

Appendix 23.1

Terrestrial Ornithology Technical Appendix

23 Terrestrial Ornithology Technical Appendix

23.1 Introduction

23.1 This Technical Appendix presents the following information in support of Chapter 23: Ornithology of the Dounreay Tri Floating Wind Demonstration Project Environmental Statement (ES):

- **Terrestrial ornithology survey methods:** the methodology employed by Caledonian Conservation Ltd in order to provide baseline information on the breeding and non-breeding bird interests within the current onshore project area and surroundings. All deviations from guidance due to access restrictions are discussed and justified. Timings, details of surveyors, duration of survey work and weather conditions are provided for each survey type;
- **Existing records:** a summary of records of sensitive bird species (i.e. those afforded special protection, and/or are of conservation concern) received through data requests as part of the desk study; and
- **Terrestrial ornithology survey results:** the results of terrestrial ornithology surveys carried out by Caledonian Conservation Ltd from April to December 2015.

23.2 Terrestrial ornithology survey methods

23.2 Ornithology surveys were designed with reference to Scottish Natural Heritage (SNH) guidance (2010; 2014), and included the following:

- Desk-based study;
- Breeding bird survey (modified three visit Brown & Shepherd (1993) method, including 500 m buffer of the initial onshore project area);
- Breeding raptor and seabird survey (within relevant buffers of initial onshore project area, 2 km buffer for raptors and seabirds and 1 km buffer for barn owl);
- Foraging goose survey (fortnightly visits in April, May and September to December within a 3 km buffer); and
- Winter bird survey (including a winter walkover survey and wetland bird survey).

23.3 These are described in more detail in the following sections.

Breeding bird survey

23.4 A breeding bird survey was completed within a 500 m buffer around the initial onshore project area. This followed a modified Brown & Shepherd method, as recommended by SNH guidance (SNH, 2014). This method is used to census upland breeding birds, which may use more open habitats in Caithness such as those surrounding the initial onshore project area. Four survey visits were made between April and July, in line with SNH guidance (2014) and Calladine *et al.* (2009). Each 500 m x 500 m quadrat of open land was surveyed for 20-25 minutes. Details of bird behaviour were noted using standard British Trust for Ornithology (BTO) Common Bird Census (CBC) notation (see Gilbert *et al.* 1998), with the exception of meadow pipit (*Anthus pratensis*) which were tallied per quadrat.

23.5 The survey visits focused on breeding waders. However, all species seen or heard were recorded accurately onto 1:10,000 scale maps, using BTO CBC codes. This allows distinction between different species and between behaviours – particularly between behaviours indicative of breeding and those not related to breeding.

- 23.6 The purpose of the breeding bird survey is to map the territories of breeding birds, from which breeding bird density is estimated, in order to allow an assessment of potential displacement effects (particularly for waders).

Territory analysis

- 23.7 Territories have been estimated for all species using ArcGIS, with the exception of meadow pipits. Meadow pipit territory densities are often too high for accurate recording and mapping by a surveyor. In order to estimate territory densities for meadow pipits, the survey area was divided into 500 m x 500 m quadrats, and the number of meadow pipits observed were tallied for each quadrat during each of the four visits. The maximum value for each quadrat was then calculated. All maximum values were summed to provide an estimate of the density of meadow pipits within the study area.

Limitations

- 23.8 It was not possible to access Dounreay Nuclear Power Development Establishment and HMS Vulcan military base, although these areas were surveyed at a distance using magnification. However, given the small scale and temporary duration of the impact of the onshore works, this is unlikely to represent a significant data gap.

Breeding raptor and seabird survey

- 23.9 Breeding raptor and seabird surveys were completed within a 2 km buffer around the initial onshore project area. Walkovers and short vantage point (VP) watches of all suitable areas were carried out in order to establish whether any protected raptors and seabirds were breeding within, or in close proximity to, the initial onshore project area, following methods detailed in Hardey *et al.* (2013) and Gilbert *et al.* (1998) in accordance with SNH guidance (SNH, 2014). Target species included Annex I (EU Birds Directive) and Schedule 1 (Wildlife and Countryside Act) listed species, as well as species associated with North Caithness Cliffs Special Protection Area (SPA), although observations of buzzards, kestrels and sparrowhawks were also noted. When recording seabirds, the number of nests or individual birds (in the case of species which form dense colonies) was recorded for each distinct colony observed during survey visits, as appropriate (Gilbert *et al.*, 1998).
- 23.10 The surveyor walked across the survey area searching for target species, as well as raptor signs (e.g. pellets, pluck sites, kill sites, nests, egg fragments, etc.) and undertook short VP watches from areas offering good visibility of suitable breeding habitat using magnification to aid the detection and identification of birds observed. All areas of suitable breeding habitat were visited monthly between April and August during the breeding season to determine occupancy of territories.
- 23.11 In addition, potential barn owl nest sites were identified within 1 km of the initial onshore project area. Potential nest sites were visited once in the breeding season to search for evidence of occupancy. The surveyor searched for signs (e.g. pellets, feathers, egg fragments, staining, ammonia smell, etc.) and observations of actual nests and birds. This survey is based upon the method recommended in Hardey *et al.* (2013) and by the Barn Owl Trust (2001; 2012).
- 23.12 All signs and observations were recorded on large scale maps, using standard BTO notation.
- 23.13 The purpose of the breeding raptor and seabird survey is to map the territories of breeding raptors and owls and identify seabird colonies in order to allow an assessment of potential displacement impacts.

Limitations

- 23.14 It was not possible to access Dounreay Nuclear Power Development Establishment and HMS Vulcan military base, although these areas were surveyed at a distance using magnification.
- 23.15 Where possible, breeding seabird nests or breeding pairs were recorded. However, species such as guillemot (*Uria aalge*), kittiwake (*Rissa tridactyla*) and razorbill (*Alca torda*) nest in dense colonies and it is often not possible to distinguish individual nests or breeding pairs. Where this was the case, the total number of birds was recorded. This is considered a suitable proxy, and is the recommended unit for standard monitoring methods of such colonial species (Gilbert *et al.*, 1998). Therefore this is not considered to be a significant limitation.
- 23.16 The number of breeding seabirds recorded is likely to be an underestimate due to the inaccessibility of the cliffs they breed on. It was not always possible to access suitable vantage points safely in order to view all areas of cliffs. However, the majority of cliffs were visible, and therefore this is not considered a significant limitation, particularly considering the small scale and temporary duration of the onshore works, which will also avoid the cliffs.
- 23.17 Access to search the interior of all structures within 1 km of the search area for barn owls was not possible. However, all structures within the search area were assessed, and as the recommended disturbance distance for barn owls is only 100 m (Ruddock & Whitfield, 2007; Whitfield *et al.*, 2008).
- 23.18 Given the small scale and temporary duration of the onshore works, these issues are unlikely to represent a significant data gap.

Foraging goose survey

- 23.19 A survey of foraging geese was undertaken to establish the number of geese foraging within a 3 km buffer of the revised onshore project area. The survey method was designed with reference to SNH guidance (SNH, 2014), and involved driving the survey area and selecting suitable vantage points from which to observe suitable foraging fields, using magnification to aid the detection and identification of birds observed.
- 23.20 The survey area exceeded the recommended 500 m buffer area (SNH, 2014) in order to provide a robust dataset to allow an assessment of potential effects on geese and swans associated with Caithness Lochs SPA, and to inform an Appropriate Assessment if required. Foraging goose surveys were undertaken every two weeks during April and May and September to December 2015.
- 23.21 All signs and observations were recorded on large scale maps, using standard BTO notation.

Limitations

- 23.22 It was not possible to access Dounreay Nuclear Power Development Establishment or HMS Vulcan military base, although these areas were surveyed at a distance using magnification.
- 23.23 Foraging goose surveys would normally be undertaken every two weeks between September and mid-May. Due to the Project timeframe, however, it was only possible to complete three visits from mid-April to mid-May 2015 and fortnightly visits between September and December 2015.
- 23.24 However, given the small scale and temporary duration of the onshore works, habitat present, and availability of historic data, the shorter survey period should provide adequate data for an assessment, and is unlikely to represent a significant data gap.

Winter bird survey

- 23.25 A combination of winter walkover surveys and wetland bird surveys (WeBS) was undertaken to determine the baseline wintering bird community present within the initial onshore project area and surroundings.

Winter walkover survey

- 23.26 Winter walkover surveys were used to survey the revised onshore project area and a 500 m buffer, following the same methods as the breeding bird survey described above, to assess the use of these areas by wintering birds such as wildfowl, waders and gulls. Three visits were made, ensuring that all areas were approached within 200 m, as recommended in SNH guidance (SNH, 2010).
- 23.27 For all species, the total number of registrations were tallied per visit. The maximum number of registrations per visit was then used as an estimate of density per species.

Wetland bird survey

- 23.28 The WeBS was completed following the standard Core Counts method (Gilbert *et al.*, 1998). All waders and wildfowl species using the shore within a 500 m buffer of the revised onshore project area were recorded. Counts were made using telescopes from vantage points selected to avoid disturbance to birds. Routes between vantage points were also carefully selected so as to avoid disturbance to birds. If birds moved during a count, this was recorded to avoid double counting. All counts were completed within a seven hour period commencing 3.5 hours before the advertised time of low water and finishing 3.5 hours after low water.
- 23.29 The accuracy of counts was indicated for each visit, taking into account weather conditions and any other factors affecting the survey. An attempt to identify causes for any nil returns was also made as appropriate.
- 23.30 Four visits were made between September and December 2015. All signs and observations were recorded on large scale maps, using standard BTO notation.

Limitations

- 23.31 It was not possible to access Dounreay Nuclear Power Development Establishment and HMS Vulcan military base, although these areas were surveyed at a distance using magnification.
- 23.32 The WeBS survey would normally be completed monthly between September and March inclusive. Due to the Project timeframe, it was only possible to complete the September to December visits.
- 23.33 However, given the small scale and temporary duration of the onshore works, habitat present, and availability of historic data, the shorter survey period should provide adequate data for an assessment, and is unlikely to represent a significant data gap.

Survey visit details

- 23.34 The tables below provide full details of bird survey visits, including dates, times, surveyors and weather conditions. Visit details are provided in the following tables:
- Breeding bird survey– Table 23A-1;
 - Breeding raptor and seabird survey– Table 23A-2;
 - Foraging goose survey– Table 23A-3; and
 - Winter bird survey– Tables 23A-4 and 23A-5.

