3)	Transects	8	5	Not recorded	Not recorded
2010 – 2011 Wintering	Oct – Mar (6)	Transects	24	9	2	4
2010 – 2011 Wintering	Oct – Mar (6)	VPs	10	0	N/A	N/A
2011 Breeding	Mar – May (3)	Transects	8	2	Not recorded	Not recorded
2012 Breeding	Apr – Jul (4)	Transects	8	Not recorded	Not recorded	2

Season	Months	Survey type	No. of transects / VPs	No. of sightings	Average count per sighting	Peak count within one sample
2012 – 2013 Wintering	Oct – Mar (6)	Transects	12	15	Not recorded	4
2013 Breeding	Apr – Jul (4)	Transects	21	5	2.2	4
2013 Breeding	Apr – Jul (4)	VPs	7	0	N/A	N/A
2013 – 2014 Wintering	Oct – Mar (6)	Transects	36	13	2.2	6
2014 Breeding	Apr – Jul (4)	Transects	24	7	2.7	6
2014 – 2015 Wintering	Oct – Mar (6)	Transects	36	7	2.4	4
2017 Wintering	Jan – Mar (3)	Transects	36	10	2.1	4
2017 Breeding	April – July (4)	Transects	48	17	3.0	6
2017 Breeding pursuit surveys	May – June (2)	VPs	37	107	2.3	10

4.4 Limitations of survey results

The survey methodologies for recording breeding and over-wintering birds in years 2009 to 2015 given above are designed to give estimates of bird density across a landscape by sampling bird communities. They are not intended for mapping accurately the total number of birds or individual territories within a given area. However, these data are considered valuable for assessing potential effects on chough arising from the Project. This is from their value in providing a picture of the locations used by chough and typical numbers.

Survey extents and sampling methods have varied between years as the scope of the project has evolved. This prevents direct comparisons between years. This constraint was identified following stakeholder engagement and was a reason why dedicated chough surveys were completed during 2017. With the addition of the results from dedicated surveys, including data gathered on chough habitat usage, the baseline information is consequently more robust.

5. Discussion

This section discusses the results and assessment implications of the desk study and surveys carried out between 2009 and 2017.

5.1 Chough populations

5.1.1 Regional context

The historical context for the Anglesey chough population is that the island was devoid of breeding chough, the species having gone locally extinct, prior to recolonisation in the 1960s (Johnstone *et al.*, 2007). The Wylfa Head population is likely to be one of a number of 'pioneer' populations that have formed on the coast of Anglesey during recent years. The data suggest that the Anglesey population is stable, but small and slow-growing, a trait typical of pioneer populations of chough (Johnstone *et al.*, 2007).

A study by Reid *et al.* (2006) of choughs on Islay showed that habitat quality at the location of natal origin had an effect on survival rates of chough both as sub-adults and adults. Choughs fledged from areas of high quality habitats had a higher rate of survival at both age classes than choughs fledged from lower quality habitats. Adult survival rate was better explained by natal region than the region in which the bird settled to breed. For Anglesey, the implication of this study is that birds fledged from the high quality habitats of the Holy Island / Glannau Ynys Gybi SPA are the individuals which have the highest likelihood of survival as sub-adults and adults regardless of where they settle to breed. Conversely, choughs fledged from other locations around Anglesey could have, on average, a lower likelihood of survival – a factor which would be applicable to the adult birds breeding at Wylfa Head (see 3.5.2), whose origins are outwith the SPA network.

5.1.2 Study area population between 2009 and 2017

The baseline data show that between November 2009 and June 2017, chough numbers within the study area have varied relatively little. The peak count is 10 birds in the breeding season (a single count of 10 un-ringed birds of unknown origin during pursuit surveys) and six birds in the non-breeding season. Within the data up to 2017 there is no discernible pattern or trend showing an increasing or decreasing population. Within the breeding data up to 2017 there is also no pattern shown in the number of chicks that have been produced since 2009, the year in which monitoring started. More recently in 2016 and 2017, the number of breeding birds at Wylfa Head has reduced to one pair.

The results show that any assessment of impacts on the species should be based on a study area population comprising two breeding pairs and their offspring during the summer, and in winter the study area should be assessed based on its potential to support approximately six birds.

The peak counts of chough from desk study data and surveys suggest that the study area does not form one of the locations of non-breeding-season flocking by the species, which, as described by Cross and Stratford (2015a), can be upwards of 80 birds. This would also suggest that the study area does not form a staging post on the regular routes taken by chough from North Wales to over-wintering sites 60 km away in Snowdonia (JNCC, 2015a). The data however, do suggest that chough from the wider regional population visit the Wylfa Newydd Development Area and a functional link therefore exists, this is discussed further in Section 5.3.

5.1.3 Study area population with regard to SPA population thresholds

The maximum number of chough (six) recorded in the study area during the non-breeding season is below the threshold for SPA selection for non-breeding individuals (9) (JNCC, 2015a). However, there are non-breeding season management units of the Church Bay / Carmel Head possible SPA birds within the study area (see Figure 6.8, Appendix C). Chough using the study area would therefore potentially contribute to the non-breeding 2002-2007 mean individuals counts of 14 within the Church Bay / Carmel Head possible SPA (see Table 3.2), which would be above the SPA population threshold.

Usage of the study area by chough from the Church Bay / Carmel Head possible SPA during the non-breeding season is therefore acknowledged, but the level of use is not significant.

The figure of two breeding pairs is also below the selection threshold of three pairs for SPA selection for breeding chough populations (JNCC, 2015b). Unlike the non-breeding season, no breeding season management units for chough from the Church Bay / Carmel Head possible SPA exist in the study area (see Figure 6.7, Appendix C). The breeding season chough recorded in the study area therefore do not contribute to the selection threshold for the Church Bay / Carmel Head possible SPA population.

5.2 Sensitivity to disturbance

In recent years there have been a number of changes to the habitats within the Wylfa Newydd Development Area as a result of a cessation of grazing in some areas to facilitate ground investigation and archaeological trial trenching. These activities have taken some land out of habitat management methods ideal for chough, and have potentially had the effect of displacing chough via disturbance during operation. The Wylfa Newydd Development Area is also subject to a number of other disturbance operations above that considered normal in an agricultural environment. There are vehicle movements in association with site security, ecological surveys and noise associated with the Existing Power Station, including loud fire alarm tests and stack venting. Choughs in the study area are therefore currently exposed to many short-term disturbance impacts.

Chough are considered to be generally resilient to disturbance as long as the disturbing factors are regular and present prior to breeding attempts, or occur later in the breeding period after the initial setting up of breeding territories (Adrienne Stratford / RSPB *pers. comm.*). A 'new' disturbance event during the early stages of the breeding season can cause birds to desert the nest site for the season, whereas a similar level of disturbance taking place further in to the breeding season is much less likely to have an adverse effect.

5.3 Possible functional linkages with SPAs designated for chough

The following three sections describe the three possible functional linkages identified from the data above.

5.3.1 SPA chough using the Wylfa Newydd Development Area and Associated Development sites during the breeding season

A possible functional linkage would be that chough from SPAs were using the Wylfa Newydd Development Area or Associated Development sites during the breeding season.

Chough is a well-recorded species with data showing that the species has been recorded widely around the Anglesey coast. The ecology, and in particular the diet, of chough is also well understood (*e.g.* Whitehead *et al.*, 2005) with the provision of short grassland and suitable nesting sites being critical.

Whitehead *et al.* (2005) studied 15 different habitat types used by 14 pairs of choughs at four breeding sites during the breeding season. The results showed that habitats used preferentially by chough were those where grassland sward heights were less than 2 cm, and where present, bare earth paths and cloddiau were particularly strongly used. This is related to the ease with which choughs can walk on vegetation, and access their invertebrate prey within the soil. These habitats are often associated with agricultural land-uses, in particular stock grazing.

The data presented in this report concur with these findings, with desk study and survey data showing chough recorded most frequently foraging in grazed short sward grassland associated with coastal habitats, and most frequently of all on Wylfa Head within 500 m of nesting sites.

Whitehead *et al.* (2005) also showed that most foraging during the breeding season took place within 600 m of the nest site. Johnstone *et al.* (2011) found that foraging activity usually took place close to nests and was mainly within 300 m. The quality of habitat within 300 m has also been shown to directly influence breeding success. A study from Ouessant, Brittany found that fecundity was directly related to the ratio of foraging habitat with sward heights less than 5 cm and within 300 m (Kerbiriou *et al.*, 2006). Thorpe and Young (2009) recommend a precautionary approach of 1 km as a typical foraging range for choughs during the breeding season, with grassland areas with swards less than 5 cm being the most valuable habitats.

The Holy Island / Glannau Ynys Gybi SPA, at c. 15 km from the study area, is therefore beyond the maximum range of foraging chough in the breeding season (see above). Choughs breeding within the SPA are therefore

highly unlikely to use the habitats within the study area for foraging during the breeding season, and there are no records of chough originating from any SPA in the survey data during the breeding period.

The Associated Development sites closest to the Holy Island / Glannau Ynys Gybi SPA boundary are Parc Cybi Logistics Centre (2km), Valley Off-line Highway Improvements (4km) and Dalar Hir Park and Ride (4.5km). These sites are also beyond the normal foraging range of breeding chough during the breeding season and are therefore unlikely to support foraging chough from the Holy Island / Glannau Ynys Gybi SPA.

Based on our findings and applicable studies from elsewhere (Whitehead *et al.*, 2005, Johnstone *et al.*, 2011) there is considered to be no functional linkage as a result of foraging chough from any European Site (where chough is a qualifying feature) using the Wylfa Newydd Development Area or Associated Development sites during the breeding season, including the Glannau Ynys Gybi / Holy Island Coast SPA.

5.3.2 Recruitment of chough from Wylfa Head into the SPA network

Young chough, fledged from nests within the study area could disperse as far as the Holy Island / Glannau Ynys Gybi SPA, Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St. Tudwal Islands and Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island and potentially, when of breeding age, be recruited into the SPA population, thereby creating a functional link between the study area and the SPA network. Evidence of this is described in section 3.6.3, whereby two re-sightings of colour-marked choughs ringed as juveniles at Wylfa Head were from the Holy Island / Glannau Ynys Gybi SPA. Choughs breed at a minimum age of two years old, more commonly three or four years (Roberts, 1985).

The total number of breeding pairs of chough present within the region (as described in 3.7.2) is of the order of 96. The 75 km theoretical recruitment catchment of the Holy Island / Glannau Ynys Gybi SPA could therefore yield up to this number of broods of chough per year. The productivity of up to two breeding pairs from Wylfa Head could therefore represent at most a very small percentage of the total potential yearly fledgling cohort supporting its population. This percentage is not considered to represent a significant functional link with the Holy Island / Glannau Ynys Gybi SPA or the wider SPA network.

It is also considered that nest sites further away from the Holy Island / Glannau Ynys Gybi SPA are likely to contribute fewer birds than those closer to the SPA. This is based on typical bird dispersal patterns, whereby numbers of birds decrease as distance increases. This has been shown in blackbirds (*Turdus merula*), lesser black-backed gull (*Larus fuscus*) reed warbler (*Acrocephalus scirpaceus*) and wood pigeon (*Columba palumbus*) (Paradis *et al.*, 1998). This has also been seen in chough by Cross and Stratford (2015a) (see Figure 3.3) which shows an uneven distribution in chough dispersal from the Llyn Peninsular (see Figure 3.3). This showed that the numbers of chough steadily decreased within each bracket as the distance from natal sites increased. The approximate distribution of breeding pairs in the region is presented diagrammatically in Figure 5.1. Whilst it is therefore recognised that a functional linkage exists, the number of fledglings that would go on to nest within the Holy Island / Glannau Ynys Gybi SPA or the wider SPA network is therefore likely to only be a very small fraction of the total fledged from the 75 km theoretical recruitment.

There are no breeding choughs to contribute to SPA recruitment within any of the Associated Development areas.

5.3.3 SPA chough using the Wylfa Newydd Development Area and Associated Development sites during the non-breeding season

A possible functional linkage would be that chough from SPAs were using the Wylfa Newydd Development Area or Associated Development sites during the non-breeding season.

The distribution and movements of chough during the non-breeding season are more widespread than during the breeding season (e.g. Roberts, 1985). Choughs congregate at traditional roost sites outside of the breeding season and range / forage from these locations through the winter months. Thorpe and Young (2009) show that choughs exhibit fidelity to communal roosting sites during the non-breeding season, and suggest that a 6 km regular foraging range from such roosts can be used for determining potential boundaries for non-breeding SPAs. The distribution of foraging non-breeding chough at and around winter roosts can be influenced not only by available habitat quality, but also by a social overlay effect whereby young choughs learn from older choughs the location of potentially suitable foraging habitats (Adrienne Stratford, *pers. comm.*). Maintaining the integrity

of non-breeding season roost sites and foraging habitats is therefore an essential component of chough conservation.

Baseline data from surveys and records show a maximum of six choughs within the study area during the non-breeding season, but generally no more than four birds have been recorded (see Appendix E). Based on these values there are no substantial non-breeding season roosts in the study area, with numbers recorded rarely exceeding the resident two pairs and their offspring.

Prior to 2017, the provenance of chough observed in the study area during the non-breeding season was unknown – birds could have been the resident breeding pairs or potentially birds from further afield, or both. There are study area chough records throughout each period of non-breeding season surveys, generally indicating four birds foraging within habitats during winter months, with a peak count of six birds. This would seem largely consistent with the breeding pairs roaming the area, with the occasional addition of small numbers of other birds, such as their offspring or roaming immature birds. Colour ring data gathered during the 2017 winter surveys provide positive identification of one individual chough, and likely identification of another. One bird (Right leg: Blue / Red, Left leg: Red / BTO) is the individual which originated from the Holy Island / Glannau Ynys Gybi SPA in 2015 (Section 3.7.3), the other (Right leg: Yellow / Black, Left leg: Red / BTO) is the 13 year old female originally from Church Bay (Section 3.6.2). This latter bird is suspected to be the individual identified in Table 6.15 as having a yellow colour band, and that the black colour band was not detected by observers due to brief vies in poor light. Therefore, at least for the 2017 winter period, choughs foraging within the study area are shown to include individuals from the study area breeding pairs and one confirmed record of a sub-adult bird from as far afield as the Holy Island / Glannau Ynys Gybi SPA.

The review of possible chough SPAs in Wales (Thorpe and Young, 2009) identifies the Church Bay / Carmel Head possible chough SPA (non-breeding), described in section 3.3 (Figure 6.6, Figure 6.7 and Figure 6.8, Appendix C). The location of the winter roost at Church Bay is approximately 5.5km from the study area at its closest point, and therefore the study area is within the limit of the typical non-breeding season foraging range of choughs from their traditional winter roosts. The chough fledged in 2015 from the Holy Island Coast / Glannau Ynys Gybi SPA (described above) has also been recorded at Church Bay and Carmel Head and is therefore an indicator that birds using the Church Bay winter roost can reach the study area in the non-breeding season. A functional link between the study area and the possible SPA network therefore exists. However, the following factors suggest that the functional link to the possible SPA network is not significant:

- the low numbers of chough recorded in the study area in the non-breeding season;
- the availability of alternative foraging habitat closer the Church Bay / Carmel Head compared to those within the study area; and
- the distance of the study area from the Church Bay roost.

The occurrence of the 2015-born SPA bird within the study area during winter 2016 / 2017 means there is a functional link between the study area and the existing SPA network. However, as there is only a single record, the evidence does not suggest that this functional link is significant. The chough recorded was also a sub-adult bird, and therefore would not contribute to the qualifying interests of the SPA. This is therefore not considered to be sufficient evidence to suggest that this functional linkage would be significant.

Beyond the single bird recorded in 2016 / 2017, there is no further evidence of SPA birds in the study area. Whilst it is therefore recognised that the study area is within chough dispersal distances, and a bird has visited the site, what are probably more important for chough from the Holy Island Coast / Glannau Ynys Gybi SPA are habitats much closer to the SPA itself. This would include habitats within the Anglesey Coast amalgamated possible chough SPA, as illustrated in Figure 6.5.

The Associated Development sites all lie within the maximum foraging range of chough in the winter period (25km) of the Holy Island / Glannau Ynys Gybi SPA boundary. These sites could therefore support foraging chough from the Holy Island / Glannau Ynys Gybi SPA in winter.

The habitats within the study area and Associated Development sites are therefore considered to have functional links with the SPA network due to being within winter foraging ranges of SPA birds, but the evidence suggests these links are not significant.

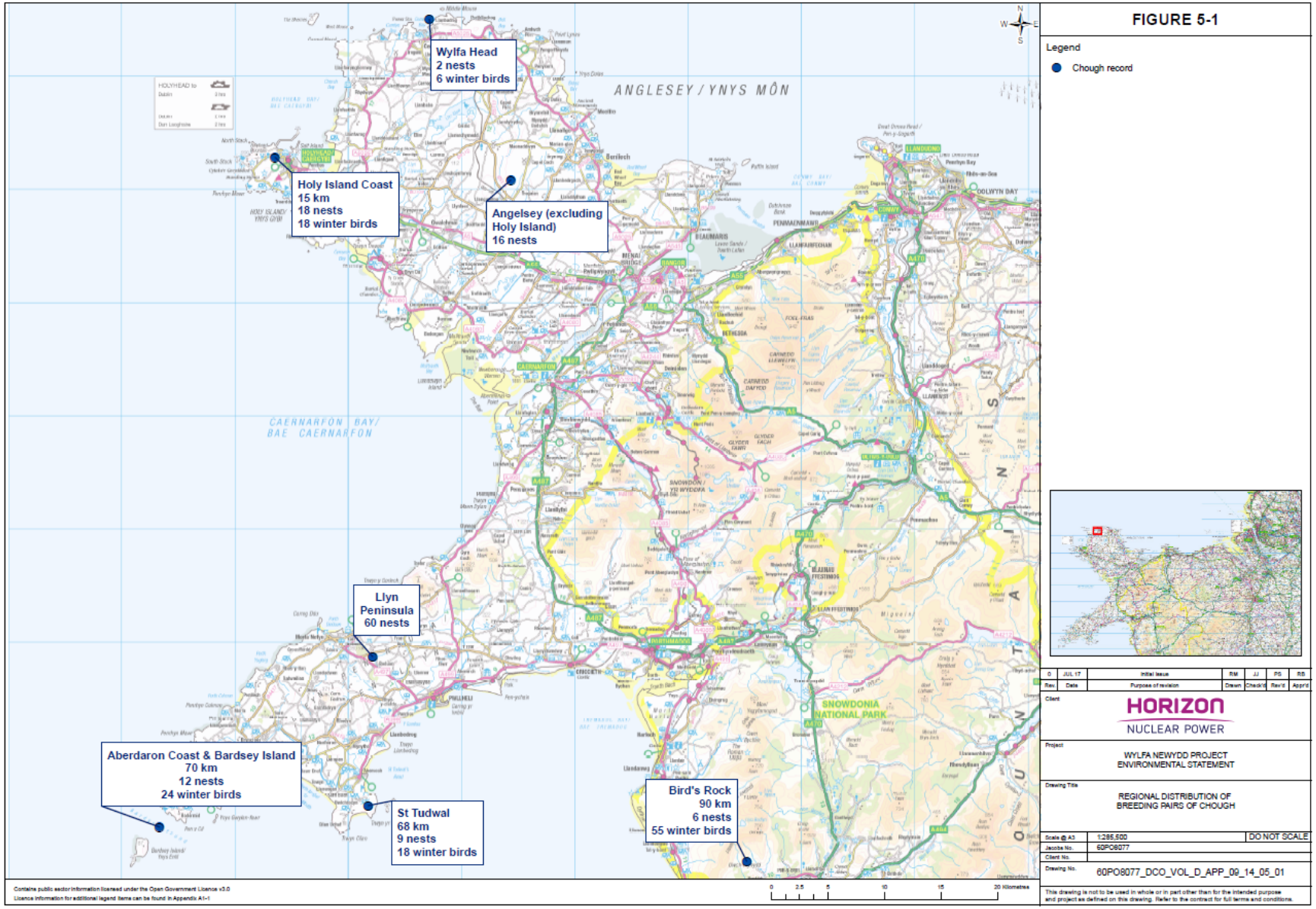

Figure 5.1: Regional distribution of breeding pairs of chough using data from review of JNCC SPA descriptions (online) and Cross and Stratford (2015a)

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Appendix A. Legal protection and conservation status of chough

Chough is afforded the highest degree of legal protection through its inclusion on Schedule 1 of the Wildlife and Countryside Act 1981 and Annex I of the Birds Directive.