Table 23A-1: Breeding bird survey visit details

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
1	29/04/15	JS	05:45	1	2	1	SE	0	7	2	0	0
				2	2	2	SE	3	8	2	0	0
				3	2	3	E	5	8	1	0	0
	30/04/15	JS	05:30	1	2	4	N	4	6	2	0	0
				2	2	4	N	4	7	2	0	0
				3	2	3	N	0	6	2	0	0
				4	2	3	N	0	6	2	0	0
				5	2	3	N	2	5	2	0	0
		PH	05:30	1	2	4	N	4	6	2	0	0
				2	2	4	N	4	7	2	0	0
3				2	3	N	0	6	2	0	0	
4				2	3	N	0	6	2	0	0	
5				2	3	N	2	5	2	0	0	
2	13/05/15	JS	05:45	1	2	3	NW	4	8	2	0	0
				2	2	4	NW	3	7	2	0	0
				3	2	4	NW	2	7	2	0	0
				4	2	3	NW	0	5	2	0	0
				5	2	3	NW	0	4	2	0	0
				6	2	3	NW	0	4	2	0	0
	14/05/15	JS	05:00	1	2	1	S	0	1	2	1	0
				2	2	1	SE	0	1	2	1	0
				3	2	1	SE	0	1	2	0	0
				4	2	1	SE	0	1	2	0	0
				5	2	1	SE	0	7	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow	
3	01/06/15	SJ	15:30	1	2	3	SSE	0	6	2	0	0	
				2	2	3	SE	0	7	2	0	0	
				3	2	3	SE	0	8	2	0	0	
				4	2	4	SE	0	8	2	0	0	
	02/06/15	SJ	08:05	1	2	2	WS W	1	8	2	0	0	
				2	2	2	WS W	2	8	2	0	0	
				3	2	3	WS W	0	8	2	0	0	
				4	2	3	W	0	7	2	0	0	
				5	2	4	W	2	8	2	0	0	
				6	2	3	W	2	8	2	0	0	
	02/06/15	TW	08:00	1	2	3	NW	2	7	2	0	0	
				2	2	3	NW	2	7	2	0	0	
				3	2	3	NW	2	7	2	0	0	
				4	2	3	NW	0	8	2	0	0	
				5	2	3	NW	2	8	2	0	0	
				6	2	3	NW	2	8	2	0	0	
	4	30/06/15	EF, CG	09:30	1	2	3	SSE	0	7	2	0	0
					2	2	3	SSE	0	5	2	0	0
					3	2	4	SSE	0	4	2	0	0
4					2	4	SSE	0	4	2	0	0	
5					2	4	SSE	0	5	2	0	0	
6					2	3	SSE	0	4	2	0	0	
7					2	3	SSE	0	5	2	0	0	

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
4	30/06/15	EF, CG	09:30	8	2	2	SSE	0	5	2	0	0
	15/07/15	TW	08:30	1	2	3	NW	0	3	2	0	0
				2	2	3	NW	2	5	2	0	0
				3	2	3	NW	0	4	2	0	0
	15/07/15	SJ	08:30	1	2	1	N	0	4	2	0	0
				2	2	1	N	0	6	2	0	0
				3	2	2	N	2	7	2	0	0

Key:

- *Visibility: 0 = <1 km; 1 = 1-2 km; 2 = ≥2 km*
- *Wind direction: according to 16-point compass*
- *Wind strength: according to the Beaufort scale*
- *Cloud cover: in eighths of sky*
- *Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m*
- *Precipitation: 0 = None; 1 = Drizzle/mist; 2 = Light showers; 3 = Light; 4 = Heavy showers; 5 = Heavy*
- *Frost: 0 = No; 1 = Yes*
- *Snow: 0 = None; 1 = On high ground only; 2 = All ground*
- *Surveyor: EF = Eamonn Flood; CG = Carolyn Gillen; PH = Paul Higson; SJ = Steven Johnston; JS = Julian Smith; TW = Tim Wallis*

Table 23A-2: Breeding raptor and seabird visit details

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
1	16/04/15	SJ	15:00	1	2	3	SW	0	1	2	0	0
				2	2	2	SW	0	0	-	0	0
				3	2	4	SW	0	1	2	0	0
				4	2	4	SW	0	1	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
		EF	15:00	1	2	4	SW	0	1	2	0	0
				2	2	4	SW	0	1	2	0	0
				3	2	4	SW	0	1	2	0	0
				4	2	5	SW	0	1	2	0	0
	17/04/15	SJ	08:00	1	2	2	SW	0	1	2	0	0
				2	2	1	SW	0	2	2	0	0
				3	2	1	SW	0	1	2	0	0
				4	2	2	SW	0	2	2	0	0
2	13/05/15	JS	09:45	1	2	3	NW	0	5	2	0	0
				2	2	3	NW	0	4	2	0	0
				3	2	3	NW	0	4	2	0	0
		PH	09:45	1	2	3	NW	0	5	2	0	0
				2	2	3	NW	0	4	2	0	0
				3	2	3	NW	0	4	2	0	0
3	01/06/15	TW	15:30	1	2	4	S	0	6	2	0	0
				2	2	3	S	0	5	2	0	0
				3	2	4	S	0	7	2	0	0
				4	2	4	S	0	7	2	0	0
	02/06/15	TW	14:15	1	2	4	NW	0	8	2	0	0
				2	2	4	NW	0	5	2	0	0
3	02/06/15	SJ	14:15	1	2	3	SSE	1	7	2	0	0
				2	2	3	SSE	0	5	2	0	0
4	15/07/15	TW	11:30	1	2	3	NW	0	4	2	0	0
				2	2	3	NW	2	5	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow		
				3	2	3	NW	0	4	2	0	0		
				4	2	2	NW	0	4	2	0	0		
				5	2	2	NW	0	5	2	0	0		
				6	2	2	NW	2	6	2	0	0		
				7	2	2	NW	0	5	2	0	0		
				SJ	11:30	1	2	2	N	2	7	2	0	0
				2	2	2	N	0	7	2	0	0		
		3	2	1	NNE	0	5	2	0	0				
		4	2	1	NNE	0	4	2	0	0				
		5	2	2	E	0	7	2	0	0				
		6	2	1	E	2	8	2	0	0				
		7	2	0	-	2	7	2	0	0				
		5	12/08/15	SJ	10:00	1	2	3	SW	0	7	2	0	0
				2	2	3	SW	0	7	2	0	0		
				3	2	3	NW	0	6	2	0	0		
				4	2	2	NW	0	6	2	0	0		
				5	2	2	NN W	0	6	2	0	0		
				6	2	3	NN W	0	7	2	0	0		
				7	2	3	NW	0	7	2	0	0		
				8	2	3	NW	0	7	2	0	0		
5	12/08/15	TW	10:00	1	2	3	SW	0	6	2	0	0		
				2	2	3	SW	0	5	2	0	0		
				3	2	3	W	0	5	2	0	0		

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
				4	2	3	N	0	5	2	0	0
				5	2	3	NE	0	5	2	0	0
				6	2	3	NE	0	5	2	0	0
				7	2	2	ENE	0	6	2	0	0
				8	2	2	ENE	0	6	2	0	0

Key:

- *Visibility; 0 = <1 km; 1 = 1-2 km; 2 = ≥2 km*
- *Wind direction: according to 16-point compass*
- *Wind strength: according to the Beaufort scale*
- *Cloud cover: in eighths of sky*
- *Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m*
- *Precipitation: 0 = None; 1 = Drizzle/mist; 2 = Light showers; 3 = Light; 4 = Heavy showers; 5 = Heavy*
- *Frost: 0 = No; 1 = Yes*
- *Snow: 0 = None; 1 = On high ground only; 2 = All ground*
- *Surveyor: EF = Eamonn Flood; JS = Julian Smith; PH = Paul Higson; SJ = Steven Johnston; TW = Tim Wallis*

Table 23A-3: Foraging goose survey visit details

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
1	17/04/15	EF	08:15	1	2	2	SW	0	1	2	0	0
				2	2	2	SW	0	2	2	0	0
				3	2	3	SW	0	1	2	0	0
				4	2	2	SW	0	1	2	0	0
2	29/04/15	PH	05:45	1	2	1	SE	0	7	2	0	0
				2	2	2	SE	3	8	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
				3	2	3	E	5	8	1	0	0
3	13/05/15	JS	05:45	1	2	3	NW	4	8	2	0	0
				2	2	4	NW	3	7	2	0	0
				3	2	4	NW	2	7	2	0	0
				4	2	3	NW	0	5	2	0	0
				5	2	3	NW	0	4	2	0	0
				6	2	3	NW	0	4	2	0	0
4	09/09/15	SJ	16:30	1	2	5	S	0	0	2	0	0
				2	2	6	SSW	0	0	2	0	0
				3	2	5	S	0	0	2	0	0
	10/09/15	TW	08:00	1	2	2	SE	0	2	2	0	0
				2	2	2	SE	0	2	2	0	0
				3	2	2	SE	0	3	2	0	0
5	22/09/15	TW	10:15	1	1	3	NW	2	8	1	0	0
				2	1	3	NW	2	8	1	0	0
		SJ	10:15	1	1	3	NW	1	8	1	0	0
				2	1	3	NW	3	8	1	0	0
6	08/10/15	SJ	15:30	1	2	1	WSW	0	1	2	0	0
6	08/10/15	SJ	15:30	2	2	1	WSW	0	1	2	0	0
				3	2	2	WSW	0	2	2	0	0
		TW	16:30	1	2	2	SW	0	1	2	0	0
				2	2	2	SW	0	1	2	0	0
7	20/10/15	SJ	07:58	1	1	2	SW	0	8	2	0	0
				2	2	2	SW	2	8	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
				3	2	3	SW	1	7	2	0	0
8	02/11/15	SJ	13:45	1	2	1	SSW	0	0	2	0	0
				2	2	1	SSW	0	0	-	0	0
				3	2	1	SSW	0	1	2	0	0
	03/11/15	SJ	09:05	1	2	1	S	0	0	-	0	0
				2	2	2	S	0	2	2	0	0
				3	2	1	S	0	5	2	0	0
9	17/11/15	TW	07:00	1	2	5	SW	4	7	2	0	0
				2	2	4	SW	4	5	2	0	0
10	01/12/15	TW	07:40	1	2	4	SW	0	8	2	0	0
				2	2	4	SW	0	8	2	0	0
11	18/12/15	TW	08:00	1	2	4	SW	2	5	2	0	0
				2	2	4	SW	0	5	2	0	0
				3	2	4	SW	0	6	2	0	0

Key:

- *Visibility: 0 = <1 km; 1 = 1-2 km; 2 = ≥2 km*
- *Wind direction: according to 16-point compass*
- *Wind strength: according to the Beaufort scale*
- *Cloud cover: in eighths of sky*
- *Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m*
- *Precipitation: 0 = None; 1 = Drizzle/mist; 2 = Light showers; 3 = Light; 4 = Heavy showers; 5 = Heavy*
- *Frost: 0 = No; 1 = Yes*
- *Snow: 0 = None; 1 = On high ground only; 2 = All ground*
- *Surveyor: EF = Eamonn Flood; JS = Julian Smith; PH = Paul Higson; SJ = Steven Johnston; TW = Tim Wallis*