Chough is also listed as a priority species in accordance with Section 7 of the Environment (Wales) Act 2016, as well as being listed on Anglesey Local Biodiversity Action Plan.

Appendix B. Project consultation

Table 6.1: Section 61Z consultation responses on the Project regarding chough

Stakeholder	Stakeholder response to section 61Z consultation	Action taken by Jacobs presented in this report
Natural Resources Wales	Chough and barn owls are protected under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). The proposed works have the potential to disturb these Schedule 1 birds. NRW advise that a Method Statement should be prepared detailing the works that will be restricted, and / or mitigation measures to be employed, to avoid disturbing Schedule 1 listed birds during the breeding period. The Method Statement should be approved by the local authority in consultation with Natural Resources Wales.	This comment relates to activities likely during construction phase of the Project, and is not relevant in the context of the basis for assessment provided in this report. However, throughout all construction phases good practice mitigation will be in operation to prevent any breaches in the legislation protecting chough and their nests.
North Wales Wildlife Trust	The environmental statement does not include a full suite of necessary data to assign evaluation and importance to features in national, regional, local context (e.g. fungi, chough, great crested newt, marine mammals).	The data from an enhanced background data search and full presentation of surveys to date, including those most recently commissioned specifically for chough are considered appropriate for addressing the concerns raised in this comment.
North Wales Wildlife Trust	Chough – no systematic targeted surveys for foraging use across the seasons – despite early evidence identifying the species as a key receptor.	Systematic targeted surveys of chough have now been completed between January and June 2017. When combined with all other data, the empirical basis for assessment is considered to be robust.
RSPB	Insufficient chough data provided.	Gathering and presenting all data available from the study area with data from additional surveys completed between January and June 2017.
RSPB	Consideration of chough in the environmental statement is very limited.	The basis for assessment presented in this report is more comprehensive than used in previous consultation documents.
RSPB	The desk study is incomplete in terms of chough usage of the site, as acknowledged by the consultants. Field study results are insufficient. Although, we acknowledge that part of the study area is supplemented by ongoing monitoring of chough nest sites conducted by the Welsh Chough Project. The use and reliance of	Chough data requested by Jacobs from the RSPB is included in this report and forms part of the basis for assessment. The full field study results available for the study area have now been included, not just data gathered during surveys by Jacobs. Overall the dataset represents information from 47 months of survey between 2009 and 2015 that was not

Stakeholder	Stakeholder response to section 61Z consultation	Action taken by Jacobs presented in this report
	generic breeding bird and winter bird surveys pre-dates the scoping advice for SPC works provided by the RSPB on 2nd March 2016. We are concerned that the retro fitting of data from the generic surveys is inadequate and is not sufficient in terms of recording chough usage of the site.	included previously due to different methodologies being used between years making comparisons difficult. Jacobs has also undertaken species-specific surveys using methods proposed by the RSPB with the intention of establishing a more robust baseline for the species. The results from these surveys are also included in this report and form the basis of assessment.
RSPB	The assessment overlooks habitat degradation through the cessation of grazing in areas outside the SPC Application Site Boundary, including key foraging areas around Wylfa Head that are 300 m from nest locations.	A management plan for Wylfa Head to ensure grassland habitats are appropriately managed is currently being prepared by Horizon with the express intention of maintaining and enhancing foraging areas for chough. This report highlights the importance of habitat quality parameters e.g. grazing pressure, to distribution and success of chough.
RSPB	We are concerned that the Glannau Ynys Gybi / Holy Island Coast SPA has been screened out by a premature HRA without sufficient data. We recommend that further consideration is made to the relationship between the study area and the SPA. We would also like to add that consideration is given to the JNCC third review of the UK SPA network which has very recently been published.	This report provides additional information in support of our professional opinion that there are no significant functional linkages between the study area populations and the Glannau Ynys Gybi / Holy Island Coast SPA. Included in the additional background data information used to form the basis for assessment is information from the JNCC third review of the UK SPA network and the 2009 review of chough SPAs in Wales.
RSPB	It is important that the condition of foraging habitat at Wylfa Head is enhanced and grazing is modified to manage the site for chough, a feature of the proposed candidate Wildlife Site. Enhancement could be achieved through mechanical means such as flailing to remove the longer grass sward and open up areas to grazing animals. In addition, a grazing plan needs to be devised to help restore the condition of the habitat. The grazing plan should also include the grassland along the coastal strip outside the development area	A management plan for Wylfa Head to ensure grassland habitats are regularly cut is currently being prepared by Horizon with the express intention of maintaining and enhancing foraging areas for chough. This report highlights the importance of habitat quality parameters e.g. grazing pressure to distribution and success of chough.

Stakeholder	Stakeholder response to section 61Z consultation	Action taken by Jacobs presented in this report
	between Wylfa Head and Porth y Wylfa.	

Appendix C. Desk study figures

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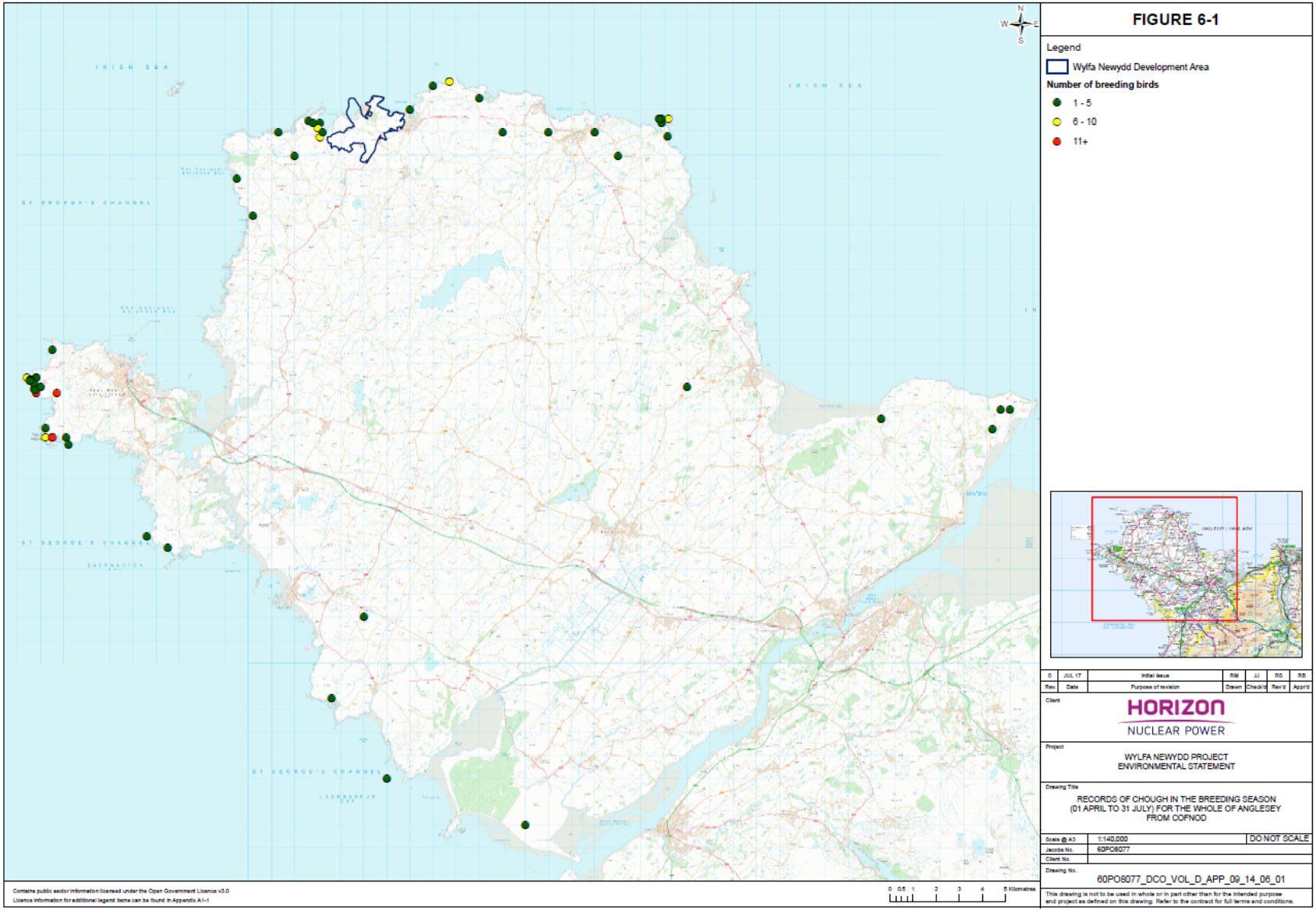

Figure 6.1: Records of chough in the breeding season (01 April to 31 July) for the whole of Anglesey from Cofnod

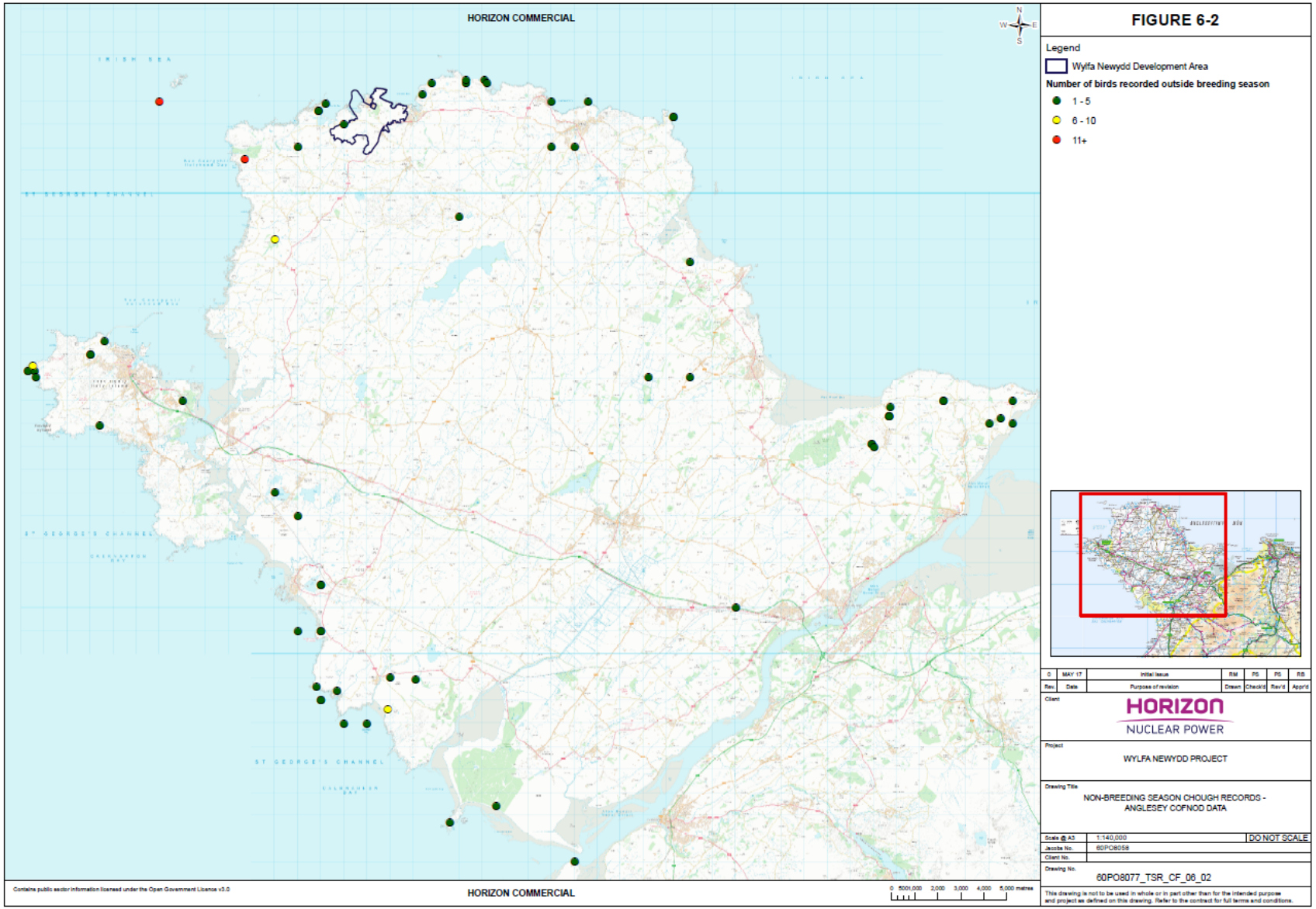

Figure 6.2: Records of chough in the non-breeding (01 August to 31 March) for the whole of Anglesey from Cofnod

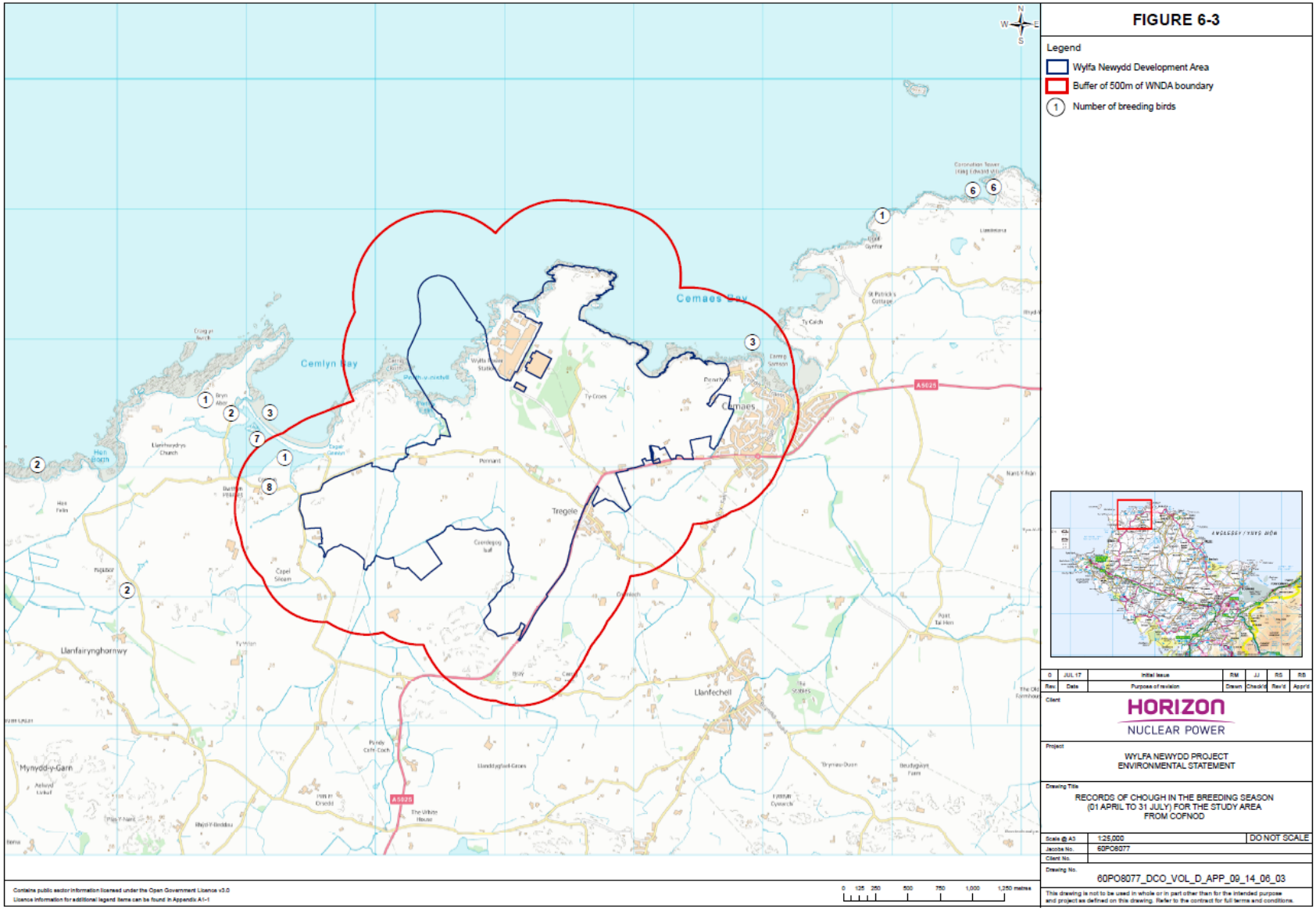

Figure 6.3: Records of chough in the breeding season (01 April to 31 July) for the study area from Cofnod

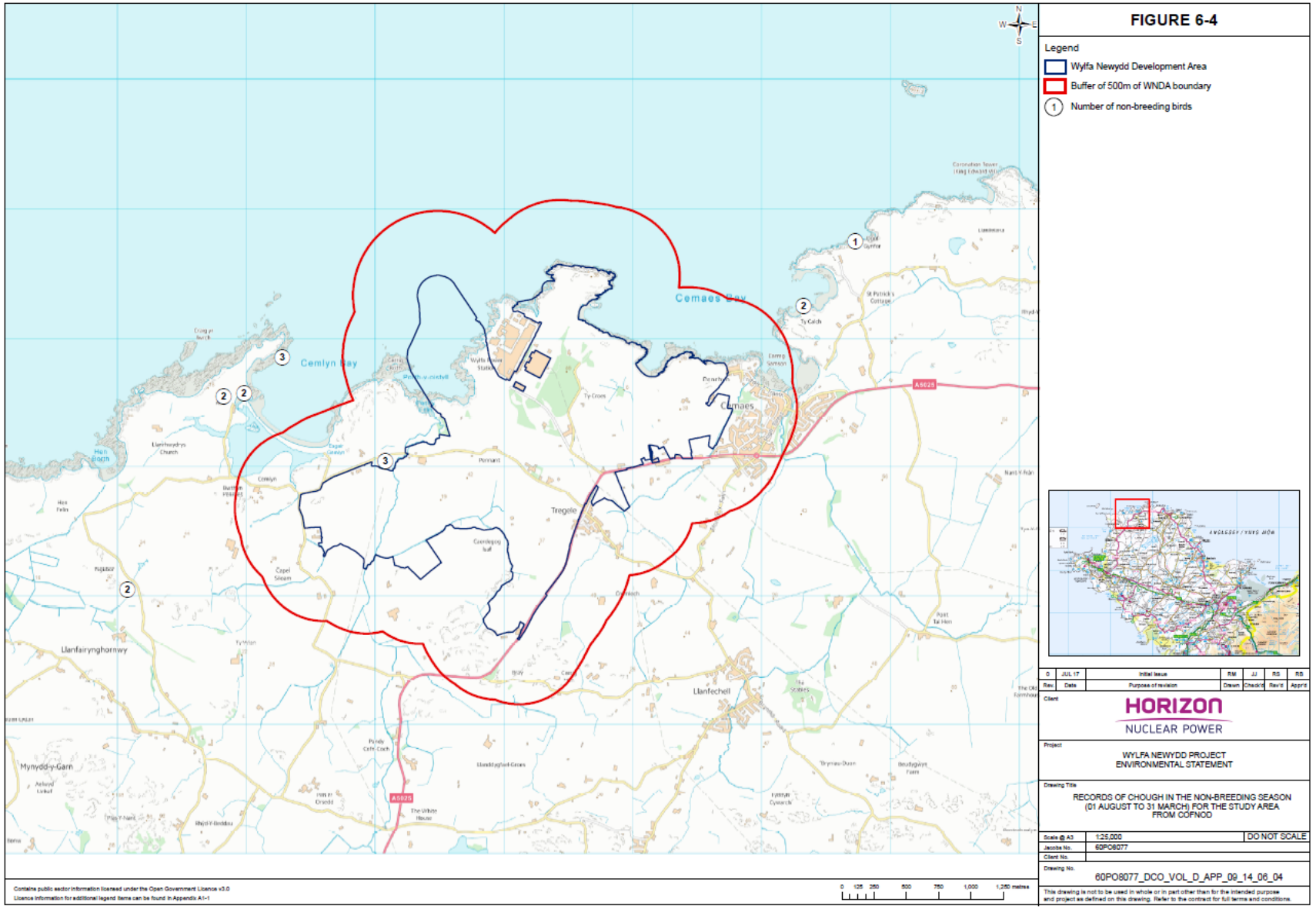

Figure 6.4: Records of chough in the non-breeding season (01 August to 31 March) for the study area from Cofnod