Table 23A-4: Winter walkover survey visit details

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
1	21/09/15	TW	17:00	1	3	NW	0	7	2	2	0	0
				2	3	NW	0	7	2	2	0	0
				3	3	NW	0	7	2	2	0	0
		SJ	17:00	1	2	NW	0	7	2	2	0	0
				2	3	NW	0	8	2	2	0	0
				3	2	NW	0	8	2	2	0	0
	22/09/15	SJ	12:15	1	3	NNW	0	7	2	2	0	0
				2	3	NNW	0	8	2	2	0	0
				3	2	N	0	8	1	2	0	0
				4	2	N	0	8	1	2	0	0
		TW	12:15	1	3	NW	0	7	2	2	0	0
				2	3	NW	0	6	2	2	0	0
				3	3	NW	0	8	1	2	0	0
2	08/10/15	SJ	09:15	1	2	SW	0	0	-	2	0	0
				2	2	W	0	0	-	2	0	0
				3	2	SSW	0	0	-	2	0	0
				4	2	WSW	0	1	2	2	0	0
		SJ	09:15	5	3	WSW	0	2	2	2	0	0
				6	2	WSW	0	1	2	2	0	0
		TW	09:30	1	3	SW	0	1	2	2	0	0
				2	3	SW	0	1	2	2	0	0
		2	08/10/15	TW	09:30	3	3	SW	0	1	2	2
4	3					SW	0	2	2	2	0	0
5	2					SW	0	1	2	2	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
2	08/10/15	TW	09:30	6	2	SW	0	1	2	2	0	0
				7	2	SW	0	1	2	2	0	0
3	02/11/15	TW	13:00	1	2	S	0	1	2	2	0	0
				2	2	S	0	1	2	2	0	0
				3	2	S	0	1	2	2	0	0
				4	1	S	0	1	2	2	0	0
	03/11/15	TW	09:00	1	2	S	0	2	2	2	0	0
				2	2	S	0	3	2	2	0	0
				3	2	S	0	6	2	2	0	0

Key:

- *Visibility: 0 = <1 km; 1 = 1-2 km; 2 = ≥2 km*
- *Wind direction: according to 16-point compass*
- *Wind strength: according to the Beaufort scale*
- *Cloud cover: in eighths of sky*
- *Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m*
- *Precipitation: 0 = None; 1 = Drizzle/mist; 2 = Light showers; 3 = Light; 4 = Heavy showers; 5 = Heavy*
- *Frost: 0 = No; 1 = Yes*
- *Snow: 0 = None; 1 = On high ground only; 2 = All ground*
- *Surveyor: EF = Steven Johnston; TW = Tim Wallis*

Table 23A-5: Wetland bird survey visit details

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
1	09/09/15	TW	16:30	1	2	5	SE	0	0	-	0	0
				2	2	4	SE	0	0	-	0	0
				3	2	4	SE	0	0	-	0	0

Visit	Date	Surveyor	Start time	Hour	Visibility	Wind speed	Wind direction	Precipitation	Cloud cover	Cloud height	Frost	Snow
	10/09/15	SJ	08:00	1	2	2	SW	0	1	2	0	0
				2	2	2	SW	0	1	2	0	0
				3	2	3	SW	0	2	2	0	0
2	20/10/15	TW	10:15	1	2	2	W	0	5	2	0	0
				2	2	2	W	0	6	2	0	0
				3	2	2	W	0	5	2	0	0
		SJ	10:30	1	2	3	SW	0	7	2	0	0
				2	2	3	SW	0	8	2	0	0
3	17/11/15	TW	09:00	1	2	4	SW	2	6	2	0	0
				2	2	4	SW	2	6	2	0	0
4	01/12/15	TW, GN	09:40	1	2	4	SW	0	8	2	0	0
				2	2	5	SW	3	8	2	0	0
				3	2	5	SW	3	8	2	0	0
<p>Key:</p> <ul style="list-style-type: none"> • <i>Visibility; 0 = <1 km; 1 = 1-2 km; 2 = ≥2 km</i> • <i>Wind direction: according to 16-point compass</i> • <i>Wind strength: according to the Beaufort scale</i> • <i>Cloud cover: in eighths of sky</i> • <i>Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m</i> • <i>Precipitation: 0 = None; 1 = Drizzle/mist; 2 = Light showers; 3 = Light; 4 = Heavy showers; 5 = Heavy</i> • <i>Frost: 0 = No; 1 = Yes</i> • <i>Snow: 0 = None; 1 = On high ground only; 2 = All ground</i> • <i>Surveyor: SJ = Steven Johnston; TW = Tim Wallis; GN = Glenn Norris</i> 												

23.3 Existing records

23.35 Information relating to sensitive bird species was supplied by the following organisations:

- Scottish Natural Heritage (SNH);
- Royal Society for the Protection of Birds (RSPB);

- British Trust for Ornithology (BTO);
 - Wildfowl and Wetlands Trust (WWT); and
 - Greenland White-fronted Goose Study (GWFGS).
- 23.36 SNH provided information relating to designated sites, but did not provide any records of sensitive bird species. Details of designated sites are presented in Chapter 23: Terrestrial Ornithology.
- 23.37 HRSG did not hold any records of breeding eagles within 6 km of the initial onshore project area, or other Schedule 1 raptors within 2 km.
- 23.38 WWT and GWFGS provided information relating to designated feature of the Caithness Lochs Special Protection Area (SPA). This information is summarised in Chapter 23: Terrestrial Ornithology and is not repeated here.
- 23.39 The BTO returned Wetland Bird Survey (WeBS) Core Count data for Sandside Bay from between winter 2009-10 and winter 2013-14. However, due to the remote location only a single visit was made each year, in either January or February, and not the monthly visits between September and March as required by the standard survey methodology (Gilbert *et al.*, 1998).
- 23.40 The BTO also returned records of 133 bird species (not including domestic birds or hybrid species) from the NC96 Bird Atlas (Balmer *et al.*, 2013) hectad (10 km grid squares). Records of sensitive species are summarised below.
- 23.41 The RSPB Returned records of 28 bird species within 2 km of the initial project area.
- 23.42 A summary of records of sensitive¹ non-passerine species provided by the BTO and RSPB is presented in Table 23A-6. Records of 30 sensitive passerine species were also returned by the BTO and RSPB. However, for reasons of brevity, passerine species are not included in Table 23A-6.
- 23.43 Numbers of breeding seabirds from recorded within the Red Point Coast Site of Special Scientific Interest (SSSI) during the most recent national census ('Seabird 2000') in 1998-2002 (Mitchell *et al.*, 2004) is presented in Table 23A-7.

Table 23A-6. Summary of records of sensitive bird species provided by the BTO and RSPB

Species	Data source	Date	Season*	Number of records	Peak count
Wildfowl species (including seaducks)					
Whooper swan	BTO Atlas	2007-11	Non-breeding	2	6
Pink-footed goose	BTO Atlas	2007-11	Non-breeding	2	15
	RSPB	2000-01	Non-breeding	4	780
Greylag goose	BTO Atlas	2007-2011	Breeding	7	12

¹ Defined as those species afforded special protection under Schedule 1 of the Countryside and Wildlife Act 1981 (as amended) and/or Annex I of the Birds Directive, as well those included on the UK Birds of Conservation Concern Red or Amber Lists, and/or the Scottish Biodiversity List

Species	Data source	Date	Season*	Number of records	Peak count
			Non-breeding	15	574
	RSPB	2001	Non-breeding	5	496
Barnacle goose	BTO Atlas	2007-11	Non-breeding	2	4
Shelduck	BTO Atlas	2007-11	Breeding	8	15
			Non-breeding	5	9
Wigeon	BTO Atlas	2007-11	Breeding	1	1
			Non-breeding	2	32
Teal	BTO Atlas	2007-11	Breeding	4	3
			Non-breeding	7	37
Mallard	BTO Atlas	2007-11	Breeding	11	8
			Non-breeding	5	58
Tufted duck	BTO Atlas	2007-11	Non-breeding	3	5
Eider	BTO Atlas	2007-11	Breeding	15	80
			Non-breeding	9	4
	BTO WeBS	2010-14	Non-breeding	4	22
	RSPB	2002	Breeding	3	12
Long-tailed duck	BTO Atlas	2007-11	Non-breeding	9	20
	BTO WeBS	2010-14	Non-breeding	3	6
Common scoter	BTO WeBS	2010-14	Non-breeding	1	3
	BTO Atlas	2007-11	Non-breeding	1	Not recorded
Goldeneye	BTO Atlas	2007-11	Non-breeding	6	6
Diver and grebe species					
Red-throated diver	BTO Atlas	2007-11	Breeding	4	3
			Non-breeding	6	2
	BTO WeBS	2010-14	Non-breeding	1	2

Species	Data source	Date	Season*	Number of records	Peak count
Black-throated diver	RSPB	24/04/02	Non-breeding	1	1
Great northern diver	BTO Atlas	2007-11	Non-breeding	7	3
	BTO WeBS	2010-14	Non-breeding	2	3
Slavonian grebe	BTO Atlas	2007-11	Non-breeding	1	Not recorded
Seabird species (including gulls)					
Fulmar	BTO Atlas	2007-11	Breeding	26	152
			Non-breeding	7	382
Gannet	BTO Atlas	2007-11	Non-breeding	4	1
Shag	BTO Atlas	2007-11	Breeding	22	66
	BTO Atlas	2007-11	Non-breeding	18	22
	BTO WeBS	2010-14	Non-breeding	4	26
Great skua	BTO Atlas	2007-11	Breeding	5	2
	RSPB	2002	Breeding	1	1
Puffin	BTO Atlas	2007-11	Breeding	21	1,500
Black guillemot	BTO Atlas	2007-11	Breeding	3	4
			Non-breeding	2	1
Razorbill	BTO Atlas	2007-11	Breeding	17	100
			Non-breeding	1	Not recorded
Guillemot	BTO Atlas	2007-11	Breeding	13	300
			Non-breeding	1	2
Little tern	BTO Atlas	2007-11	Breeding	9	12
Common tern	BTO Atlas	2007-11	Breeding	1	100
Arctic tern	BTO Atlas	2007-11	Breeding	6	66
Kittiwake	BTO Atlas	2007-11	Breeding	15	1,000