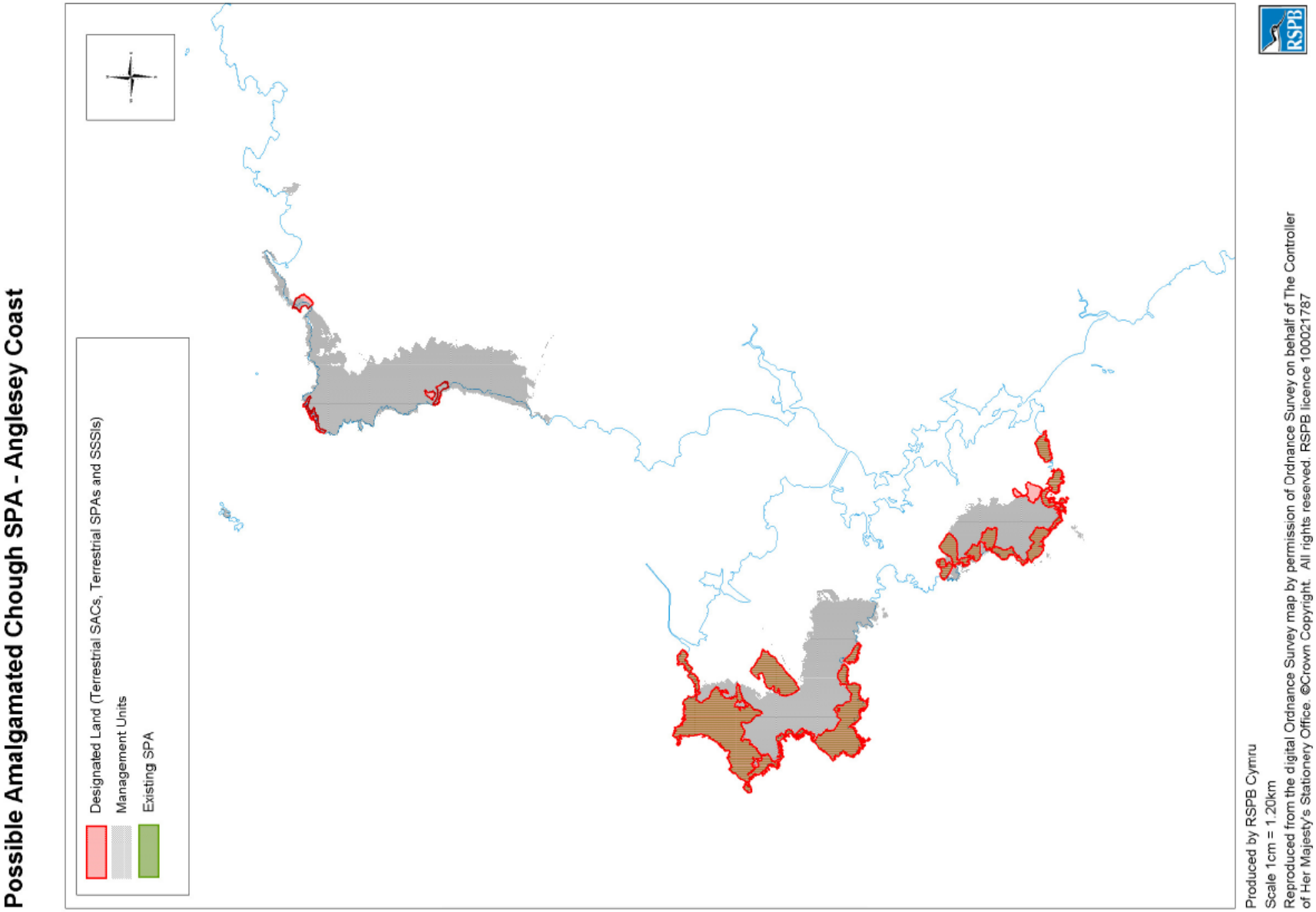

Figure 6.5: Anglesey Coast amalgamated possible chough SPA (provided by RSPB to Jacobs)

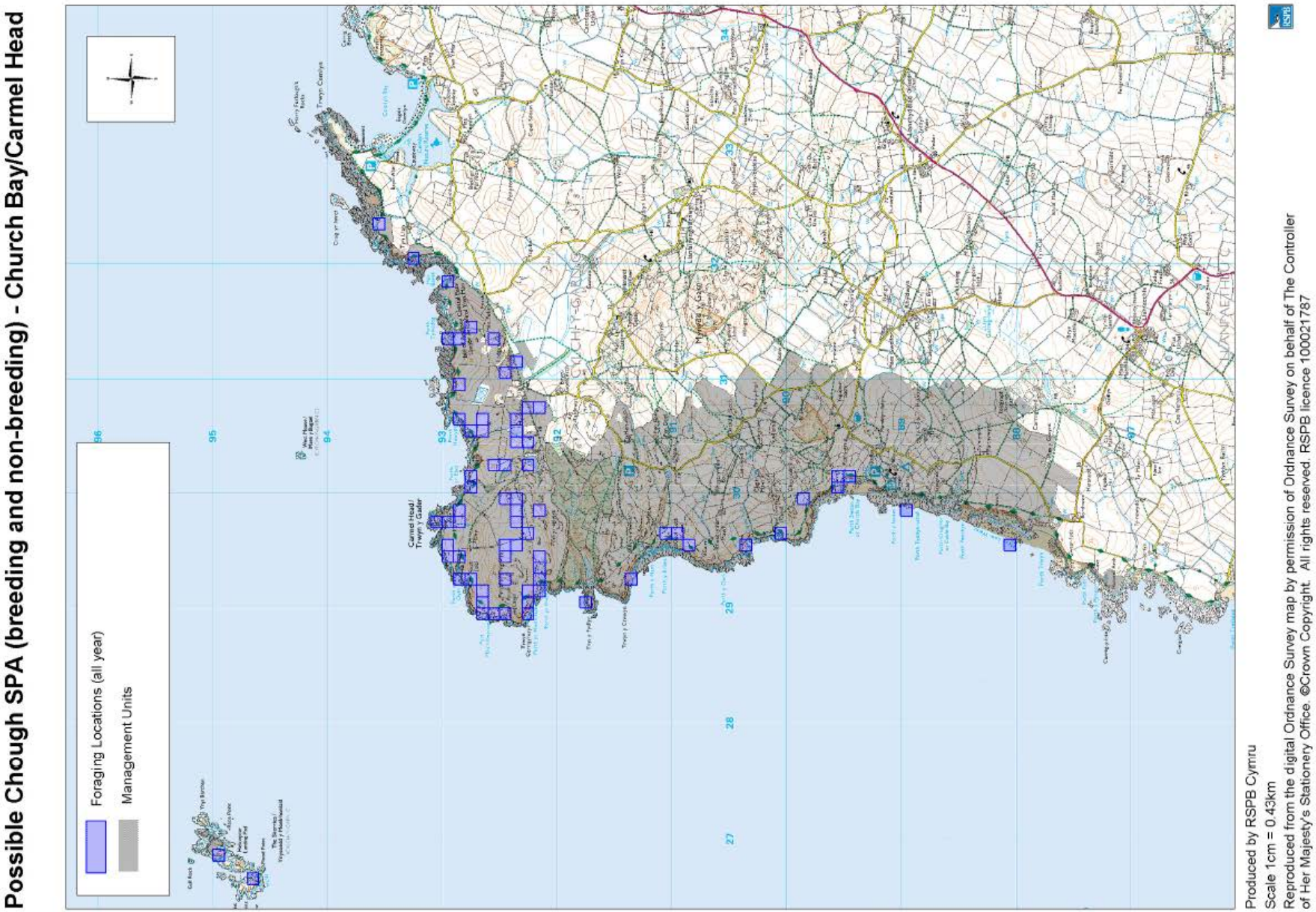

Figure 6.6: Church Bay / Carmel Head possible chough SPA (breeding and non-breeding) (provided by RSPB to Jacobs)

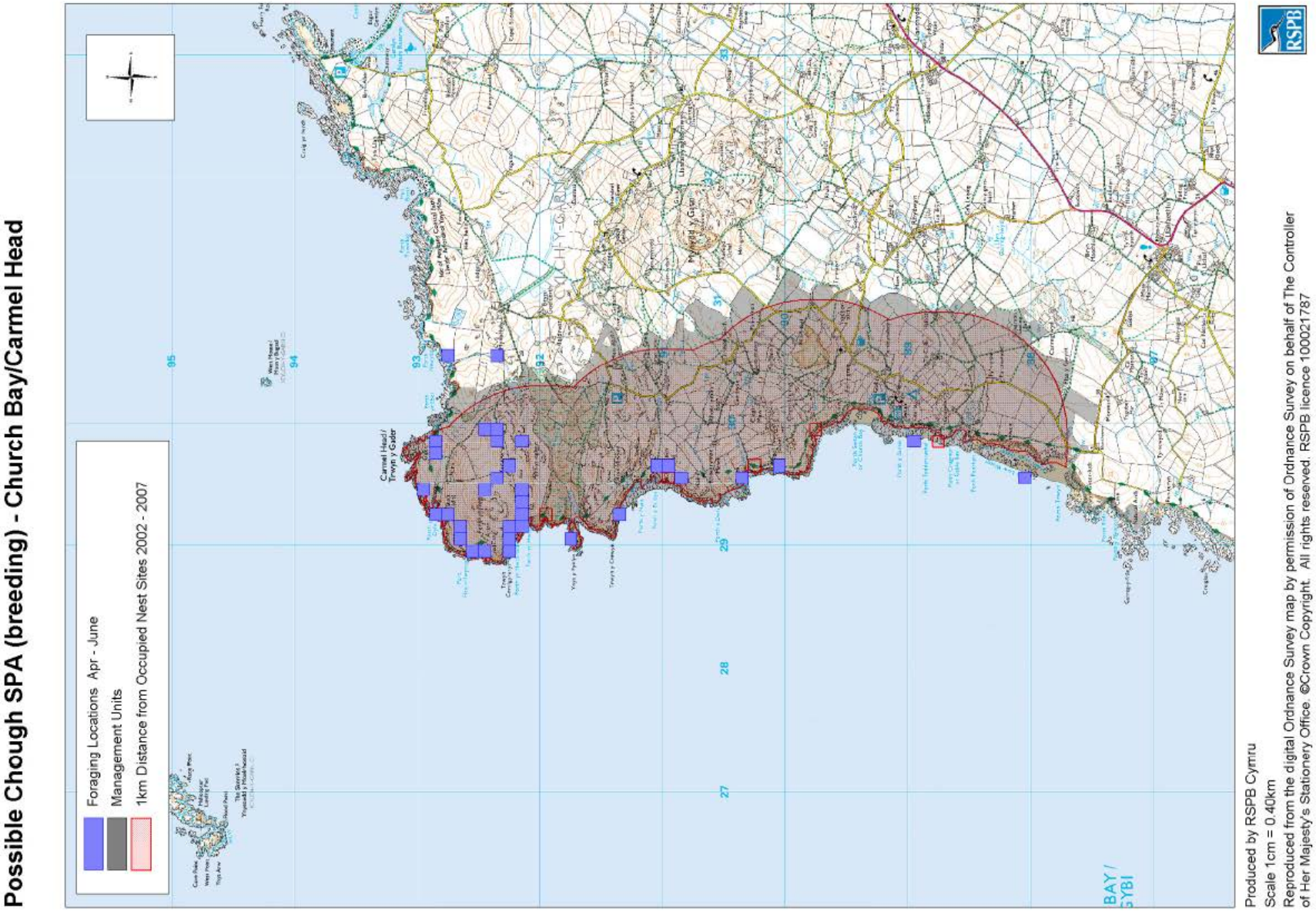

Figure 6.7: Church Bay / Carmel Head possible chough SPA (breeding) (provided by RSPB to Jacobs)

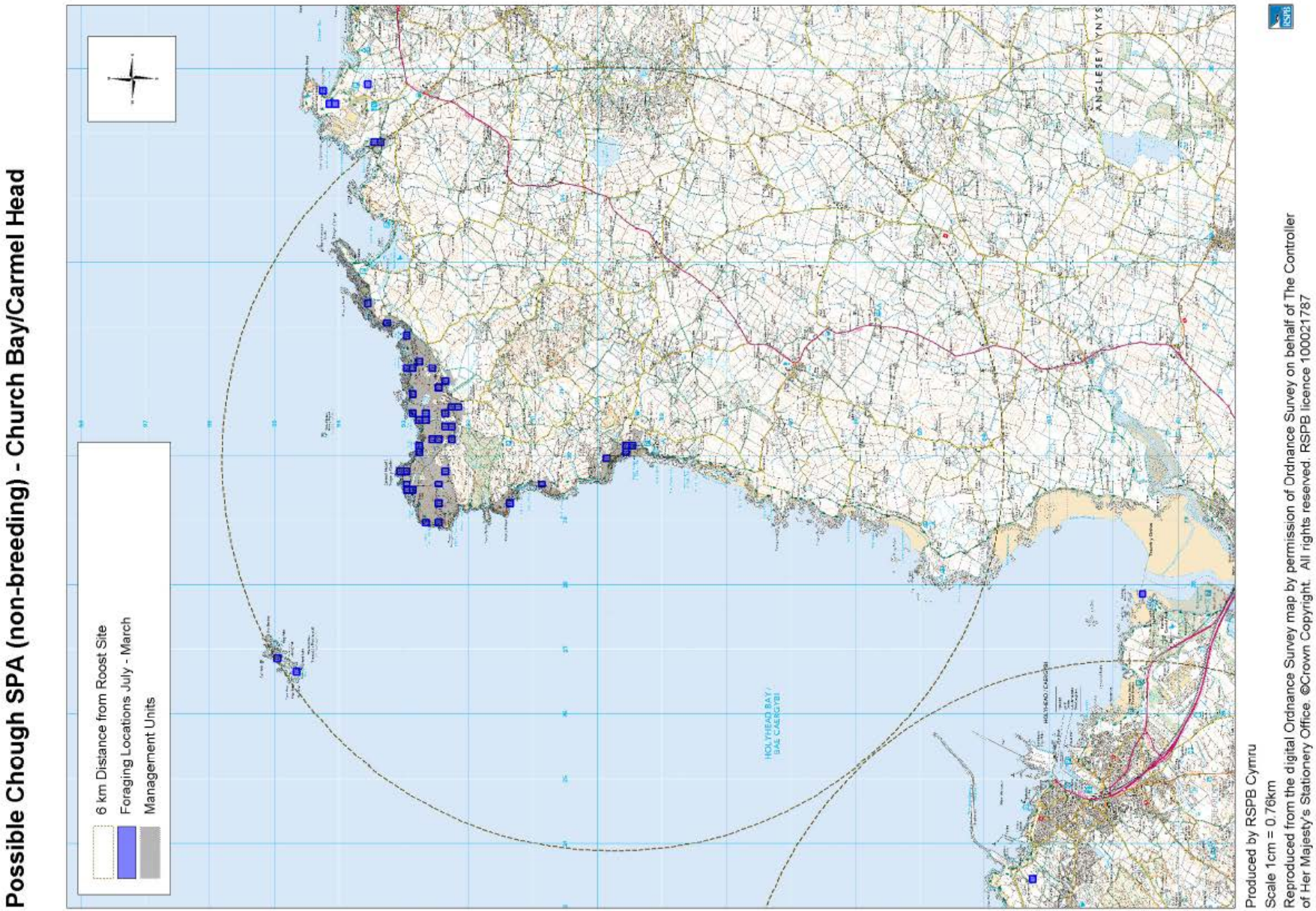

Figure 6.8: Church Bay / Carmel Head possible chough SPA (non-breeding) (provided by RSPB to Jacobs)

Appendix D. Breeding season survey results

Breeding bird survey results 2010

For the breeding bird survey season 2010, Figure 6.9 shows the area surveyed as illustrated by the green line and Table 6.2 shows the dates for the eight transects completed. Figure 6.10 shows the locations of chough sightings during the surveys (depicted by blue stars) and the surveyed area is illustrated by the green line. The numbers of chough recorded during each sighting was not included in the report.

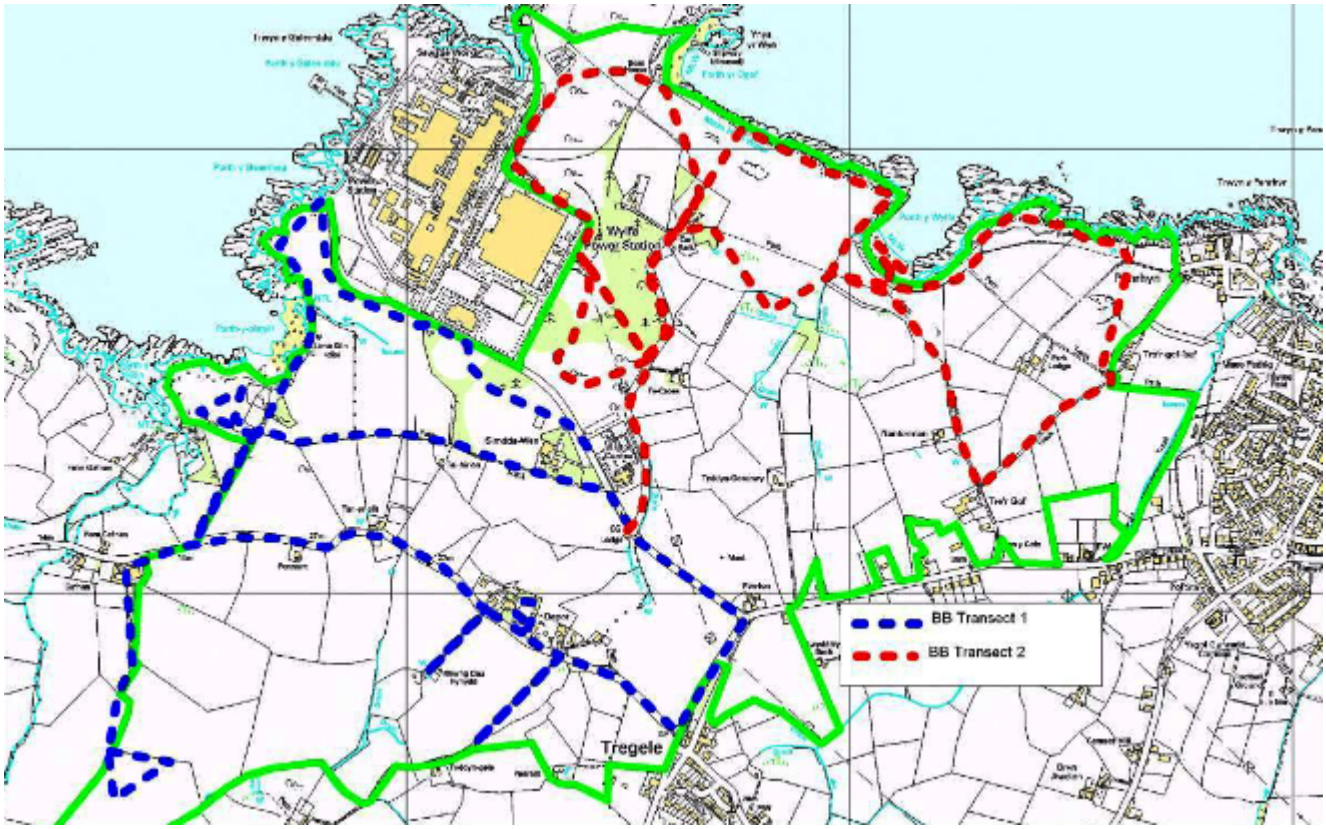

Figure 6.9: 2010 breeding bird surveys transect routes (from Arup, 2012a)

Table 6.2: 2010 breeding bird surveys transect dates (from Arup, 2012a)

Date	Transect No.	Date	Transect No.
30/03/2010	1	27/04/2010	1
31/03/2010	2	28/04/2010	2
15/04/2010	1	19/05/2010	1
16/03/2010	2	20/05/2010	2

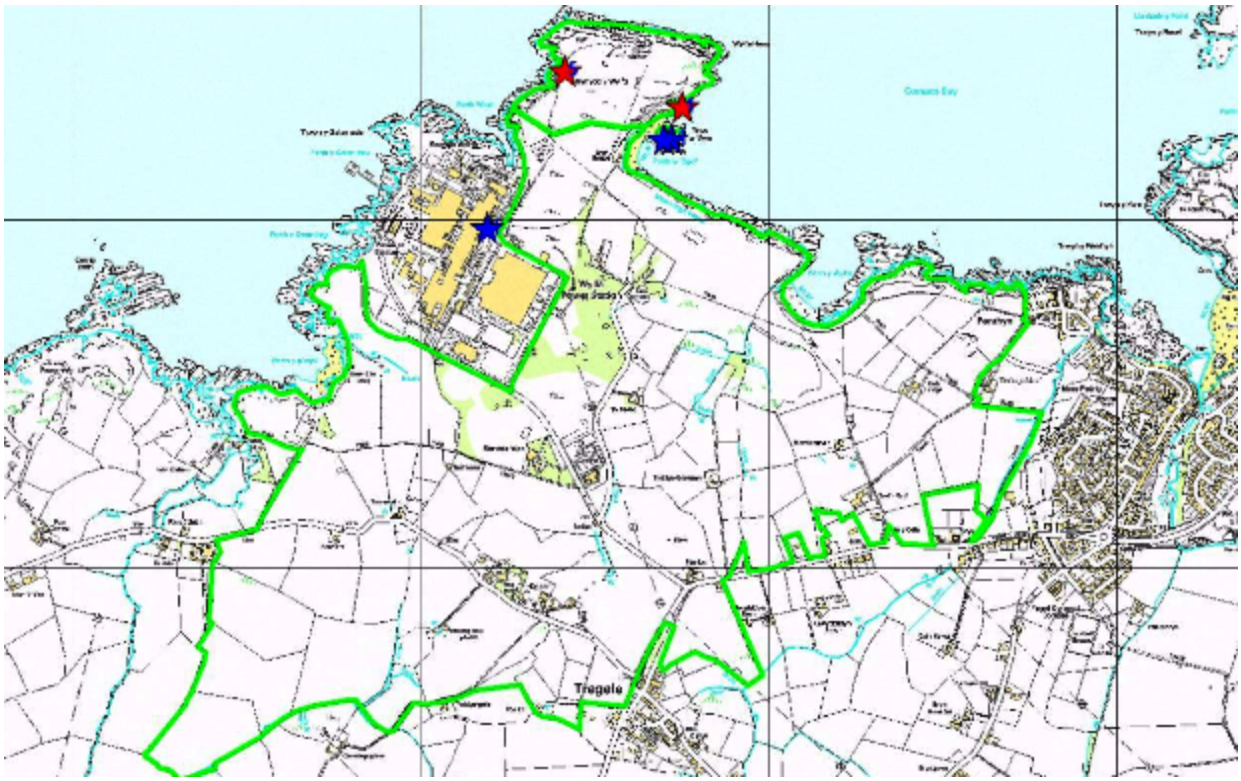

Figure 6.10: Breeding bird survey chough sightings from 2010 (blue stars) and 2011 (red stars) (from Arup, 2012a)

Breeding bird survey results 2011

For the breeding bird survey season 2011, Figure 6.11 shows the study area as illustrated by the green line and Table 6.3 shows the dates for the eight transect surveys completed. Chough sightings during the 2011 breeding season are included on Figure 6.10 depicted by red stars. The numbers of chough recorded during each sighting was not included in the report.

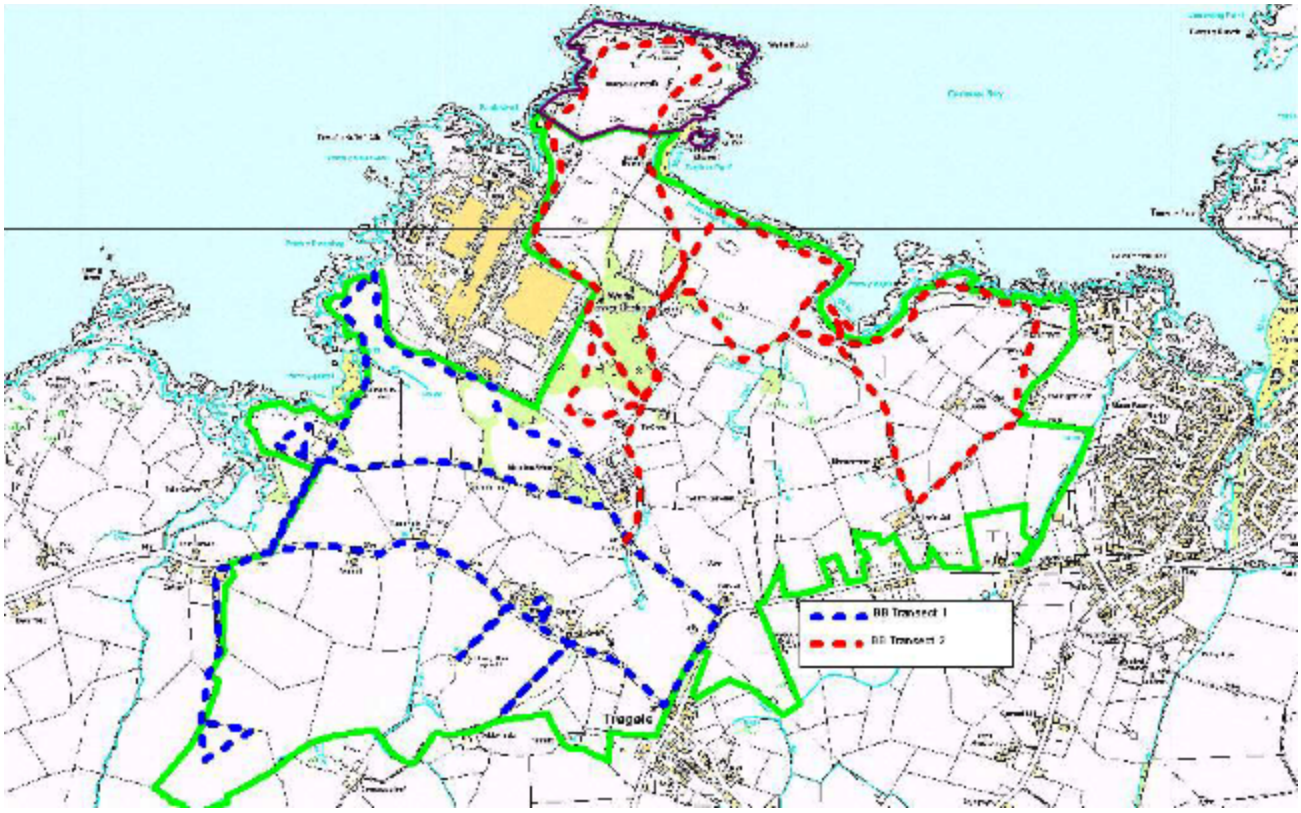

Figure 6.11: 2011 breeding bird survey transect routes (from Arup, 2012a)

Table 6.3: 2011 breeding bird survey transect dates (from Arup, 2012a)

Date	Transect No.	Date	Transect No.
22/03/2011	1	26/04/2011	1
23/03/2011	2	27/04/2011	2
05/04/2011	1	17/05/2011	1
06/04/2011	2	18/05/2011	2

Breeding bird survey results 2012

For the breeding bird survey season 2012, Figure 6.12 shows the study area and Table 6.4 shows the dates for the transect surveys completed. Chough sightings during the 2012 breeding season are included on Figure 6.13.

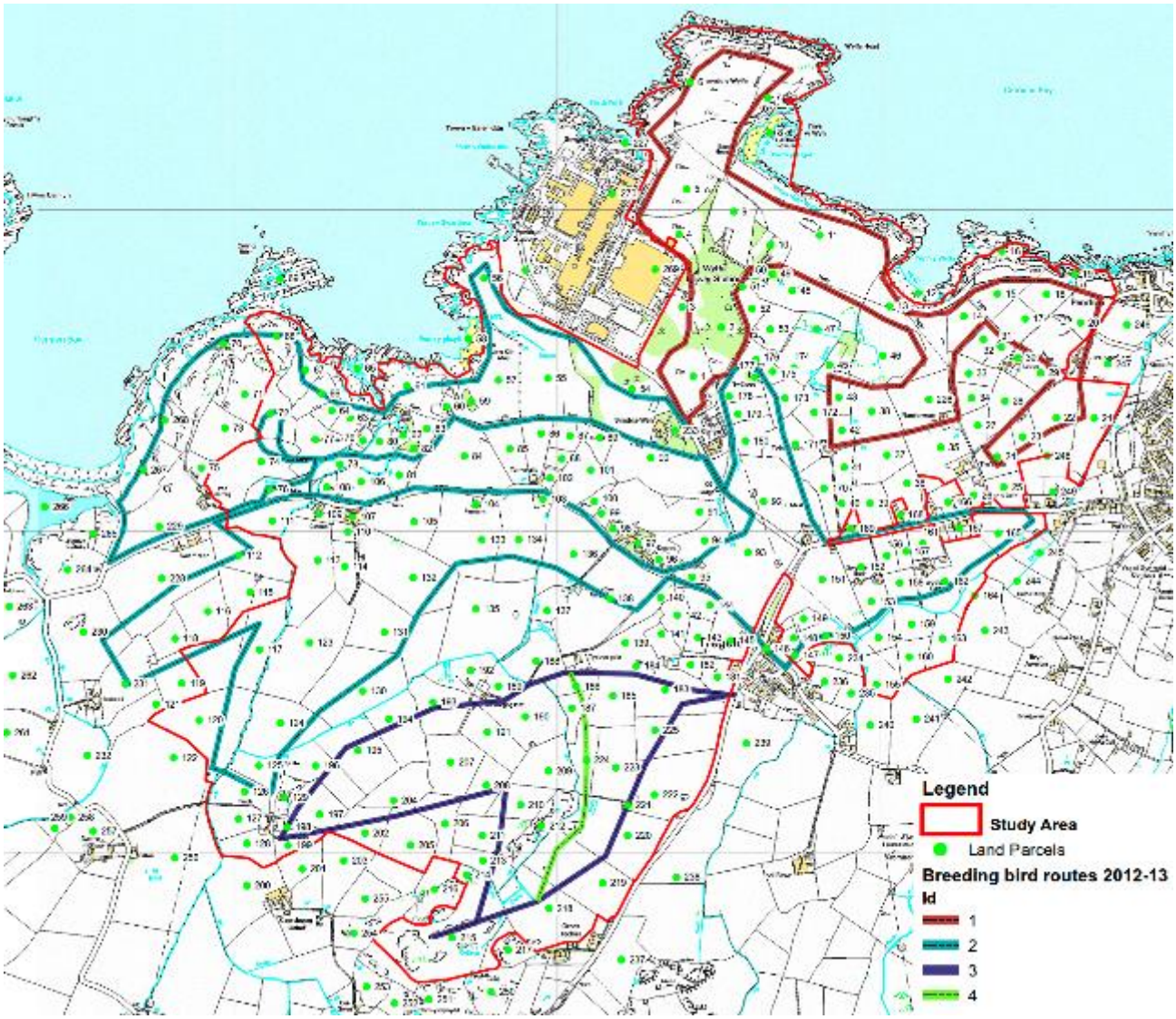

Figure 6.12: 2012 breeding bird surveys transect routes (green circles and associated numbering represent field numbers) (from Arup, 2013a)

Table 6.4: 2012 breeding bird survey transect dates (from Arup, 2013a)

Date	Transect No.	Date	Transect No.
17/04/2012	1	13/06/2012	1
18/04/2012	2	14/06/2012	2
15/05/2012	1	10/07/2012	1
16/05/2012	2	11/07/2012	2

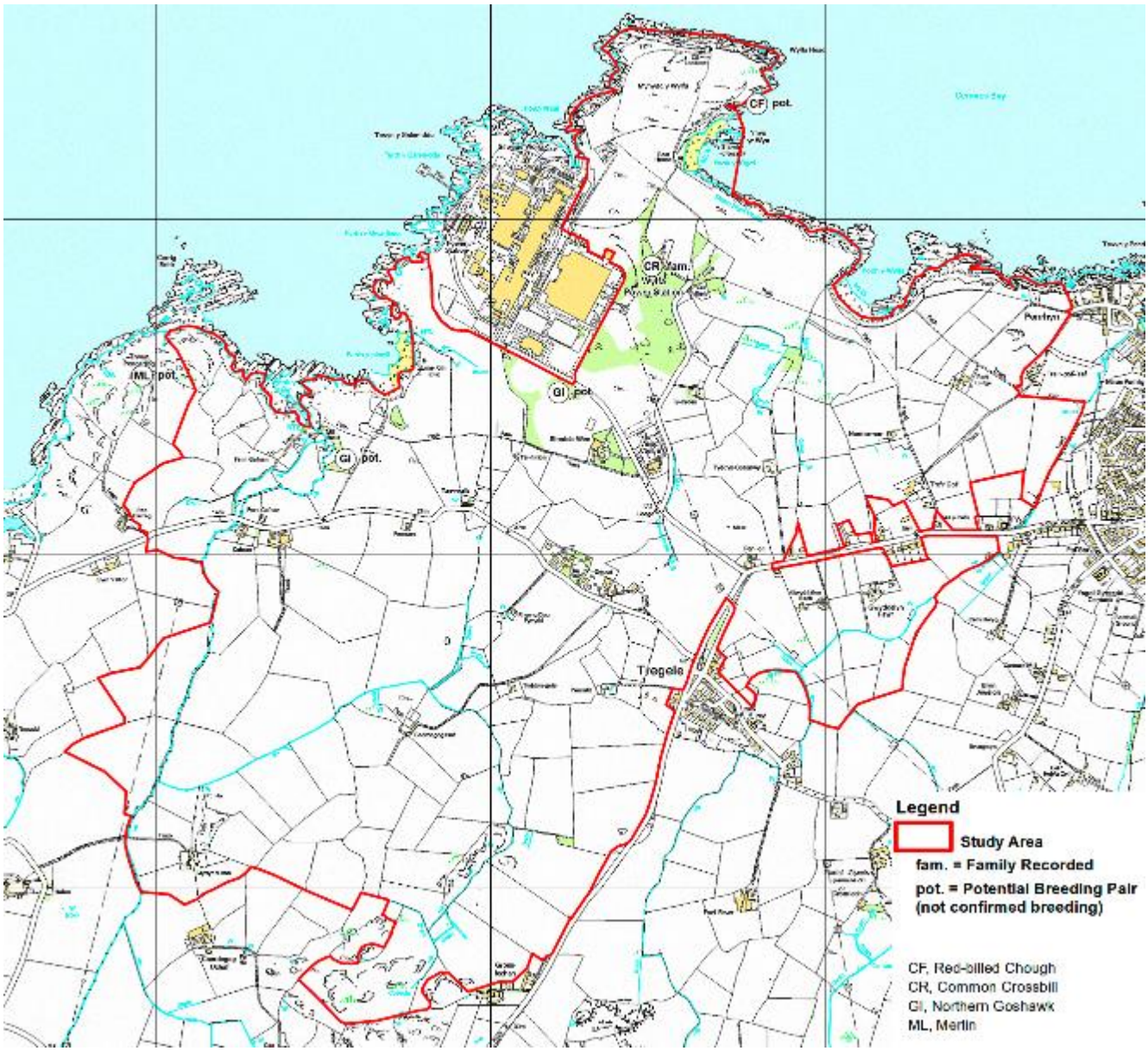

Figure 6.13: 2012 breeding bird survey chough sightings (from Arup, 2013a)[3]

[3] CF (British Trust for Ornithology code for chough) location identified on east side of Wylfa Head, pot. relates to potential nesting behaviour being recorded.

Breeding bird survey results 2013

The breeding birds survey in 2013 comprised six transect routes walked between one and three times for a total of 21 surveys and seven vantage point surveys, as shown in Figure 6.14. Transects in April and May were completed by Arup, with data provided to Jacobs who completed the survey. It was not possible to differentiate between birds recorded in April and May in these data, therefore they have been grouped together, as shown in Table 6.6.