Species	Data source	Date	Season*	Number of records	Peak count
Black-headed gull	BTO Atlas	2007-11	Breeding	1	20
			Non-breeding	7	50
	BTO WeBS	2010-14	Non-breeding	3	15
Common gull	BTO Atlas	2007-11	Breeding	29	200
			Non-breeding	13	5400
	BTO WeBS	2010-14	Non-breeding	5	529
Lesser black-backed gull	BTO Atlas	2007-11	Non-breeding	1	
Herring gull	BTO Atlas	2007-11	Breeding	19	60
			Non-breeding	21	255
	BTO WeBS	2010-14	Non-breeding	4	28
Iceland gull	BTO Atlas	2007-11	Non-breeding	1	1
Glaucous gull	BTO Atlas	2007-11	Non-breeding	2	1
Great black-backed gull	BTO Atlas	2007-11	Breeding	18	24
			Non-breeding	18	35
	BTO WeBS	2010-14	Non-breeding	4	22
Wader species					
Oystercatcher	BTO WeBS	2010-14	Non-breeding	5	130
	BTO Atlas	2007-11	Breeding	23	52
			Non-breeding	20	305
Golden plover	BTO Atlas	2007-11	Breeding	9	4
			Non-breeding	1	2
	RSPB	2002	Breeding	2	21
Lapwing	BTO Atlas	2007-11	Breeding	13	14
			Non-breeding	11	200
	RSPB	2006-11	Unknown	11	Unknown

Species	Data source	Date	Season*	Number of records	Peak count
Ringed plover	BTO Atlas	2007-11	Breeding	7	10
			Non-breeding	10	48
	BTO WeBS	2010-14	Non-breeding	1	1
Curlew	BTO Atlas	2007-11	Breeding	14	4
			Non-breeding	16	73
	BTO WeBS	2010-14	Non-breeding	5	16
	RSPB	2006-11	Unknown	13	Unknown
Bar-tailed godwit	BTO Atlas	2007-11	Non-breeding	1	1
Turnstone	BTO WeBS	2010-14	Non-breeding	2	92
Knot	BTO WeBS	2010-14	Non-breeding	1	2
	BTO Atlas	2007-11	Non-breeding	2	5
Sanderling	BTO Atlas	2007-11	Non-breeding	1	4
Dunlin	BTO Atlas	2007-11	Breeding	4	8
			Non-breeding	7	12
Purple sandpiper	BTO WeBS	2010-14	Non-breeding	14	150
	BTO WeBS	2010-14	Non-breeding	2	31
Common sandpiper	BTO Atlas	2007-11	Breeding	4	1
Greenshank	BTO Atlas	2007-11	Breeding	1	2
Redshank	BTO Atlas	2007-11	Breeding	4	2
			Non-breeding	12	4-65
	BTO WeBS	2010-14	Non-breeding	4	1-46
	RSPB	2002	Breeding	1	5
Jack snipe	BTO Atlas	2007-11	Non-breeding	11	
Woodcock	BTO Atlas	2007-11	Non-breeding	8	1-2
Snipe	BTO Atlas	2007-11	Breeding	9	1
			Non-breeding	7	1-3

Species	Data source	Date	Season*	Number of records	Peak count
	RSPB	2002	Snipe	2	2
Raptor species (including owls)					
Hen harrier	BTO Atlas	2007-11	Breeding	2	2
			Non-breeding	2	1
Kestrel	BTO Atlas	2007-11	Breeding	8	1
			Non-breeding	15	1-2
	RSPB	2002	Breeding	1	1
Merlin	BTO Atlas	2007-11	Breeding	7	1
			Non-breeding	1	Not recorded
Peregrine	BTO Atlas	2007-11	Breeding	1	1
			Non-breeding	3	1
Barn owl	BTO Atlas	2007-11	Breeding	2	1
			Non-breeding	3	1
	RSPB	2006-11	Unknown	4	Unknown
Short-eared owl	BTO Atlas	2007-11	Breeding	2	Not recorded
Other non-passerine species					
Quail	BTO Atlas	2007-11	Breeding	1	1
Red grouse	BTO Atlas	2007-11	Breeding	6	3
			Non-breeding	3	3
Crane	RSPB	2003	Breeding	1	1
Cuckoo	BTO Atlas	2007-11	Breeding	12	2
	RSPB	2002	Breeding	1	1
*Note that this does not relate to the status of birds recorded, e.g. a non-breeding bird may be recorded during the breeding season, and passage migrants during both seasons					

Table 23A-7 Numbers of seabird nests / breeding pairs recorded during the ‘Seabird 2000’ census

Species	Nests / Breeding Pairs	
	Seabird 2000 data for Red Point Coast SSSI– nearest component (NC 957 664 – NC 941 695)	Seabird 2000 data for Red Point Coast SSSI– total*
Fulmar	341	2,567
Guillemot	1,653	9,922
Kittiwake	1,301	3,517
Puffin	0	4,708
Razorbill	67	451
Shag	7	50

23.4 Terrestrial ornithology survey results

Breeding bird survey

23.44 Table 23A-8 provides a full species list based upon the results of the four-visit breeding bird survey in 2015. The table also indicates whether the bird is listed on Schedule 1 of the Wildlife and Countryside Act (as amended), and/or on the UK Birds of Conservation Concern (BoCC) Red or Amber Lists (Eaton *et al.*, 2015). For convenience, species have been arranged alphabetically as opposed to taxonomically.

Table 23A-8: Breeding bird survey results

Species	Conservation status*	Breeding	Estimated territories
Blackbird		N	
Blue tit		N	
Buzzard		N	
Carrion crow		N	
Chaffinch		N	
Collared dove		N	
Common sandpiper		N	
Curlew		Y	4
Goldcrest		N	
Golden plover		N	
Goldfinch		N	
Grasshopper warbler		N	
Great tit		N	
Greenfinch		N	
Grey heron		N	

Species	Conservation status*	Breeding	Estimated territories
Grey partridge		N	
Grey wagtail		N	
Greylag goose	Schedule 1	N	
Hooded crow		N	
House martin		N	
House sparrow		N	
Jackdaw		N	
Kestrel		N	
Lapwing		Y	8
Lesser redpoll		N	
Linnet		N	
Mallard		N	
Meadow pipit		Y	139
Mistle thrush		N	
Oystercatcher		Y	6
Pheasant		N	
Pied wagtail		N	
Pink-footed Goose		N	
Raven		N	
Red-breasted merganser		N	
Redshank		Y	1
Redwing	Schedule 1	N	
Ringed plover		N	
Robin		N	
Rock pipit		N	
Sand martin		N	
Sanderling		N	
Sedge warbler		Y	1
Skylark		Y	24
Song thrush		N	
Starling		N	
Stock dove		N	
Stonechat		N	
Swallow		N	
Tree sparrow		N	

Species	Conservation status*	Breeding	Estimated territories
Turnstone		N	
Twite		N	
Wheatear		N	
Whimbrel	Schedule 1	N	
Whitethroat		N	
Wigeon		N	
Willow warbler		Y	1
Wood pigeon		N	
Wren		Y	8
Yellowhammer		N	
*Colours correspond to species included on the UK BoCC Red and Amber Lists			

Winter bird surveys

Winter walkover survey

23.45 Table 23A-9 provides a full species list based upon the results of the three-visit winter walkover bird survey. The table also indicates whether the bird is listed on Schedule 1 of the Wildlife and Countryside Act (as amended) and/or on the BoCC Red or Amber Lists. For convenience, species have been arranged alphabetically as opposed to taxonomically.

Table 23A-9: Winter walkover survey results

Species	Conservation status*	Maximum number recorded
Black guillemot		4
Black-headed gull		2
Blackbird		11
Bullfinch		1
Buzzard		7
Carrion Crow		27
Chaffinch		81
Collared dove		38
Common gull		147
Cormorant		4
Curlew		86
Dunlin		26
Dunnock		7
Eider		12
Feral pigeon		346

Species	Conservation status*	Maximum number recorded
Fieldfare	Schedule 1	10
Gannet		1
Golden plover		100
Goldfinch		120
Goosander		3
Great black-backed gull		22
Great tit		1
Greenfinch		5
Grey heron		4
Grey wagtail		1
Greylag goose		75
Herring gull		15
Hooded crow		52
House sparrow		18
Jackdaw		404
Lapwing		457
Lesser black-backed gull		1
Little grebe		2
Linnet		128
Mallard		55
Meadow pipit		37
Mistle thrush		5
Oystercatcher		34
Pheasant		115
Pied wagtail		53
Red grouse		1
Redshank		40
Redwing	Schedule 1	10
Ringed plover		110
Robin		27
Rock dove		1
Rock pipit		14
Rook		10
Sanderling		8
Shag		10

Species	Conservation status*	Maximum number recorded
Skylark		50
Snipe		1
Snow bunting	Schedule 1	1
Song thrush		4
Sparrowhawk		1
Starling		1,833
Stonechat		3
Swallow		7
Teal		78
Turnstone		63
Twite		15
Wheatear		1
Whimbrel		1
Whooper swan		5
Wigeon		80
Woodpigeon		20
Wren		9
Yellowhammer		2
*Colours correspond to species included on the UK BoCC Red and Amber Lists		

Wetland bird survey

23.46 Table 23A-10 provides a full species list based upon the results of the four-visit wetland bird survey. The table also indicates whether the species is included on the BoCC Red or Amber Lists. For convenience, species have been arranged alphabetically as opposed to taxonomically.

Table 23A-10: Wetland bird survey results

Species	Conservation status*	Sep	Oct	Nov	Dec	Maximum number recorded
Black-headed gull		8	6			8
Curlew		24	8	21	30	30
Common gull		155	22	10	10	155
Dunlin		6				6
Eider					11	11
Great black-backed gull		2	20	6	2	20
Grey heron		11	5		1	11
Herring gull		5	2	1	4	5
Knot					8	8

Species	Conservation status*	Sep	Oct	Nov	Dec	Maximum number recorded
Little grebe				1		1
Mallard		41	8	12	26	41
Moorhen			3	1		3
Oystercatcher		129	46	79	85	129
Purple sandpiper				10		10
Redshank		39	12	27	23	39
Ringed plover		67	63	43	52	67
Sanderling		10				10
Teal			6	8	8	8
Tufted duck					1	1
Turnstone					5	5
Whooper swan				3	3	3
Wigeon		1	48	14	24	48
*Colours correspond to species included on the UK BoCC Red and Amber Lists						