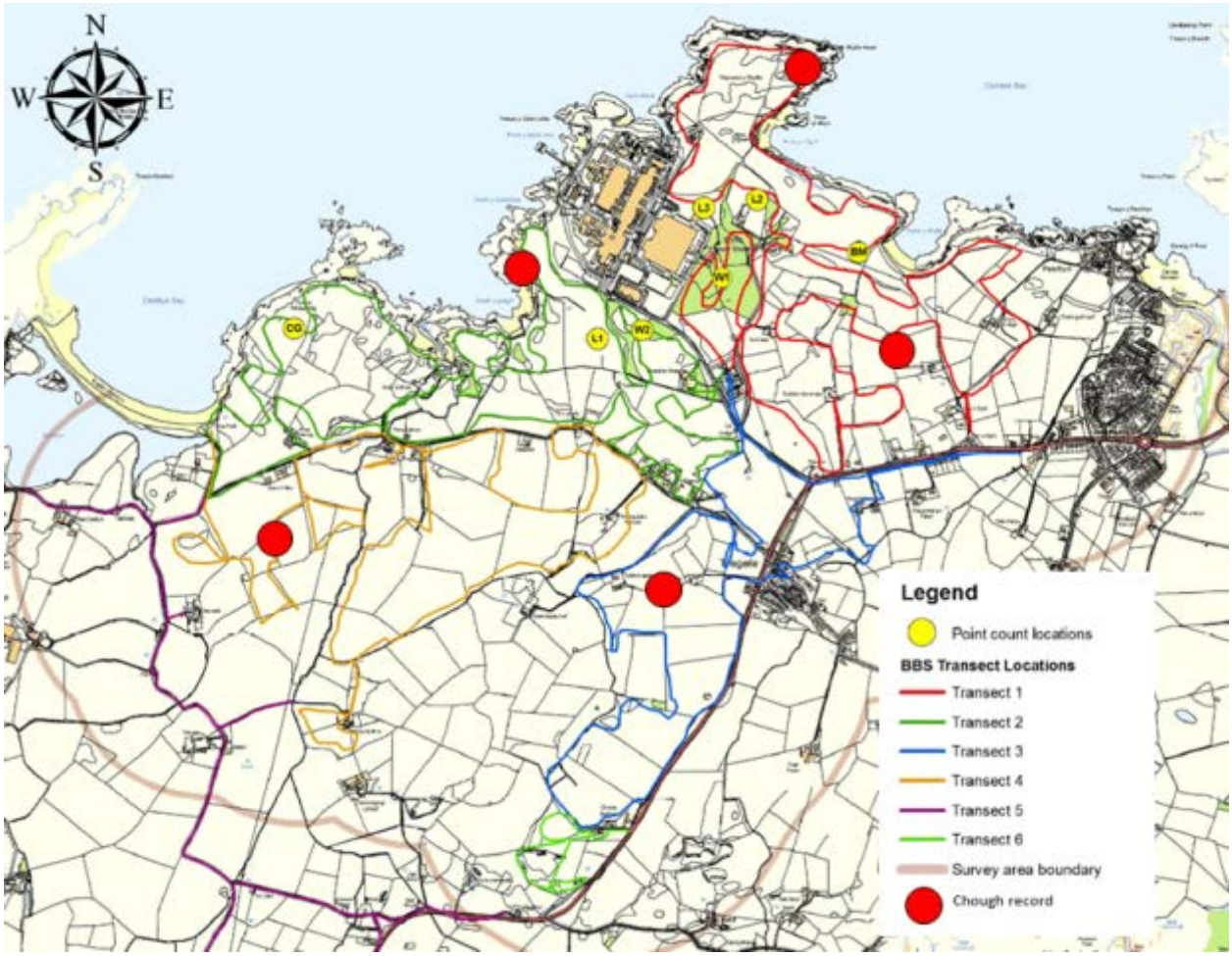

Figure 6.14: 2013 breeding bird survey transect routes and vantage point locations (from Jacobs, 2014a)

Table 6.5: 2013 breeding bird survey transect dates and chough sightings (from Jacobs, 2014a)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
April and May	1	4	April and May	4	2
18/06/2013	1	0	25/06/2013	4	0
09/07/2013	1	2	12/07/2013	4	0
April and May	2	1	April and May	5	0
20/06/2013	2	0	26/06/2013	5	0
10/07/2013	2	0	30/06/2013	5	0
April and May	3	2	05/05/2013	6[4]	0
19/06/2013	3	0	-	-	-
11/07/2013	3	0	-	-	-

[4] Only one transect was completed for Transect 6.

Table 6.6: 2013 breeding bird survey dates of the vantage point surveys (from Jacobs, 2014a)

Date	Point count	Chough sighted	Date	Point count	Chough sighted
17/06/2013	L1	0	08/07/2013	W2	0
28/06/2013	L1	0	16/07/2013	W2	0
18/06/2013	L2	0	27/06/2013	BM	0
09/07/2013	L2	0	18/07/2013	BM	0
10/07/2013	L3	0	19/06/2013	CG	0
20/07/2013	L3	0	26/06/2013	CG	0
25/06/2013	W1	0	11/07/2013	CG	0
17/07/2013	W1	0	30/07/2013	CG	0

Breeding bird survey results 2014

The breeding bird survey in 2014 comprised six transects, as shown in 23, Appendix H. Note there is no separate figure presented for 2014 breeding season results. Each transect was walked once a month between April and July, the date ranges for which and chough sightings are shown in Table 6.7.

Table 6.7: 2014 breeding bird survey transect dates and chough sightings (from Jacobs, 2014b)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
7-17/04/2014	1	1	7-17/04/2014	4	0
2-12/05/2014	1	2	2-12/05/2014	4	0
16-27/06/2014	1	0	16-27/06/2014	4	6
14-25/07/2014	1	2	14-25/07/2014	4	1
7-17/04/2014	2	0	7-17/04/2014	5	0
2-12/05/2014	2	0	2-12/05/2014	5	0
16-27/06/2014	2	5	16-27/06/2014	5	0
14-25/07/2014	2	0	14-25/07/2014	5	0
7-17/04/2014	3	0	7-17/04/2014	6	0
2-12/05/2014	3	0	2-12/05/2014	6	0
16-27/06/2014	3	0	16-27/06/2014	6	0
14-25/07/2014	3	0	14-25/07/2014	6	2

Appendix E. Non-breeding season survey results

Wintering bird survey results 2009-2010

For the wintering bird survey season 2009-2010, Figure 6.15 shows the transect routes walked, Table 6.8 shows the dates for the 20 transects completed and Figure 6.16 shows the locations of chough sightings during the surveys.

The location for the vantage point surveys was at National Grid Reference SH 35182 93031, as shown in Figure 6.17 by the blue square. In Figure 6.17 the area surveyed is shown by the green line. The blue lines on Figure 6.17 show the visible area from the vantage point location. The red lines on Figure 6.17 show potential power line routes being considered at the time of survey and are not relevant to this report. The dates for the 10 vantage point surveys are provided in Table 6.9.

Figure 6.15: 2009-2010 and 2010-2011 wintering bird transect survey routes (from Arup, 2012b)

Table 6.8: 2009-2010 wintering bird survey transect dates and chough sightings (from Arup, 2012b)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
09/11/2009	1	0	18/02/2010	1	0
10/11/2009	2	0	19/02/2010	2	0
23/11/2009	1	0	11/02/2010	1	0
24/11/2009	2	0	12/02/2010	2	0
07/12/2009	1	0	24/02/2010	1	0

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
08/12/2009	2	0	25/02/2010	2	0
22/12/2009	1	0	01/03/2010	1	0
23/12/2009	2	0	08/03/2010	2	0
04/01/2010	1	0	22/03/2010	1	0
05/01/2010	2	0	23/03/2010	2	4

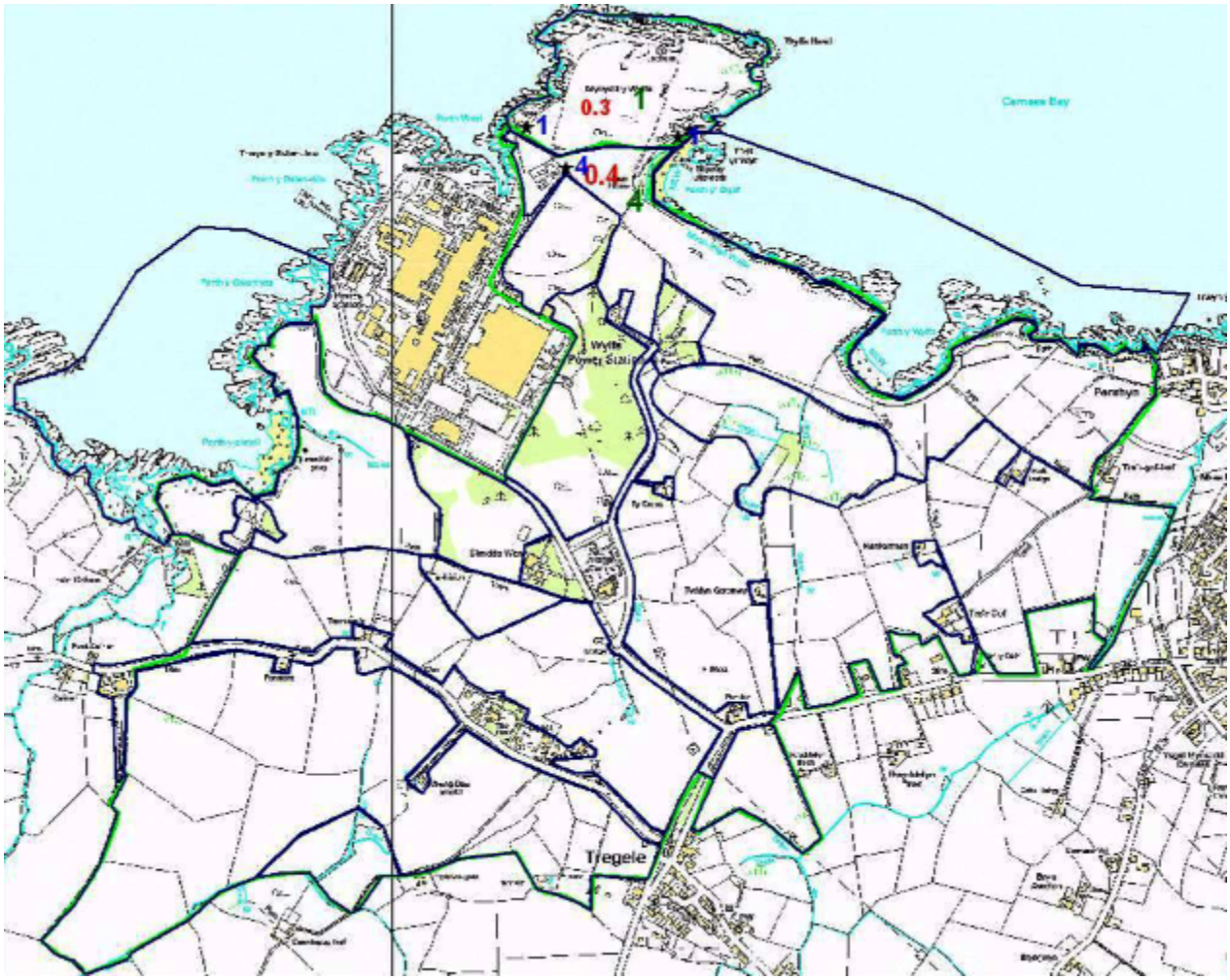

Figure 6.16: 2009-2010 wintering bird survey chough sightings (from Arup, 2012b)[5]

[5] Blue numbers refers to numbers of chough in flocks sighted, green refers to peak numbers of chough sighted and red relates to average seen per transect visit. The blue lines relate to arbitrary divisions of the study area used in 2009-2010. These divisions were not taken forward in interpreting use of the Wylfa Newydd Development by chough in this report and so are not relevant.

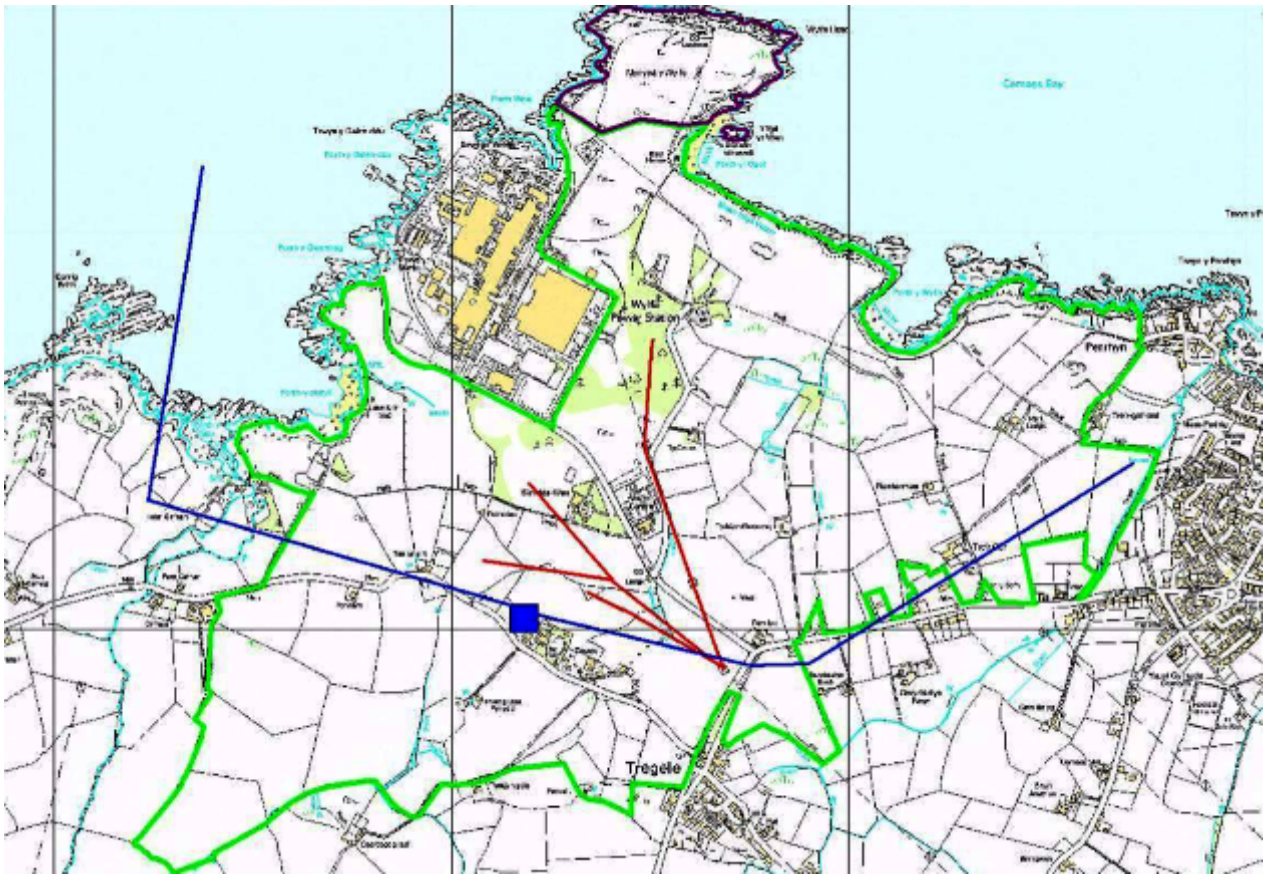

Figure 6.17: 2009-2010 and 2010-2011 vantage point survey location (blue square) (from Arup, 2012b)

Table 6.9: Vantage point survey dates 2009-2010 (from Arup, 2012b)

Date	Chough sighted	Date	Chough sighted
09/11/2009	0	19/02/2010	0
23/11/2009	0	11/02/2010	0
07/12/2009	0	09/03/2010	0
04/01/2010	0	23/03/2010	0

Wintering bird survey results 2010-2011

For the wintering bird survey season 2010-2011, Figure 6.15 (above) shows the transect routes walked, Table 6.10 shows the dates for the 24 transects completed and Figure 6.18 shows the locations of chough sightings during the surveys. The location for the vantage point survey is provided in Figure 6.17 with dates for the 12 surveys provided in Table 6.11.

Table 6.10: 2010-2011 wintering bird survey transect dates and chough sightings (from Arup, 2012b)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
05/10/2010	1	2	04/01/2011	1	0
06/10/2010	2	0	06/01/2011	2	0
25/10/2010	1	0	19/01/2011	1	2
29/10/2010	2	0	20/01/2011	2	2
11/11/2010	1	0	02/02/2011	1	0
12/11/2010	2	2	03/02/2011	2	0
23/112010	1	0	14/02/2011	1	0
24/112010	2	2	15/02/2011	2	0
06/12/2010	1	0	02/03/2011	1	0
07/12/2010	2	1+1 (different sections on transect)	03/03/2011	2	2
29/12/2010	1	0	16/03/2011	1	0
30/12/2010	2	0	17/03/2011	2	4

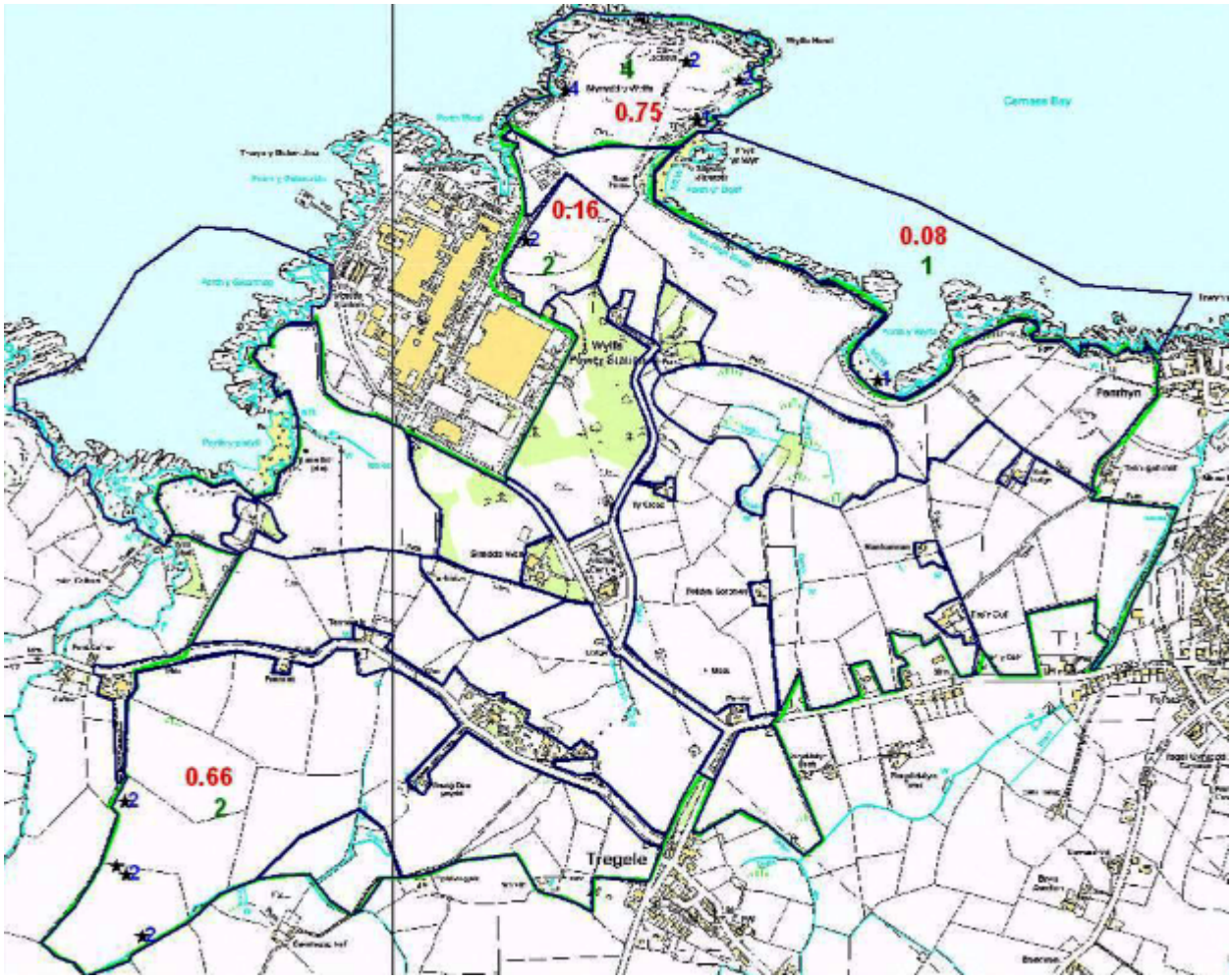

Figure 6.18: 2010-2011 wintering bird surveys chough sightings (from Arup, 2012b)[6]

Table 6.11: 2010-2011 wintering bird survey dates of the vantage point surveys (from Arup, 2012b)

Date	Chough sighted	Date	Chough sighted
06/10/2010	0	04/01/2011	0
29/10/2010	0	19/01/2011	0
04/11/2010	0	02/02/2011	0
23/112010	0	14/02/2011	0
07/12/2010	0	02/03/2011	0
29/12/2010	0	16/03/2011	0

[6] Blue numbers refers to numbers of chough in flocks sighted, green refers to peak numbers of chough sighted and red relates to average seen per transect visit. The blue lines relate to arbitrary divisions of the study area used in 2009-2010. These divisions were not taken forward in interpreting use of the Wylfa Newydd Development by chough in this report and so are not relevant.

Wintering bird survey results 2012-2013

For the wintering bird survey season 2012-2013, Figure 6.19 shows the visible land parcels during the transect route walked (Arup, 2013b). The transect route itself was not provided. Table 6.10 shows the dates for the 12 transects completed (assuming the whole site was walked over two days). The average number of chough per visit within each land parcel is provided in Figure 6.20.