Figures

23.47 Locations of species observed during winter bird surveys are shown below in Figures 23A-1 to 23A-17.

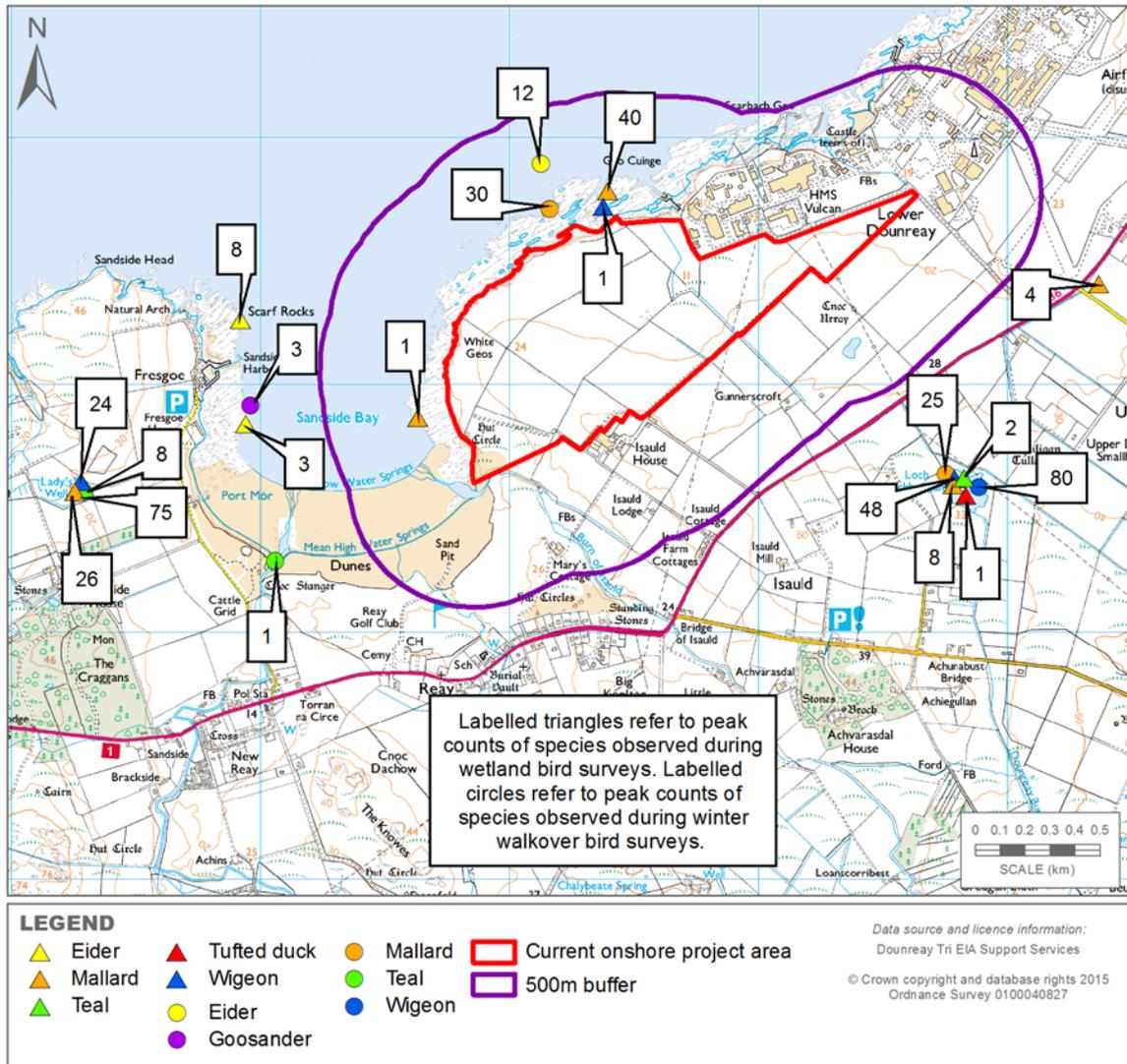


Figure 23A-1: Locations of duck species observed during 2015 winter walkover and wetland bird surveys

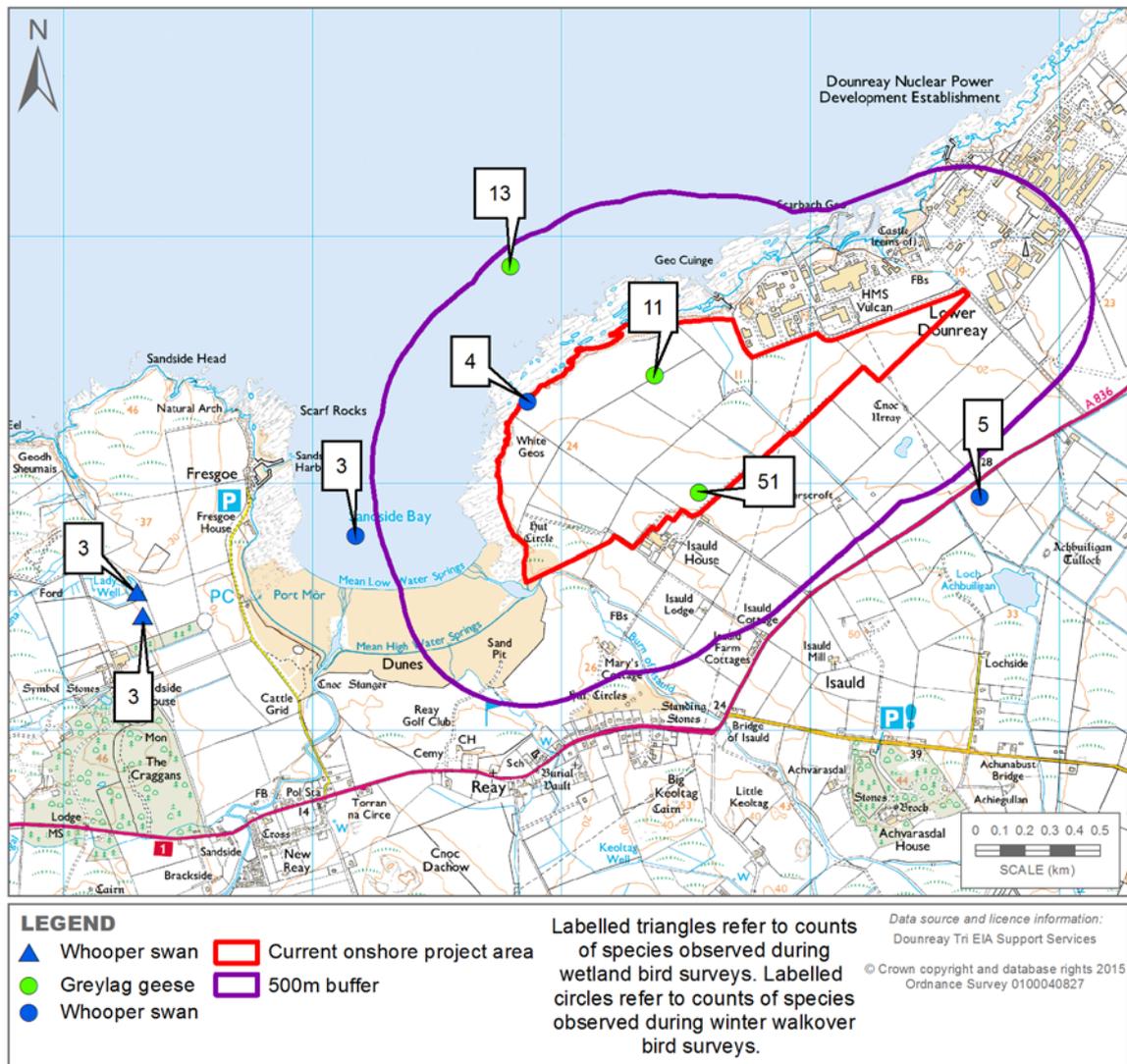


Figure 23A-2: Locations of geese and swan species observed during winter walkover and wetland bird surveys.

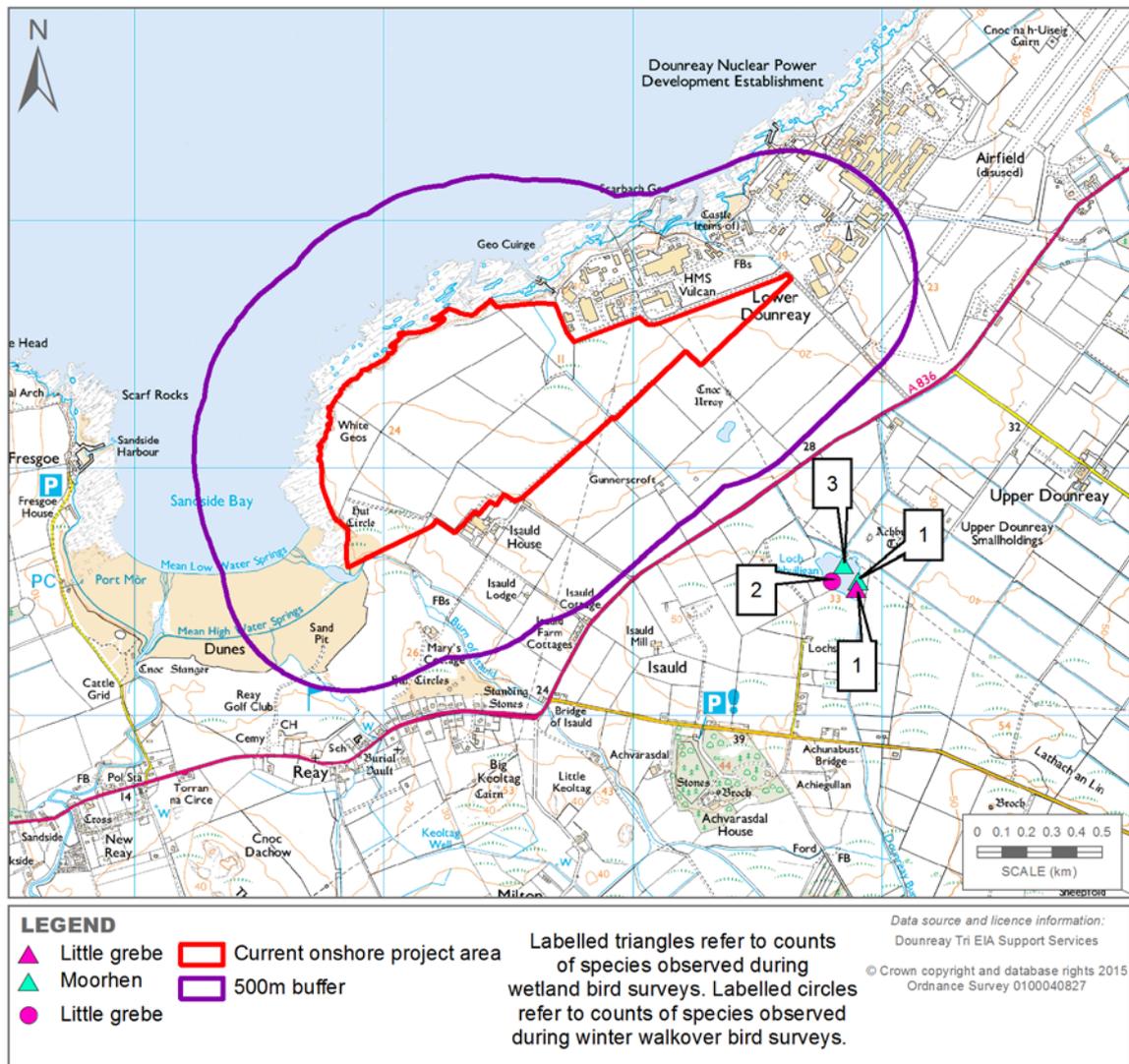


Figure 23A-3: Locations of other wildfowl species observed during winter walkover and wetland bird surveys