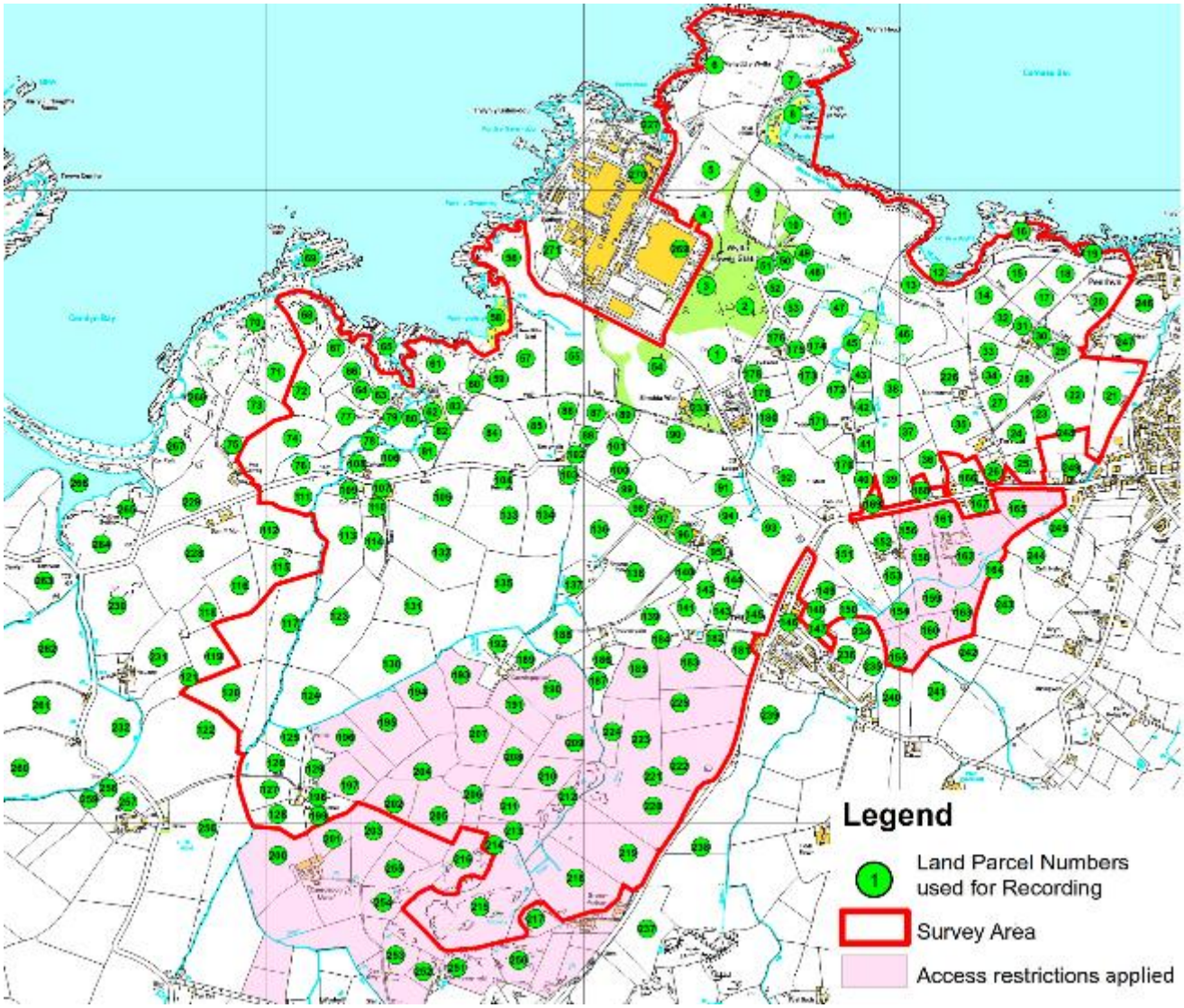

Figure 6.19: 2012-2013 wintering bird surveys visible land parcel references (from Arup, 2013b)

Table 6.12: 2012-2013 wintering bird surveys transect dates (from Arup, 2013b)

Date	Date	Date	Date
09/10/2012	29/11/2012	14/01/2013	26/02/2013
10/10/2012	30/11/2012	15/01/2013	27/02/2013
22/10/2012	04/12/2012	28/01/2013	12/03/2013
23/10/2012	05/12/2012	29/01/2013	13/03/2013
14/11/2012	12/12/2012	11/02/2013	25/03/2013
15/11/2012	13/12/2012	12/02/2013	26/03/2013

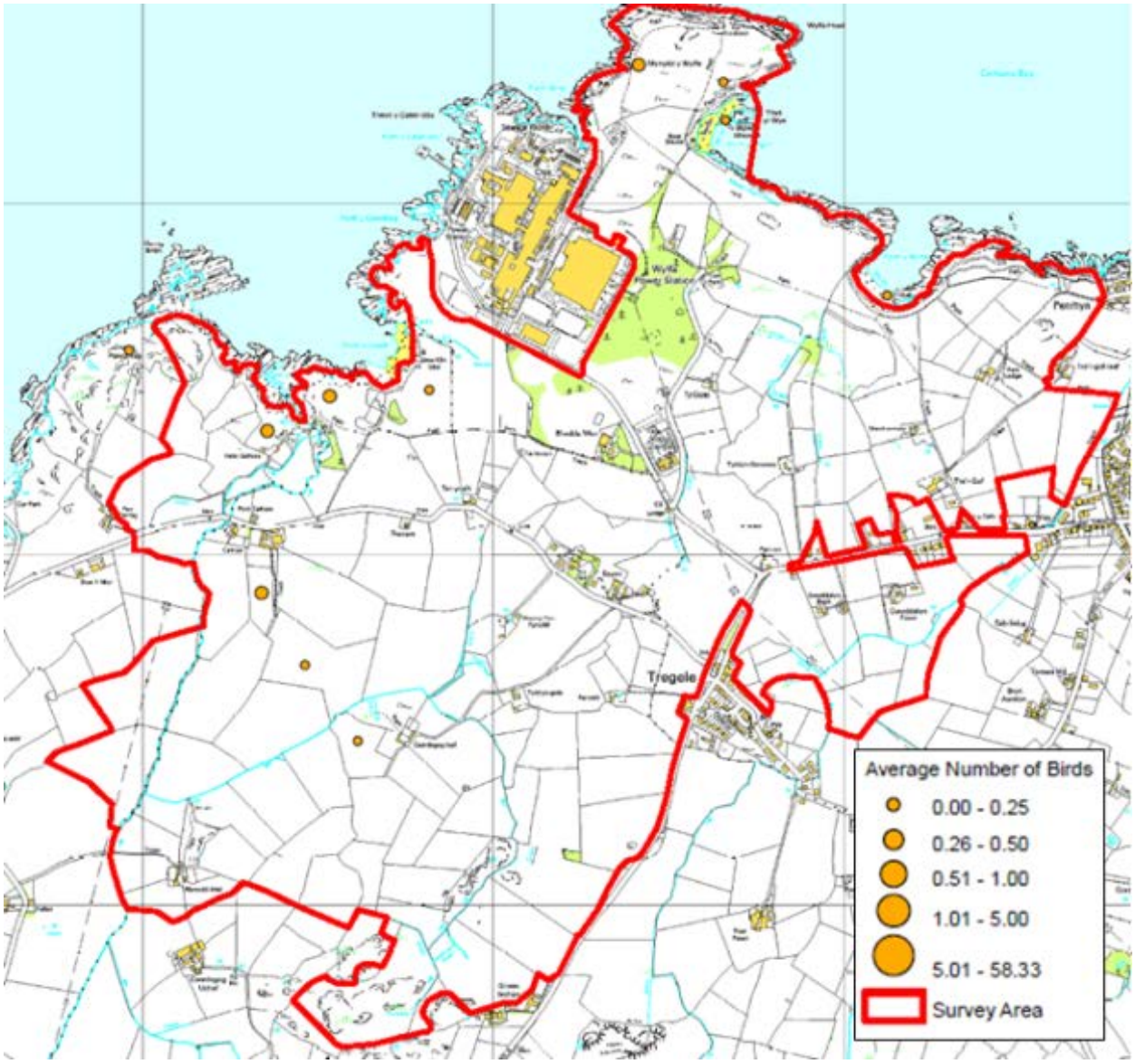

Figure 6.20: 2012-2013 wintering bird surveys average number of chough within each land parcel (n= 12) (from Arup, 2013b)

Wintering bird survey results 2013-2014

The six wintering bird transect routes and records of chough are provided in 23. Note there is no separate figure presented for winter 2013-14 results. The transect date ranges within each of the six months of survey and numbers of chough sighted are provided in Table 6.13.

Table 6.13: 2013-2014 wintering bird surveys transect dates and chough sightings (from Jacobs, 2014c)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
14-17/10/2013	1	3	14-17/10/2013	4	3
18-26/11/2013	1	1	18-26/11/2013	4	4
2-12/12/2013	1	0	2-12/12/2013	4	2
13-21/01/2014	1	0	13-21/01/2014	4	0
10-18/02/2014	1	4	10-18/02/2014	4	0
11-18/03/2014	1	1	11-18/03/2014	4	0
14-17/10/2013	2	6	14-17/10/2013	5	0
18-26/11/2013	2	0	18-26/11/2013	5	2
2-12/12/2013	2	2	2-12/12/2013	5	0
13-21/01/2014	2	2	13-21/01/2014	5	0
10-18/02/2014	2	2	10-18/02/2014	5	0
11-18/03/2014	2	2	11-18/03/2014	5	0
14-17/10/2013	3	0	14-17/10/2013	6	0
18-26/11/2013	3	0	18-26/11/2013	6	0
2-12/12/2013	3	0	2-12/12/2013	6	0
13-21/01/2014	3	0	13-21/01/2014	6	0
10-18/02/2014	3	0	10-18/02/2014	6	0
11-18/03/2014	3	0	11-18/03/2014	6	0

Wintering bird survey results 2014-2015

The six wintering bird transect routes and records of chough are provided in . Note there is no separate figure presented for winter 2014-15 results. The transect date ranges within each of the six months of survey and numbers of chough sighted are provided in Table 6.14.

Table 6.14: 2014-2015 wintering bird survey transect dates and chough sightings (from Jacobs, 2015b)

Date	Transect No.	Chough sighted	Date	Transect No.	Chough sighted
14-17/10/2014 21-22/10/2014	1	2	14-17/10/2014 21-22/10/2014	4	0
11-13/11/2014 25-26/11/2014	1	0	11-13/11/2014 25-26/11/2014	4	4
9-11/12/2014 15-16/12/2014	1	0	9-11/12/2014 15-16/12/2014	4	0
20-22/01/2015 26-27/01/2015	1	1	20-22/01/2015 26-27/01/2015	4	0
10-12/02/2015 17-18/02/2015	1	0	10-12/02/2015 17-18/02/2015	4	0
9-11/03/2015 16-18/03/2015	1	4	9-11/03/2015 16-18/03/2015	4	0
14-17/10/2014 21-22/10/2014	2	3	14-17/10/2014 21-22/10/2014	5	0
11-13/11/2014 25-26/11/2014	2	0	11-13/11/2014 25-26/11/2014	5	0
9-11/12/2014 15-16/12/2014	2	0	9-11/12/2014 15-16/12/2014	5	0
20-22/01/2015 26-27/01/2015	2	0	20-22/01/2015 26-27/01/2015	5	1
10-12/02/2015 17-18/02/2015	2	0	10-12/02/2015 17-18/02/2015	5	2
9-11/03/2015 16-18/03/2015	2	0	9-11/03/2015 16-18/03/2015	5	0
14-17/10/2014 21-22/10/2014	3	0	14-17/10/2014 21-22/10/2014	6	0
11-13/11/2014 25-26/11/2014	3	0	11-13/11/2014 25-26/11/2014	6	0
9-11/12/2014 15-16/12/2014	3	0	9-11/12/2014 15-16/12/2014	6	0
20-22/01/2015 26-27/01/2015	3	0	20-22/01/2015 26-27/01/2015	6	0
10-12/02/2015 17-18/02/2015	3	0	10-12/02/2015 17-18/02/2015	6	0
9-11/03/2015 16-18/03/2015	3	0	9-11/03/2015 16-18/03/2015	6	0

Appendix F. Wintering and breeding chough survey results 2017

Wintering chough survey results 2017

Surveys were undertaken fortnightly from 17 January to 28 March 2017 (six survey visits in total).

In total, 10 sightings of chough were made across all surveys. A peak count of three birds was made in Field 173, located near Cemlyn Bay. Chough distribution during the visits was predominantly around Wylfa head with seven records from this location and three records from the Cemlyn Bay area (Figure 6.21). Details of observations are presented below in Table 6.15.

The ten sightings of chough originate from only five fields (Table 6.15), all of which supported short sward heights (0-1 category). The dominant habitat in all five of these fields was grassland with scrub and rocky outcrops (Figure 6.21). The fields used by chough on Wylfa Head were grazed by low numbers of sheep during the winter period, and are also grazed by rabbits. Of the three fields used by chough near Cemlyn Lagoon, only Field 173 was grazed (by cattle, in March).

Other fields within the study area which supported similar habitats to the fields within which chough were recorded were primarily located on the headland between Cemlyn Bay and Porth-y-pistyll (Figure 6.21), and are likely to support foraging chough. Of those fields surveyed, a small number of fields inland also supported similar habitats, although these were small and isolated. The majority (84%) of the remaining fields within the study area supported improved or semi-improved grassland, primarily of sward heights 0 and 1 as shown in Figure 6.21.

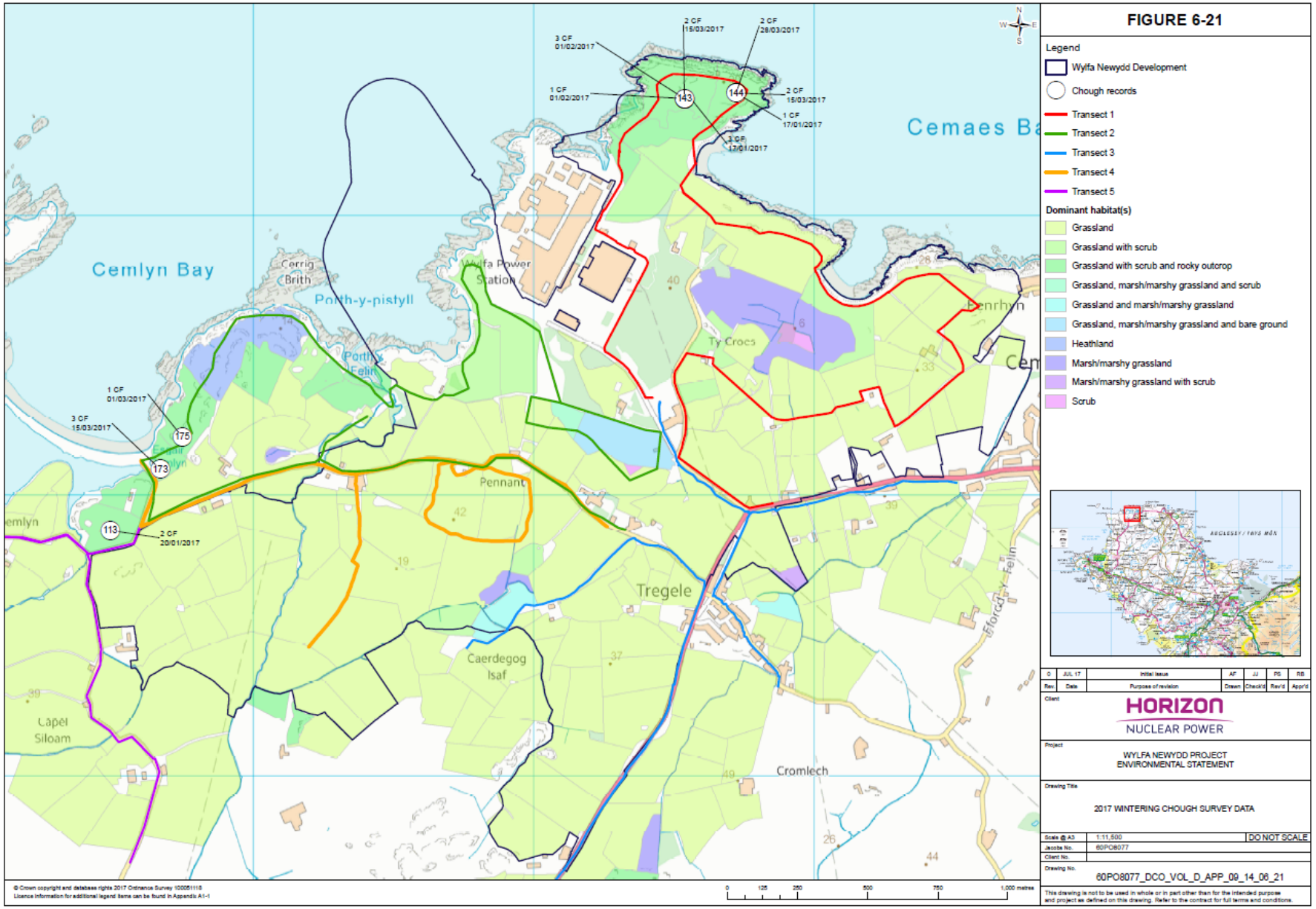

Figure 6.21: 2017 Wintering chough survey data

Table 6.15: Wintering chough 2017 survey results

Land Parcel No.	Survey date	Visit no.	Number of choughs seen	Behaviour	Colour band/ring	Livestock type	Livestock number	Sward height category	Habitat Dominant habitat type	Notes
113	20/01/2017	1	2	Preening/loafing and feeding, only present briefly and then flew off north-east	One bird apparently unringed other bird with silver on right leg but details uncertain for both birds	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
143	17/01/2017	1	3	Feeding on headland near lookout hut	• Yellow on right leg, red over silver on left leg • Orange and silver on right leg • Blue and red on right, red and silver on left leg	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
143	01/02/2017	2	3	Not recorded	1. No rings 2. Yellow ring on right leg 3. Left=silver right=blue on top of pink	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	Birds foraging and visiting freshwater pools -
143	01/02/2017	2	1	Not recorded	Did not get good enough view	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	
143	15/03/2017	5	2	Loafing	Very brief glimpse of bird indicates no rings (too distant to observe)	Sheep	5	1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
144	17/01/2017	1	1	Feeding separately from three CF at 143	Unringed	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
144	15/03/2017	5	2	Foraging, mobbing raven, seemed to be in a pair	Too distant and long grass, one bird appeared to have yellow ring on right leg	None	N/A	1 = 5-10 cm	Grassland with scrub and rocky outcrops	4 CF calling & undulating display flight (2 pairs likely) Yo-yoing
144	28/03/2017	6	2	Pair mobbing BZ before flying off over 145. Returned and	One bird appeared to have yellow ring on right leg.	Sheep	3	0 = 0-5 cm	Grassland with scrub and rocky outcrops	3 raven chicks in nest

Land Parcel No.	Survey date	Visit no.	Number of choughs seen	Behaviour	Colour band/ring	Livestock type	Livestock number	Sward height category	Habitat Dominant habitat type	Notes
				mobbed raven near to previous nest site.	Difficult to determine as in flight.					
173	15/03/2017	5	4	One flew NE over 173 and 175 but did not land, one feeding then flew N, two on rocky outcrop flew over	Feeding bird: left - red/BT0, right - blue/red. One bird on rocky outcrop had a white or yellow ring on right leg (very brief view)	Cows	6	1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
175	01/03/2017	4	1	Foraging	Right - blue over pink, left - red over silver	None	N/A	0 = 0-5 cm	Grassland with scrub and rocky outcrops	-

Breeding chough survey results 2017

Surveys were undertaken fortnightly from 10 April to 18 July 2017 (eight survey visits in total).