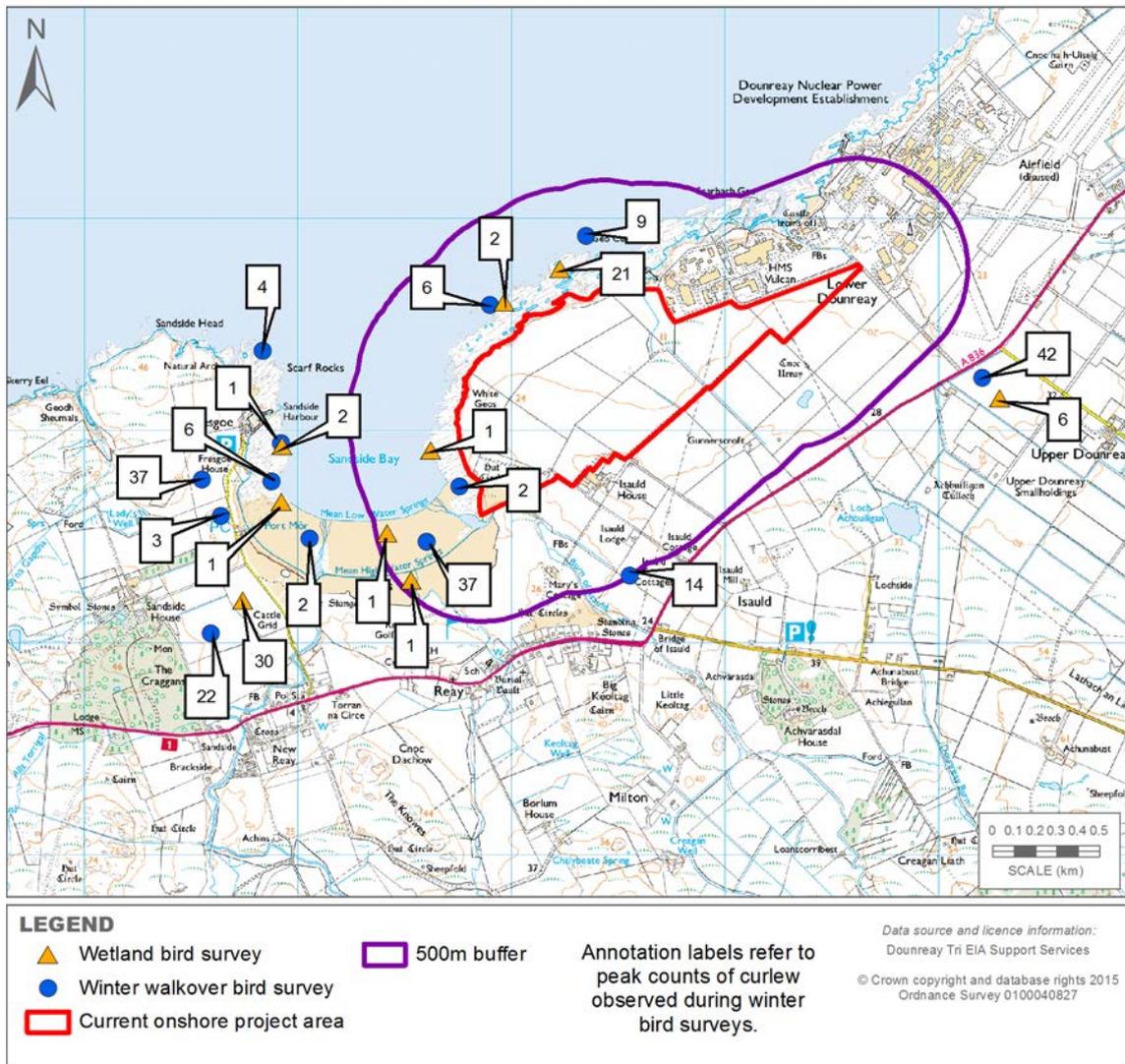


Figure 23A-4: Locations of curlew (*Numenius arquata*) observed during winter walkover and wetland bird surveys

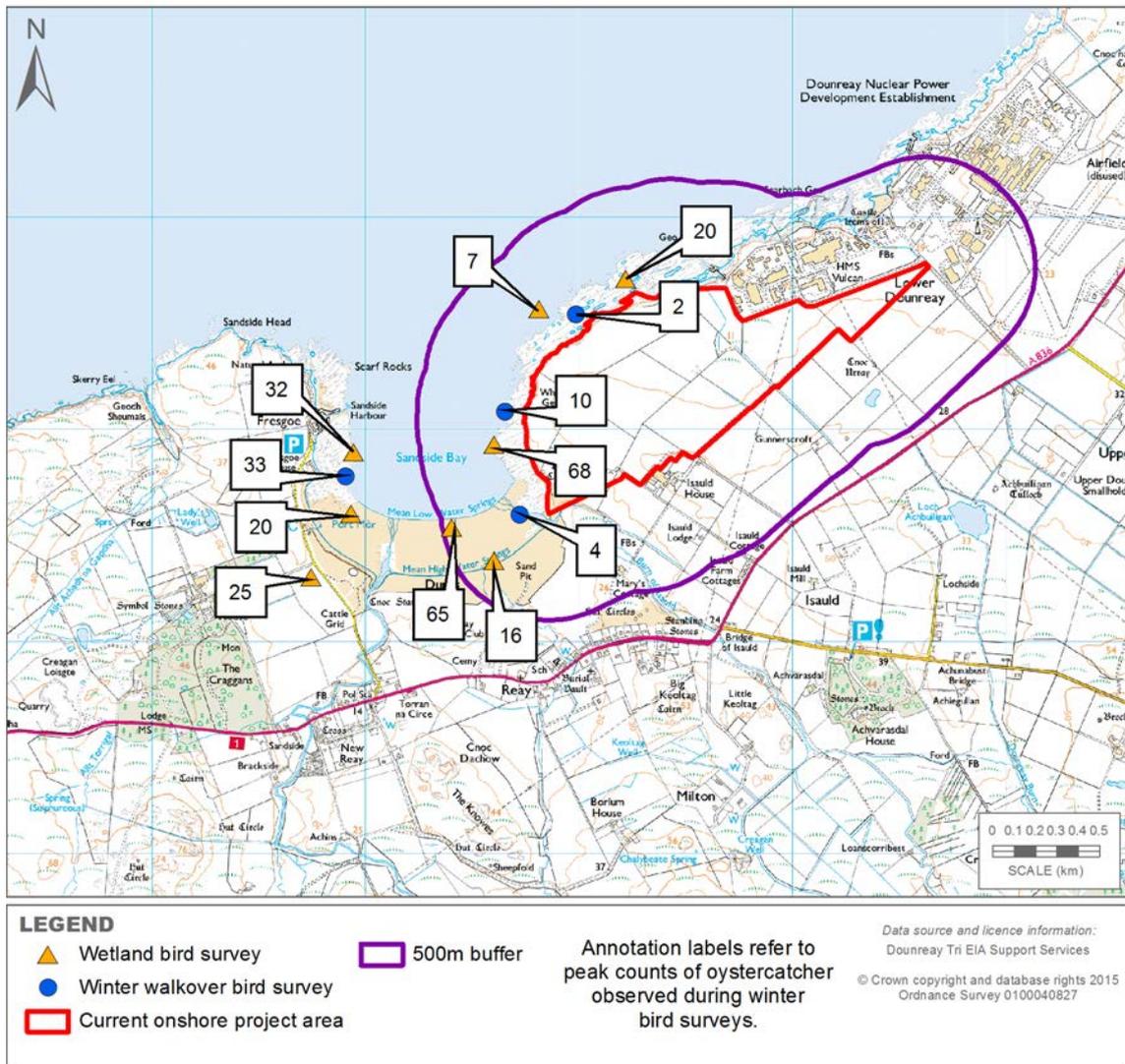


Figure 23A-5: Locations of oystercatcher (*Haematopus ostralegus*) observed during winter walkover and wetland bird surveys