In total, 17 sightings of chough were made across all surveys, of which 13 were of birds using the habitats within the survey area (the other four were of birds flying over). The peak count from surveys was six birds on three occasions. These were at Land Parcel 175, located near Cemlyn Bay, and from Land Parcel 141 and 142 east of the existing power station. Chough distribution during the visits was predominantly around Wylfa Head: 11 of the 13 records of birds on the ground were from this location, with the remaining records from Land Parcel 175 near Cemlyn Bay and Land Parcel 189 west of the existing power station (Figure 6.22). Of the records of birds flying over, one involved a single bird mobbing a raven on Wylfa Head. The remaining three were made between Cemlyn Lagoon and the existing power station, and involved pairs of birds flying in the direction of Wylfa Head. Details of observations are presented below in Table 6.16.

The ten sightings of chough using land parcels within the survey area originate from only four land parcels (Table 6.16), all of which supported short sward heights (0-1 category) (see Figure 6.21). The habitat in all of the land parcels was grassland with scrub and rocky outcrops. The land parcels used by chough on Wylfa Head were grazed by sheep during the first half of the breeding period (April to May), and are also grazed by rabbits. The land parcels used by chough near Cemlyn Lagoon (175) was grazed by cattle in May.

Other land parcels within the study area which supported similar habitats to the land parcels within which chough were recorded were primarily located on the headland between Cemlyn Bay and Porth-y-pistyll (Figure 6.21), and are likely to support foraging chough. Of those land parcels surveyed, a small number of land parcels inland also supported similar habitats, although these were small and isolated. The majority of the remaining land parcels within the study area supported improved or semi-improved grassland, of varying sward heights.

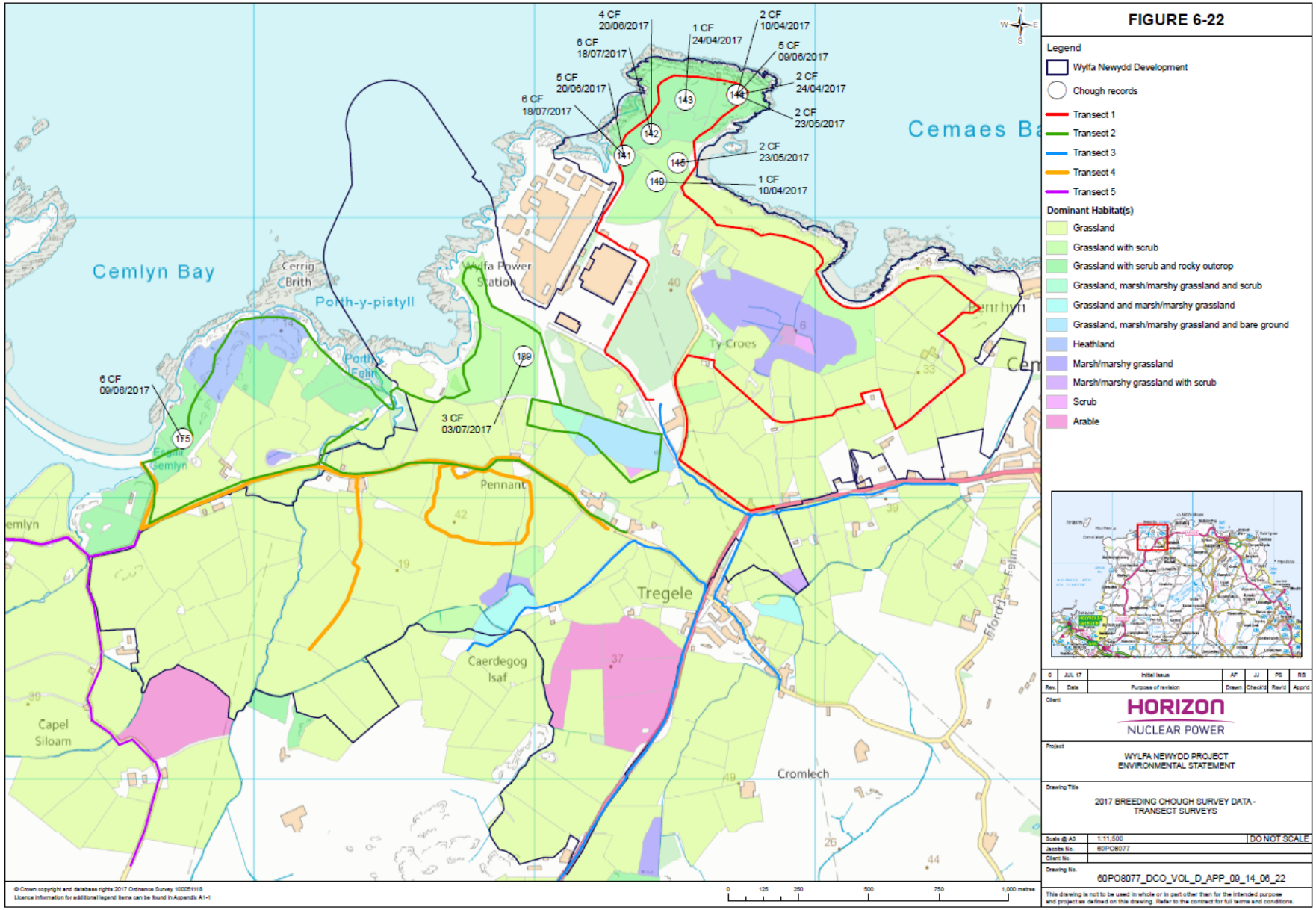

Figure 6.22: 2017 Breeding chough survey data – transect data

Table 6.16: Breeding chough 2017 survey results

Land Parcel No.	Survey Date	Visit no.	Number of choughs seen	Behaviour	Colour band/ring	Livestock type	Livestock number	Sward height category	Dominant habitat type	Notes
140	10/04/2017	1	1	Preening on fence post. Flew onto wall and preened	Adult female: yellow over black on right leg, red over silver on left leg	Sheep	5	1 = 5-10 cm	Grassland with scrub	-
141	20/06/2017	6	5	Foraging (pair feeding young)	1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg 3. Juvenile: orange over silver on right leg, yellow over orange (inscribed 3T) on left leg 4. Juvenile: orange over silver on right leg, white over orange (inscribed 33) on left leg 5. Juvenile: yellow over silver on right leg, black over orange (inscribed 3P) on left leg	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Moving between Land Parcel 141 and 142
141	18/07/2017	8	6	Foraging (pair feeding young)	1. Right - yellow, Left blue 2. Bird - Right leg, orange Four young	None	N/A	0 = >5 cm to 1 = 5-10 cm	Semi-improved grassland, gorse and rocky outcrop	Moving between Land Parcel 141 and 142.
142	20/06/2017	6	4	Foraging (pair feeding young)	1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg 3. Juvenile: orange over silver on right leg, white over orange (inscribed 33) on left leg 4. Juvenile: yellow over silver on right leg, black over orange (inscribed 3P) on left leg	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Moving between Land Parcel 141 and 142
142	18/07/2017	8	6	Foraging (pair feeding young)	1. Right - yellow, Left blue 2. Bird - Right leg, orange Four young	None	N/A	0 = >5 cm to 2 = >10 cm	Semi-improved grassland, gorse	Moving between Land Parcel 141 and 142.

Land Parcel No.	Survey Date	Visit no.	Number of choughs seen	Behaviour	Colour band/ring	Livestock type	Livestock number	Sward height category	Dominant habitat type	Notes
									and rocky outcrop	
143	10/04/2017	1	1	In flight, chasing raven	Too distant and in flight to observe	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
143	24/04/2017	2	1	Foraging	Unringed	Sheep	2	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
144	10/04/2017	1	2	One bird flew in to nest, whilst the other flew off the nest	Impossible to observe due to angle of view	Sheep	2	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Likely to have been the regular breeding pair: 1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg
144	24/04/2017	2	2	Courtship (received by ringed bird)	Uncertain due to distant observation	Sheep	4	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Likely to have been the regular breeding pair: 1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg
144	23/05/2017	4	2	Flew from nest onto rocks nearby and wiped bill	Regular breeding pair: 1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Two other surveyors present conducting vantage point watch for choughs
144	09/06/2017	5	5	Foraging on ants' nest	2 unringed birds, and three ringed: 1. Red over blue (inscribed 4P) on right leg, red over silver on left leg 2. Light green over silver on right leg, light green over blue on left leg 3. Yellow over green on right leg, red over silver on left leg	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	Considered likely to be the regular breeding pair (one of the unringed birds, and bird 3) with three 1st-year birds (one of the unringed birds, bird 1 (originally from near Porth Dafarch) and bird 2). Bird 2 thought to be

Land Parcel No.	Survey Date	Visit no.	Number of choughs seen	Behaviour	Colour band/ring	Livestock type	Livestock number	Sward height category	Dominant habitat type	Notes
										lime green over silver on right leg, lime green over blue (inscribed) on left leg (originally from Church Bay).
145	23/05/2017	4	2	Foraging on cranefly larvae in grass	Regular breeding pair: 1. Adult male: unringed 2. Adult female: yellow over black on right leg, red over silver on left leg	None	N/A	0 = >5 cm	Grassland with scrub	-
175	09/06/2017	5	6	Feeding on grass	Regular breeding pair with four offspring	None	N/A	0 = >5 cm to 1 = 5-10 cm	Grassland with scrub and rocky outcrops	-
188	10/05/2017	3	2	Flying over	Birds were in flight and too distant to read	N/A	N/A	N/A	N/A	One bird flew high over Land Parcel 188 from the south, towards the existing power station, where it was joined by a second bird. Both appeared to drop down east of the power station.
189	03/07/2017	7	3	Two juveniles begging food from foraging adult female	Ad. Female: Lt: Red / BTO, Rt: Yellow/Black. Juveniles: Lt: Black / Orange#, Rt: Yellow / BTO; Lt: Yellow / Orange#, Rt: Orange / BTO.	None	N/A	2= >10 cm	N/A	Birds flew in from south (likely foraging on shoreline in Land Parcel 188 / 189), landed to forage, then flew on when flushed to forage on shore of Land Parcel 189.
206	08/06/2017	5	2	Flying over, calling	Birds were in flight and too distant to read	N/A	N/A	N/A	N/A	-
Cemlyn Lagoon	10/05/2017	3	2	Flying over	Birds were in flight and too distant to read	N/A	N/A	N/A	N/A	Flew east over lagoon, following the coastline towards the power station

Appendix G. 2017 Pursuit surveys

The full dataset gathered from the pursuit surveys are provided in Table 6.17 and Table 6.18. These are summarised in Table 6.19 where the percentage foraging time in each land parcel have been calculated based on the total number of chough minutes recorded during surveys of either Trwyn Pencarreg or Wylfa Head, depending on where they were. This is also presented in Figure 6.23 which shows the relative importance of each land parcel within either the Wylfa Head land parcels or those at Trwyn Pencarreg. Within Table 6.19 and Figure 6.23 it is not possible to make direct comparison between the proportion of time foraging in land parcels at Wylfa Head and Trwyn Pencarreg as there was more time spent at Wylfa Head (50 hours) compared to Trwyn Pencarreg (24 hours), and extrapolation of data or the inclusion of a statistical correction factor was not considered appropriate. Figure 6.25 presents the detailed foraging locations from pursuit survey. Whilst the core foraging area can be calculated by field area, the actual area of land that chough forage in is much smaller and focussed on small patches of very specific microhabitat patches.

The results show that there was almost ten-times the amount of chough minutes recorded at Wylfa Head (3365 minutes) compared to Trywn Pencarreg (345.9 minutes) when the total survey time was only increased by a factor of two. Wylfa Head habitats are therefore considered to be much more significant for foraging chough than habitats at Trywn Pencarreg.

The most important area was Land Parcel 146, a field of short grassland on the coast to the east of Wylfa Head. The time spent foraging here (2138 chough minutes) was over six times greater than that in any other land parcel at Wylfa Head, including Land Parcel 141 (305 chough minutes), Land Parcel 143 (265 chough minutes) and Land Parcel 144 (333 chough minutes), which were the next most frequently used.

Based on the habitats listed in Section 2.1.4, the habitat most frequently used by foraging chough was a mosaic of coastal grassland (ungrazed) with rock, cliff, scree, buildings and stone walls. Improved and semi-improved agricultural grassland (ungrazed) was the next most frequently used, followed by coastal grassland (ungrazed), both receiving approximately half the foraging effort of the mosaic of coastal grassland (ungrazed) with rock, cliff, scree, buildings and stone walls. However, it should be noted that all of the above habitats were grazed during the winter period, and generally had short sward heights. Other habitats used were mostly mixtures of the above habitats and paths (bare ground and worn swards associated with public rights of way). Cloddiau (traditional stock boundaries consisting of stone-faced earth banks) were used on two occasions, whilst improved and semi-improved agricultural grassland (grazed) was used on one occasion only.

The majority of observations made during the chough pursuit surveys involved the pair (and subsequently their juveniles) breeding on Wylfa Head, although other birds were occasionally observed, with a maximum of 10 birds observed together, on one occasion.

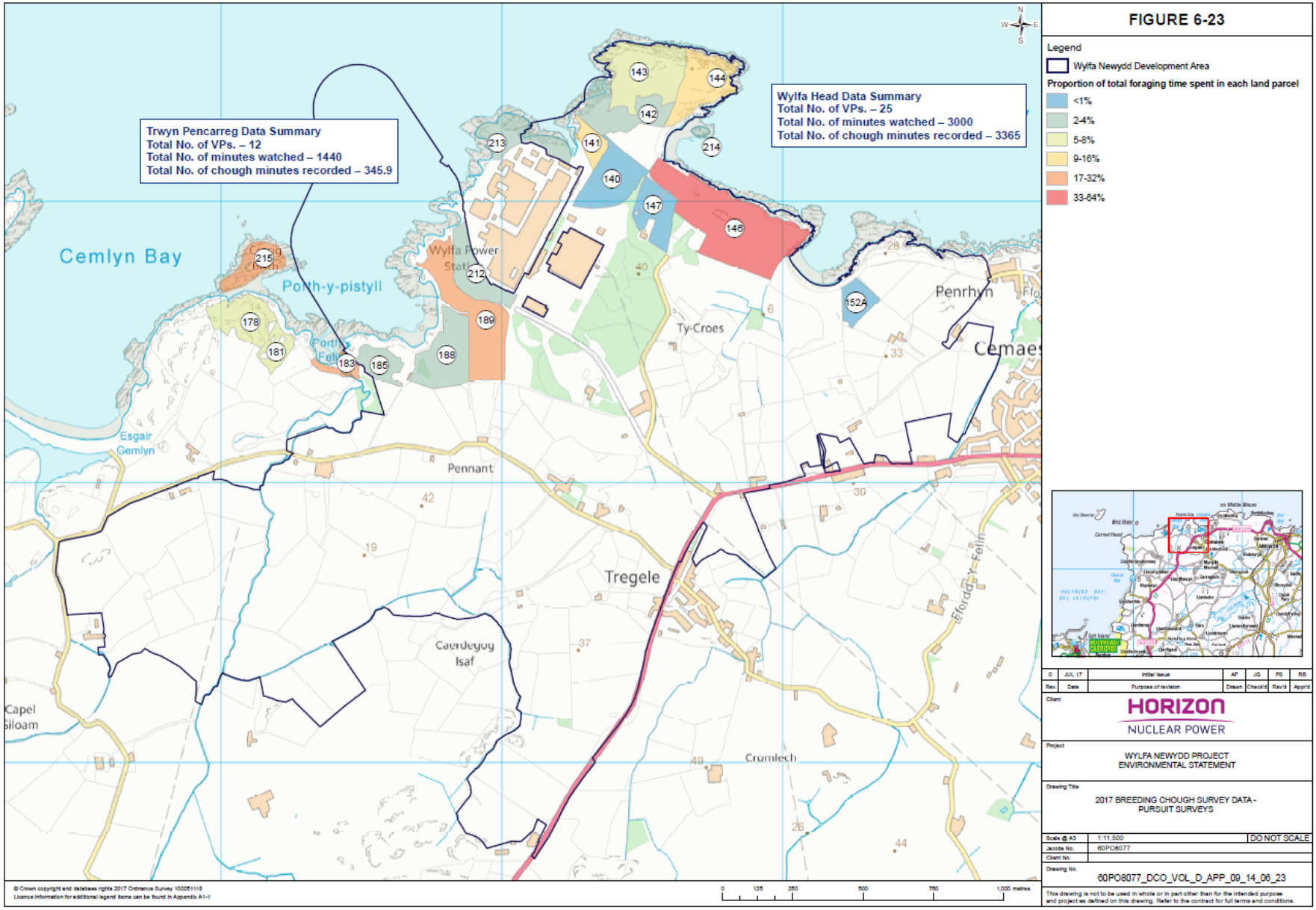

Figure 6.23: 2017 Breeding chough survey data – pursuit surveys

Key to Table 6.17 and Table 6.18

The terms “Unknown” and “(?)” are used for incidents where the identification of individual birds was not possible, either due to a lack of rings, or the distance at which they were sighted.

Within Table 6.18 the raw data from the pursuit surveys includes the following abbreviations relating to habitat types as outlined in Section 2.1.4:

- C(tsb) – Cloddiau (traditional stock boundaries consisting of stone-faced earth banks);
- CG(ug) – Coastal grassland (ungrazed);
- I&SIAG(g) – Improved and semi-improved agricultural grassland (grazed);
- I&SIAG(ug) – Improved and semi-improved agricultural grassland (ungrazed);
- P(bg&prow) – Paths (bare ground and worn swards associated with Public Rights of Way); and
- RCSB&SW – Rock, cliff, scree, buildings and stone walls.

Within the column titled “Chough minutes”, this indicates the total number of minutes chough were observed during any one sighting and is the product of the number of chough multiplied by the total minutes they were observed in that land parcel.

Where chough were observed foraging in multiple fields during any single foraging event, the total time was recorded as being equal e.g. on 04-Jun at Trwyn Pencarreg, 10.3 minutes at Land Parcel 185, 188 and 189 represents a total of 31 minutes split between the three land parcels.