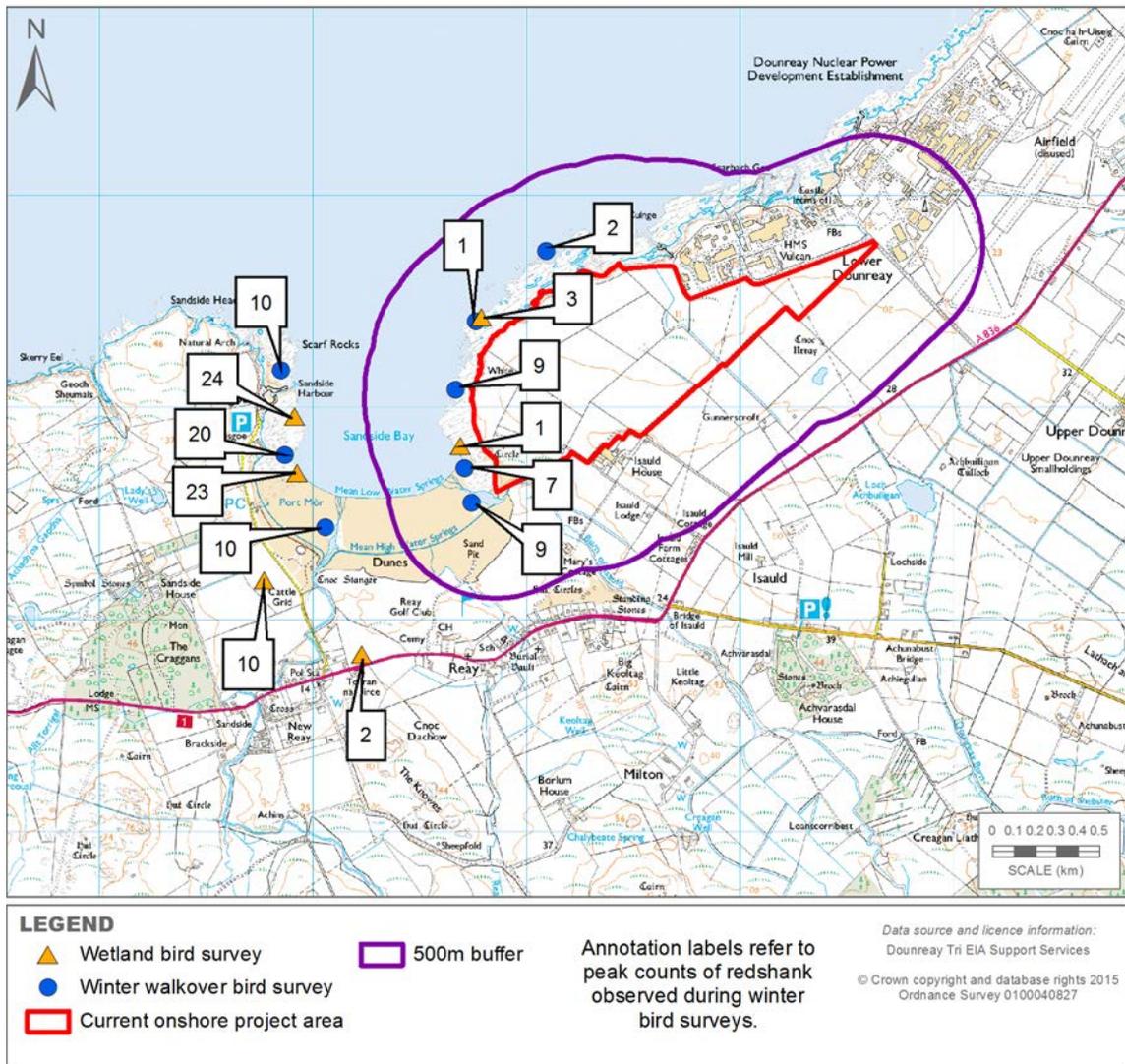


Figure 23A-6 shows locations of redshank (*Tringa totanus*) observed during winter walkover and wetland bird surveys.

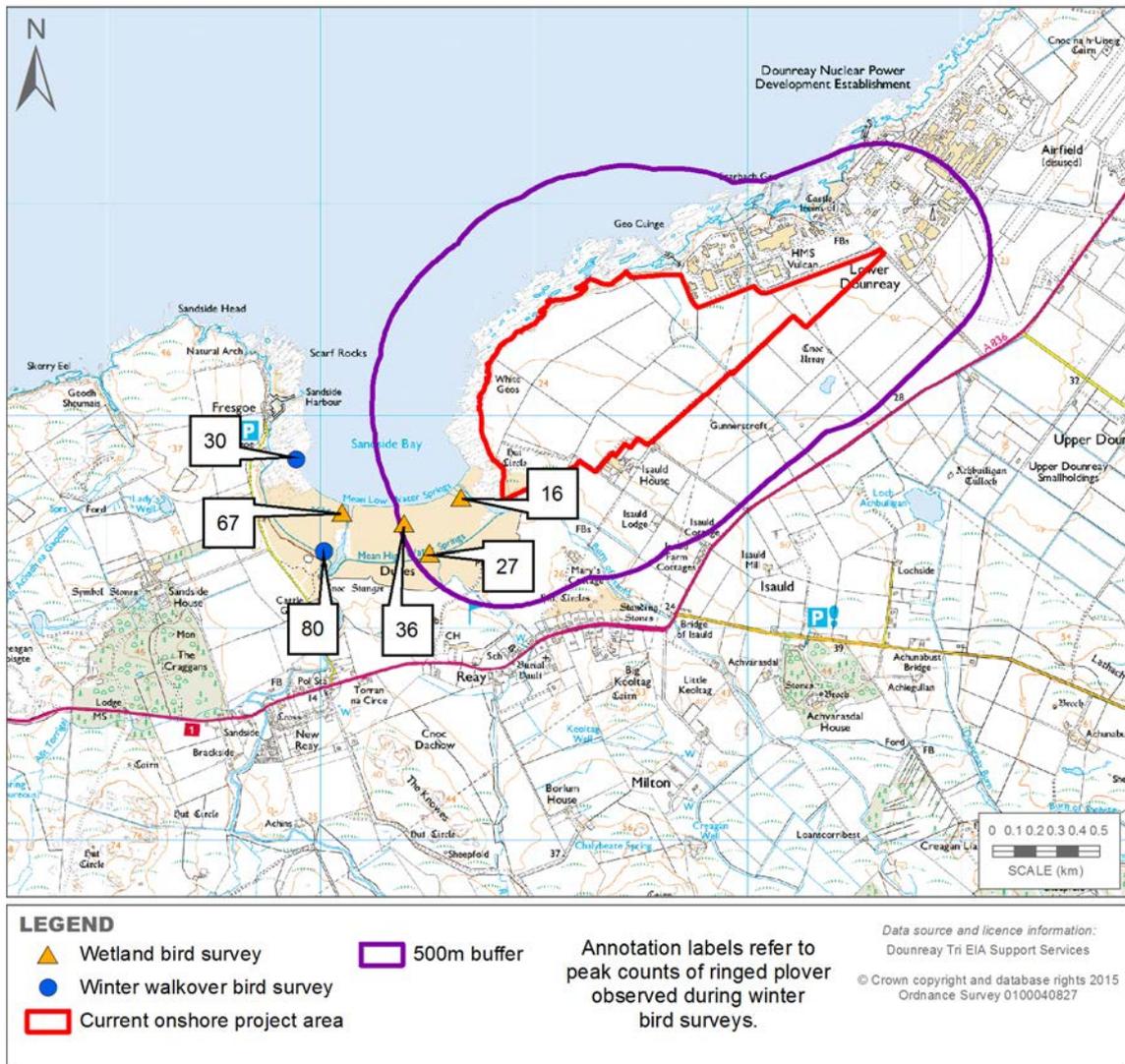


Figure 23A-7: Locations of ringed plover (*Charadrius hiaticula*) observed during winter walkover and wetland bird surveys

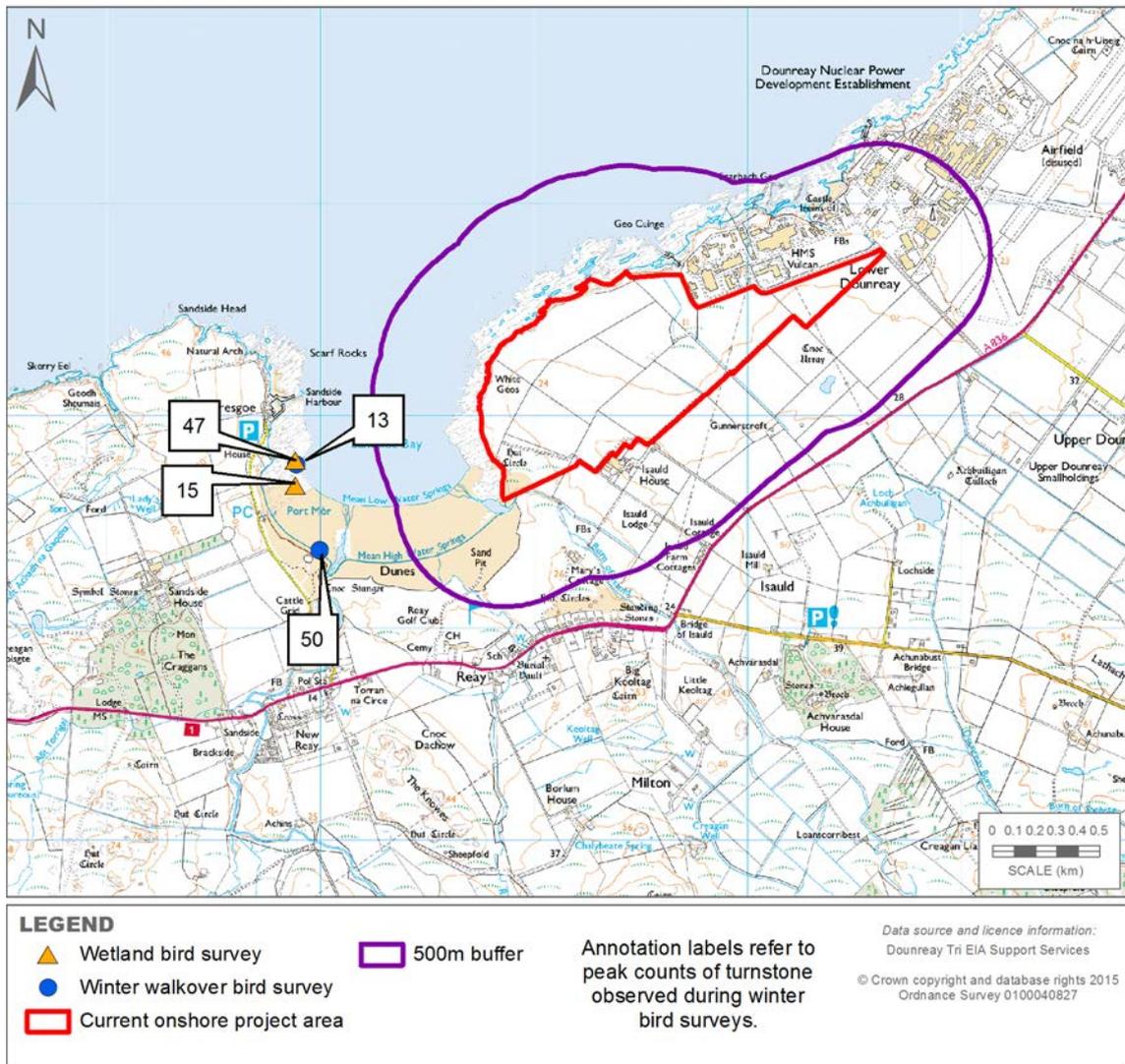


Figure 23A-8: Locations of turnstone (*Arenaria interpres*) observed during winter walkover and wetland bird surveys.