Table 6.17: Breeding chough 2017 pursuit chough survey results from Trwyn Pencarreg

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
23-May	2	Wylfa Head pair (?)	189	CG(ug)	1	2
04-Jun	10	Unknown	181	I&SIAG(ug)	2	20
04-Jun	1	Unknown	178	RCSB&SW	5	5
04-Jun	1	Rt: poss Blue/BTO, Lt: White / poss Red	178	RCSB&SW	2	2
04-Jun	1	Unknown	189	RCSB&SW	10.3	10.3
04-Jun	1	Unknown	188	RCSB&SW	10.3	10.3
04-Jun	1	Unknown	185	RCSB&SW	10.3	10.3
05-Jun	2	Wylfa Head pair	212	I&SIAG(ug) / RCSB&SW	6	12
05-Jun	4	Wylfa Head pair; unknown pair	215	RCSB&SW / CG(ug) / P(bg&prow)	8	32

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
05-Jun	4	Wylfa Head pair; unknown pair	178	RCSB&SW / CG(ug) / P(bg&prow)	2	8
05-Jun	4	Wylfa Head pair; unknown pair	183	CG(ug) / P(bg&prow)	16	64
05-Jun	2	Unknown (not Wylfa Head pair)	183	CG(ug) / P(bg&prow)	6	12
05-Jun	4	Wylfa Head pair; unknown pair	183	CG(ug) / P(bg&prow)	4	16
05-Jun	4	Wylfa Head pair; unknown pair	215	RCSB&SW / CG(ug) / P(bg&prow)	19	76
23-Jun	6	Wylfa Head family	189	CG(ug)	11	66
Totals	**47**				**112.9**	**345.9**

Table 6.18: Breeding chough 2017 pursuit chough survey results from Wylfa Head

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
17-May	2	Wylfa Head pair	214	RCSB&SW / CG(ug)	10	20
18-May	2	Wylfa Head pair	144	CG(ug) / P(bg&prow)	5	10
18-May	1	Wylfa head male	144	CG(ug) / P(bg&prow)	2	2
19-May	2	Wylfa Head pair	146	I&SIAG(ug) / P(bg&prow)	3	6
19-May	2	Wylfa Head pair	145	I&SIAG(ug)	3	6
19-May	2	Wylfa Head pair	146	RCSB&SW	19	38
19-May	2	Wylfa Head pair	146	RCSB&SW / I&SIAG(ug)	41	82
22-May	2	Wylfa Head pair	214	RCSB&SW	4	8
22-May	2	Wylfa Head pair	146	I&SIAG(ug)	7	14
23-May	2	Wylfa Head pair	140	I&SIAG(ug)	14	28
23-May	2	Wylfa Head pair	146	I&SIAG(ug)	34	68
23-May	2	Wylfa Head pair	146	I&SIAG(ug)	23	46
23-May	2	Wylfa Head pair	146	I&SIAG(ug)	9	18
23-May	1	Lt: Red/BTO, Rt: Orange/Blue#	144	RCSB&SW / P(bg&prow)	25	25

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
23-May	3	Wylfa Head pair; Lt: Red/BTO, Rt: Orange/Blue#	144	CG(ug) / P(bg&prow)	5	15
23-May	3	Wylfa Head pair; Lt: Red/BTO, Rt: Orange/Blue#	146	I&SIAG(ug)	6	18
23-May	3	Wylfa Head pair; Lt: Red/BTO, Rt: Orange/Blue#	146	RCSB&SW / I&SIAG(ug)	29	87
23-May	1	Lt: Red/BTO, Rt: Orange/Blue#	146	RCSB&SW / I&SIAG(ug)	5	5
23-May	2	Wylfa Head pair	144	RCSB&SW / CG(ug) / P(bg&prow)	2	4
24-May	2	Wylfa Head pair	144	RCSB&SW	14	28
24-May	2	Wylfa Head pair	146	I&SIAG(ug)	33	66
24-May	2	Wylfa Head pair	143	CG(ug)	8	16
24-May	2	Wylfa Head pair	146	I&SIAG(ug)	6	12
24-May	2	Wylfa Head pair	146	CG(ug)	2	4
24-May	1	Wylfa Head female	146	CG(ug)	34	34
24-May	2	Wylfa Head pair	146	RCSB&SW	25	50
24-May	2	Wylfa Head pair	146	RCSB&SW	9	18
25-May	1	Wylfa Head male	144	CG(ug) / P(bg&prow)	4	4
25-May	2	Wylfa Head pair	146	I&SIAG(ug)	22	44
25-May	2	Wylfa Head pair	143	RCSB&SW	29	58
25-May	2	Wylfa Head pair	146	I&SIAG(ug)	10	20
26-May	2	Wylfa Head pair	146	I&SIAG(ug)	64	128
26-May	2	Wylfa Head pair	146	I&SIAG(ug) / C(tsb)	11.5	23
26-May	2	Wylfa Head pair	147	I&SIAG(ug) / C(tsb)	11.5	23
03-Jun	1	Wylfa Head male	144	RCSB&SW / CG(ug) / P(bg&prow)	8	8
03-Jun	1	Wylfa Head pair	143	CG(ug)	19	19
03-Jun	2	Wylfa Head pair	143	RCSB&SW / CG(ug)	17	34

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
03-Jun	2	Wylfa Head pair	144	RCSB&SW / CG(ug) / P(bg&prow)	3	6
04-Jun	2	Wylfa Head pair	146	I&SIAG(ug)	2	4
04-Jun	2	Unknown (not Wylfa Head pair)	144	CG(ug)	2	4
04-Jun	4	Wylfa Head pair; unknown pair	144	CG(ug)	9	36
04-Jun	2	Wylfa Head pair	143	CG(ug) / RCSB&SW	13	26
04-Jun	2	Wylfa Head pair	144	CG(ug)	29	58
06-Jun	2	Wylfa Head pair	144	RCSB&SW	19	38
06-Jun	2	Wylfa Head pair	143	CG(ug)	28	56
06-Jun	2	Wylfa Head pair	146	CG(ug)	4	8
06-Jun	2	Wylfa Head pair	146	I&SIAG(ug)	4	8
06-Jun	2	Wylfa Head pair	146	RCSB&SW	8	16
06-Jun	1	Wylfa Head female	146	RCSB&SW	5	5
06-Jun	2	Wylfa Head pair	146	CG(ug)	5	10
06-Jun	2	Wylfa Head pair	146	CG(ug)	14	28
06-Jun	1	Wylfa Head pair	146	CG(ug)	2	2
06-Jun	2	Wylfa Head pair	146	RCSB&SW / CG(ug)	8	16
06-Jun	1	Wylfa Head pair	146	RCSB&SW / CG(ug)	2	2
06-Jun	2	Wylfa Head pair	146	RCSB&SW / CG(ug)	11	22
07-Jun	2	Wylfa Head pair	143	I&SIAG(ug)	5	10
07-Jun	2	Wylfa Head pair	144	I&SIAG(ug)	14	28
07-Jun	2	Wylfa Head pair	144	I&SIAG(ug)	2	4
07-Jun	2	Wylfa Head pair	144	P(bg&prow)	2	4
07-Jun	2	Wylfa Head pair	213	CG(ug) / RCSB&SW	11	22
07-Jun	2	Wylfa Head pair	144	CG(ug)	4	8
07-Jun	2	Wylfa Head pair	146	I&SIAG(ug)	10	20

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
07-Jun	1	Wylfa Head female	146	I&SIAG(ug)	3	3
07-Jun	2	Wylfa Head pair	146	RCSB&SW	9	18
07-Jun	2	Wylfa Head pair	143	CG(ug) / RCSB&SW	9	18
07-Jun	2	Wylfa Head pair	146	I&SIAG(ug)	7	14
12-Jun	1	Wylfa Head male	214	RCSB&SW / CG(ug)	5	5
12-Jun	1	Wylfa Head male	214	RCSB&SW / CG(ug)	4	4
12-Jun	2	Wylfa Head pair (?)	152A	I&SIAG(g)	4	8
12-Jun	1	Wylfa Head male (?)	146	I&SIAG(ug)	6	6
12-Jun	2	Wylfa Head pair	143	RCSB&SW	14	28
12-Jun	2	Wylfa Head pair	144	RCSB&SW	3	6
12-Jun	5	Wylfa Head family	144	CG(ug) / P(bg&prow)	3	15
12-Jun	2	Wylfa Head pair	144	CG(ug)	7	14
12-Jun	2	Wylfa Head pair	144	CG(ug)	1	2
12-Jun	2	Wylfa Head pair	144	CG(ug) / RCSB&SW	7	14
20-Jun	3	Ad. and Juv.	146	RCSB&SW / I&SIAG(ug)	6	18
20-Jun	2	Ad. and Juv.	141	CG(ug) / RCSB&SW	90	180
20-Jun	1	Unknown	146	RCSB&SW	2	2
20-Jun	1	Unknown	146	I&SIAG(ug) / I&SIAG(ug)	88	88
22-Jun	4	1 Ad., 3 Juv. Partial details obtained for 3 birds - Lt: Red, Rt: Yellow; Lt: Yellow; Rt: Orange	213	RCSB&SW	17	68
22-Jun	4	1 Ad., 3 Juv. Partial details obtained for 3 birds - Lt: Red, Rt: Yellow; Lt: Yellow; Rt: Orange	213	CG(ug) / RCSB&SW	2	8
22-Jun	4	1 Ad., 3 Juv. Partial details obtained for 3 birds - Lt: Red, Rt: Yellow; Lt: Yellow; Rt: Orange	142	CG(ug)	17	68

Date	No. chough	Identification	Land Parcel No.	Habitat types used by chough	Minutes	Chough minutes
25-Jun	1	Wylfa Head female	141	CG(ug) / RCSB&SW	11	11
27-Jun	5	Wylfa Head male and juveniles (?)	146	CG(ug) / RCSB&SW	34	170
27-Jun	6	Wylfa Head female. With Wylfa Head male and juveniles (?)	146	CG(ug) / RCSB&SW	7	42
27-Jun	5	Wylfa Head male and juveniles (?)	146	CG(ug) / RCSB&SW	79	395
27-Jun	1	Wylfa Head female	142	CG(ug)	56	56
27-Jun	1	Wylfa Head female	141	CG(ug) / RCSB&SW	114	114
27-Jun	5	Wylfa Head male and juveniles (?)	146	CG(ug)	9	45
27-Jun	5	Wylfa Head male and juveniles (?)	146	CG(ug) / RCSB&SW	26	130
27-Jun	5	Wylfa Head male and juveniles (?)	146	CG(ug) / RCSB&SW	57	285
Totals	**246**				**1486**	**3365**

Table 6.19: Land parcel usage summary table at Trwyn Pencarreg and Wylfa Head

Trwyn Pencarreg Land Parcel No.	Total chough minutes at Trwyn Pencarreg	% of chough minutes at Trwyn Pencarreg	Wylfa Head Land Parcel No.	Total chough minutes at Wylfa Head	% of chough minutes at Wylfa Head
215	108.0	31.22	146	2138.0	63.54
183	92.0	26.60	144	333.0	9.90
189	78.3	22.65	141	305.0	9.06
181	20.0	5.78	143	265.0	7.88
178	15.0	4.34	142	124.0	3.68
212	12.0	3.47	213	98.0	2.91
185	10.3	2.99	214	37.0	1.10
188	10.3	2.99	140	28.0	0.83
Total	**345.9**		147	23.0	0.68
			152A	8.0	0.24

Trwyn Pencarreg Land Parcel No.	Total chough minutes at Trwyn Pencarreg	% of chough minutes at Trwyn Pencarreg	Wylfa Head Land Parcel No.	Total chough minutes at Wylfa Head	% of chough minutes at Wylfa Head
			Total	**3365**	

Table 6.20: Summary of habitat usage at Trwyn Pencarreg

Habitat type	Total chough minutes	% of total chough minutes
Rock, cliff, scree, buildings and stone walls / Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	116	33.5
Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	92	26.6
Coastal grassland (ungrazed)	68	19.7
Rock, cliff, scree, buildings and stone walls	37.9	11
Improved and semi-improved agricultural grassland (ungrazed)	20	5.8
Improved and semi-improved agricultural grassland (ungrazed) / Rock, cliff, scree, buildings and stone walls	12	3.5
Total	**345.9**	

Table 6.21: Summary of habitat usage at Wylfa Head

Habitat type	Total chough minutes	% of total chough minutes
Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	1415	42.1
Improved and semi-improved agricultural grassland (ungrazed)	565	16.8
Coastal grassland (ungrazed)	468	13.9
Rock, cliff, scree, buildings and stone walls	381	11.3
Rock, cliff, scree, buildings and stone walls / Improved and semi-improved agricultural grassland (ungrazed)	192	5.7
Rock, cliff, scree, buildings and stone walls / Coastal grassland (ungrazed)	103	3.1
Improved and semi-improved agricultural grassland (ungrazed)	88	2.6
Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	46	1.4
Improved and semi-improved agricultural grassland (ungrazed) / Cloddiau (traditional stock boundaries consisting of stone-faced earth banks)	46	1.4

Habitat type	Total chough minutes	% of total chough minutes
Rock, cliff, scree, buildings and stone walls / Paths (bare ground and worn swards associated with Public Rights of Way)	25	0.7
Rock, cliff, scree, buildings and stone walls / Coastal grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	18	0.5
Improved and semi-improved agricultural grassland (ungrazed)	8	0.2
Improved and semi-improved agricultural grassland (ungrazed) / Paths (bare ground and worn swards associated with Public Rights of Way)	6	0.2
Paths (bare ground and worn swards associated with Public Rights of Way)	4	0.1
Total	**3365**	

Appendix H. Summary map of survey results 2014-17

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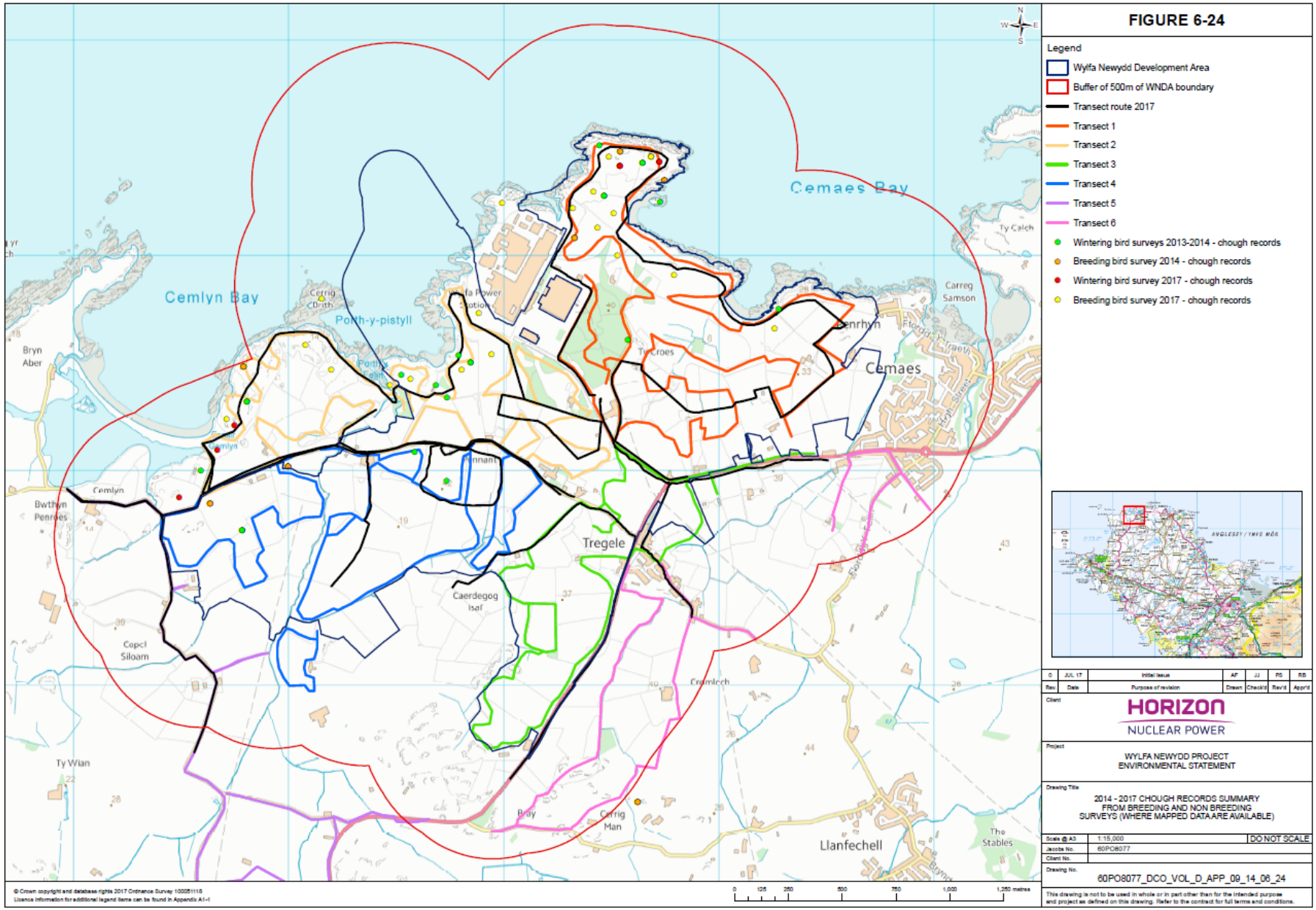

Figure 6.24: 2014 – 2017 chough records summary from breeding and non-breeding surveys (where mapped data are available)

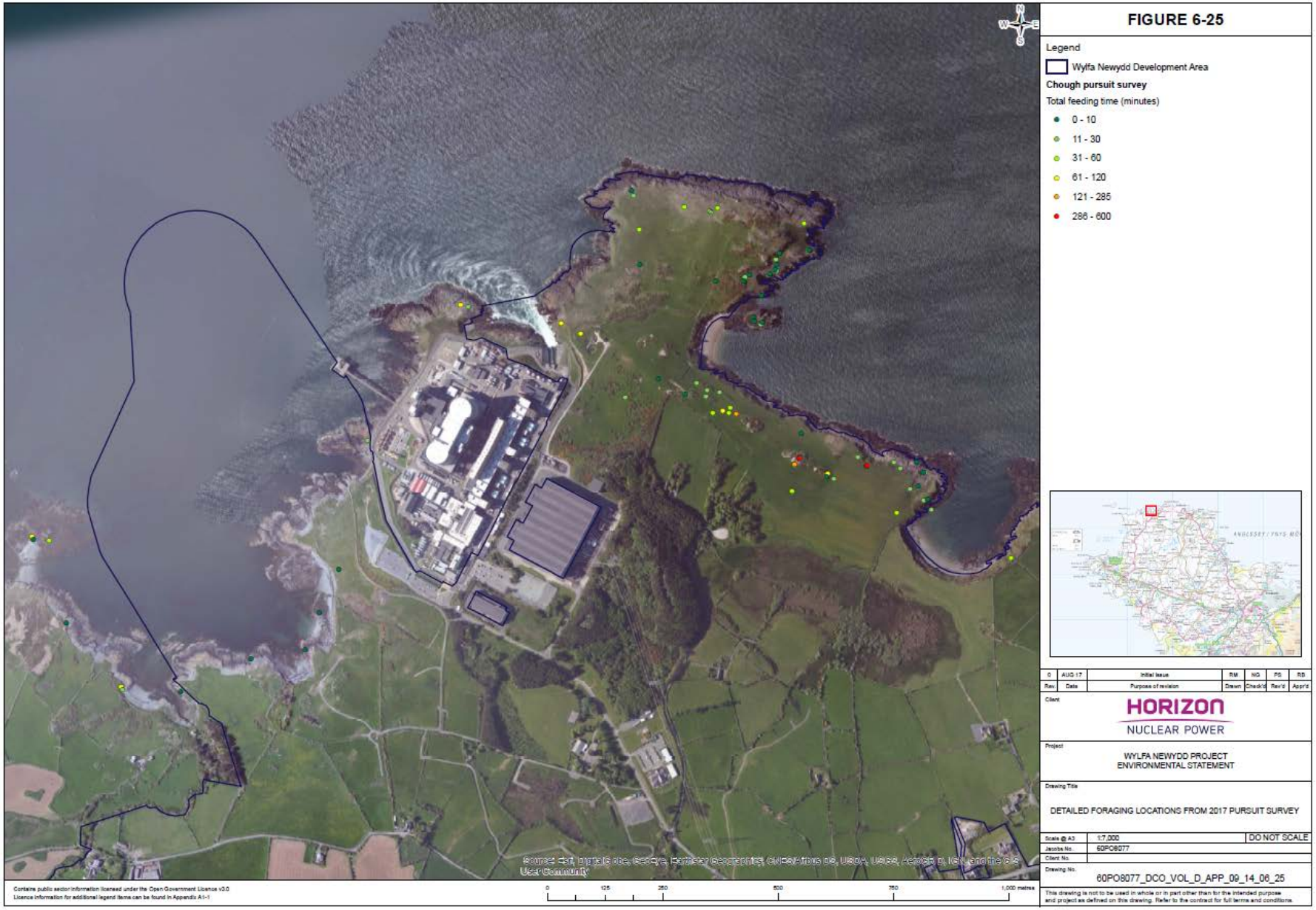

Figure 6.25: Detailed foraging locations from 2017 pursuit survey