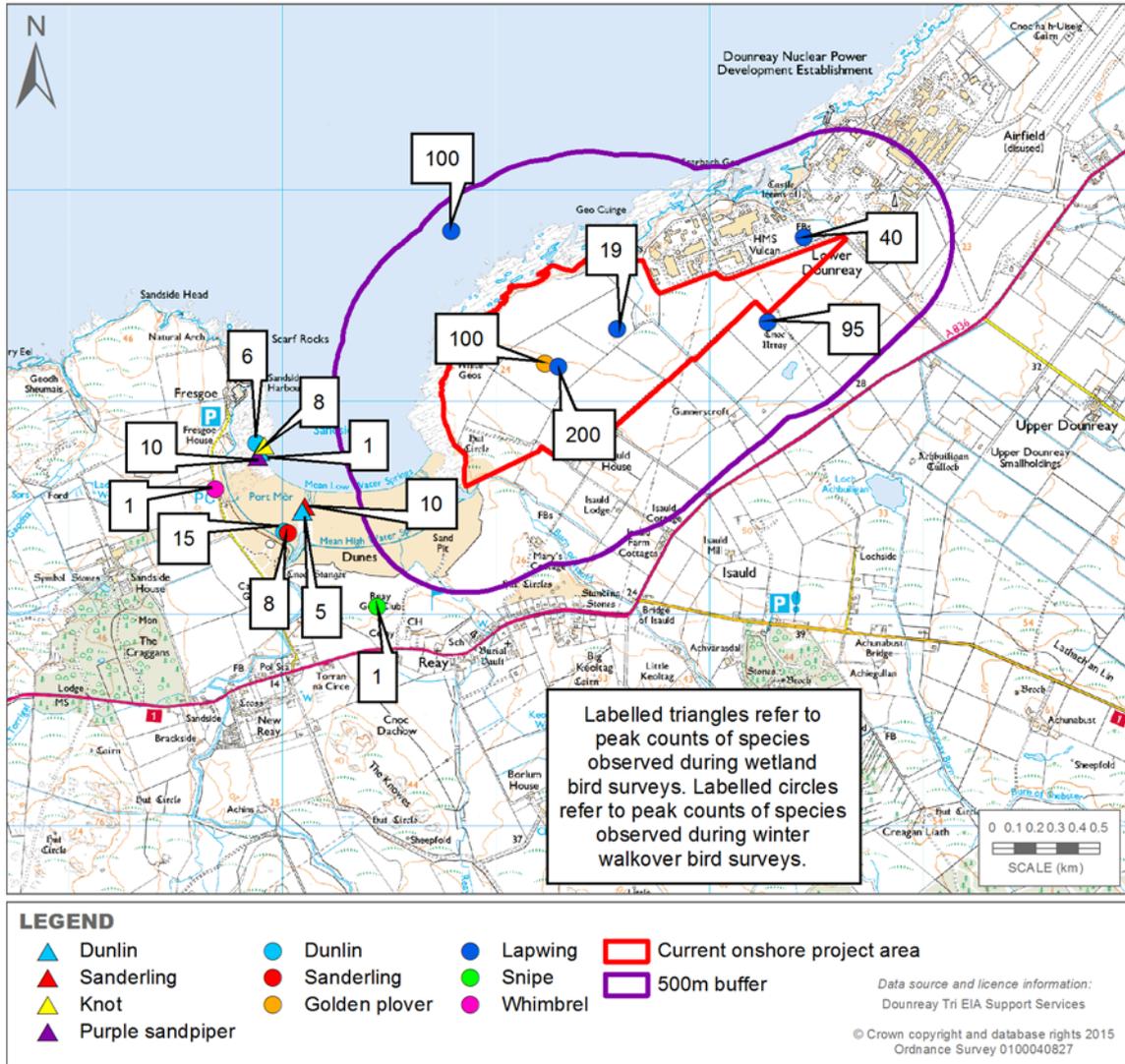


Figure 23A-9: Locations of other wader species observed during winter walkover and wetland bird surveys

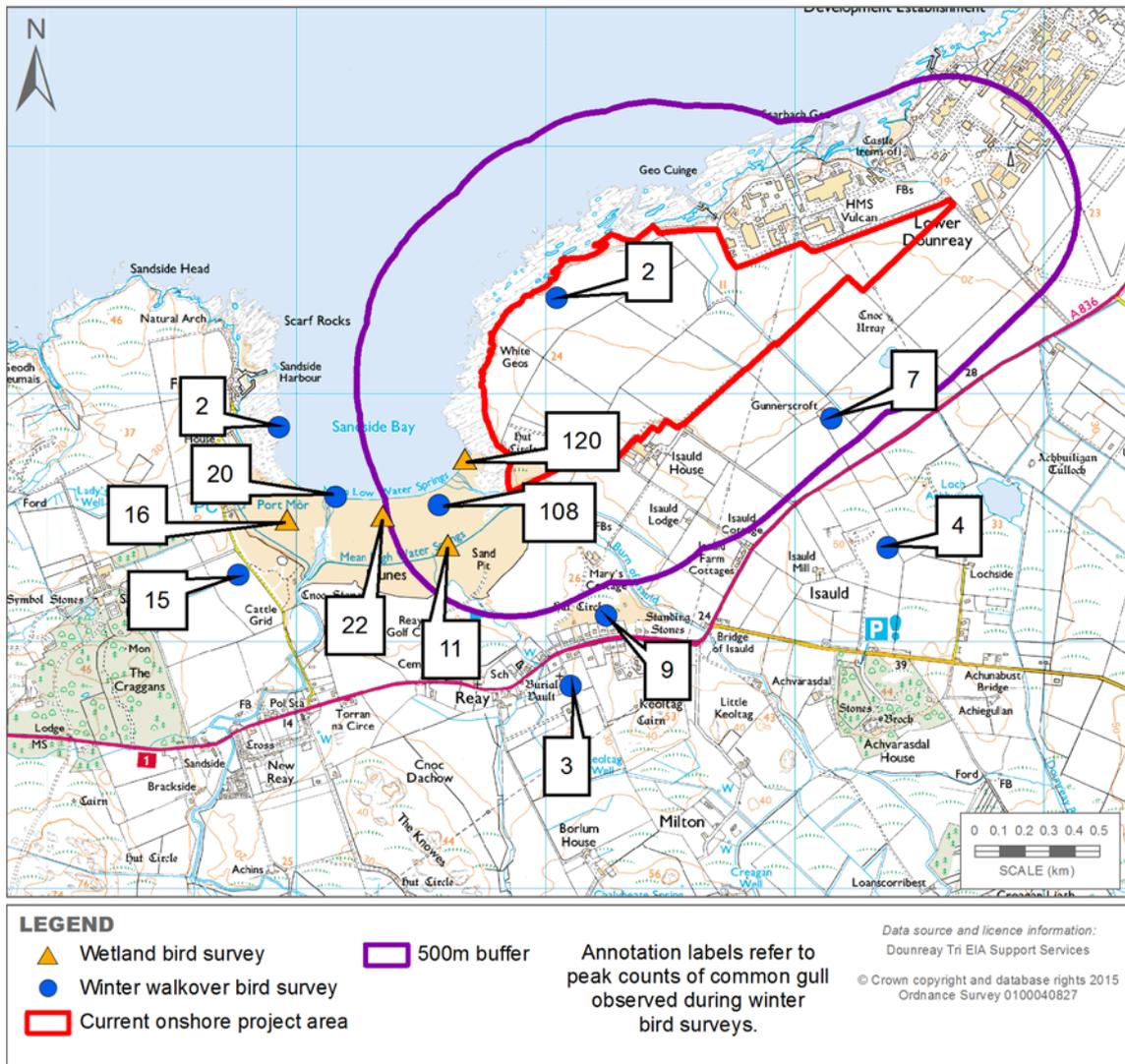


Figure 23A-10: Locations of common gull (*Larus canus*) observed during winter walkover and wetland bird surveys

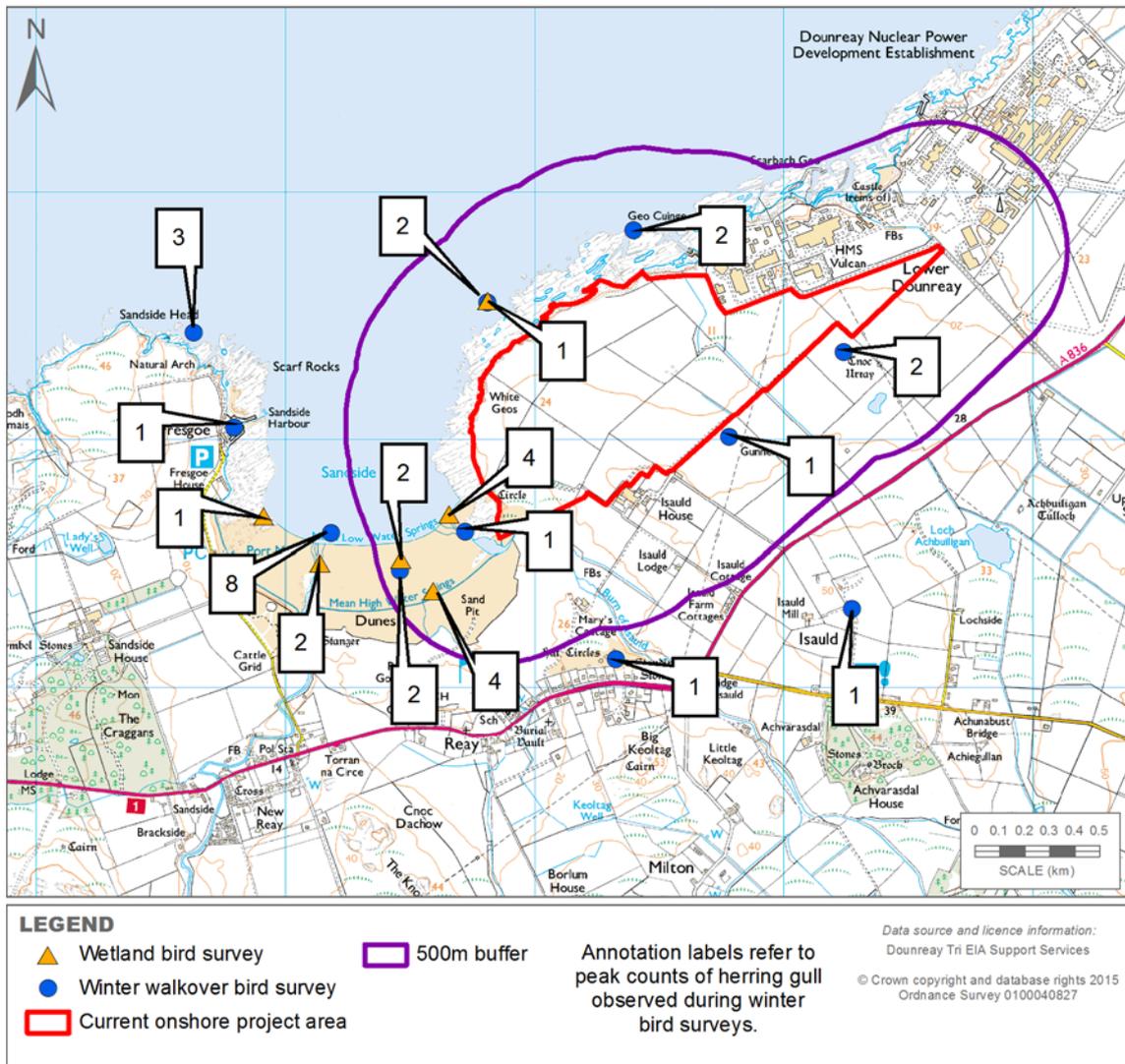


Figure 23A-11: Locations of herring gull (*Larus argentatus*) observed during winter walkover and wetland bird surveys

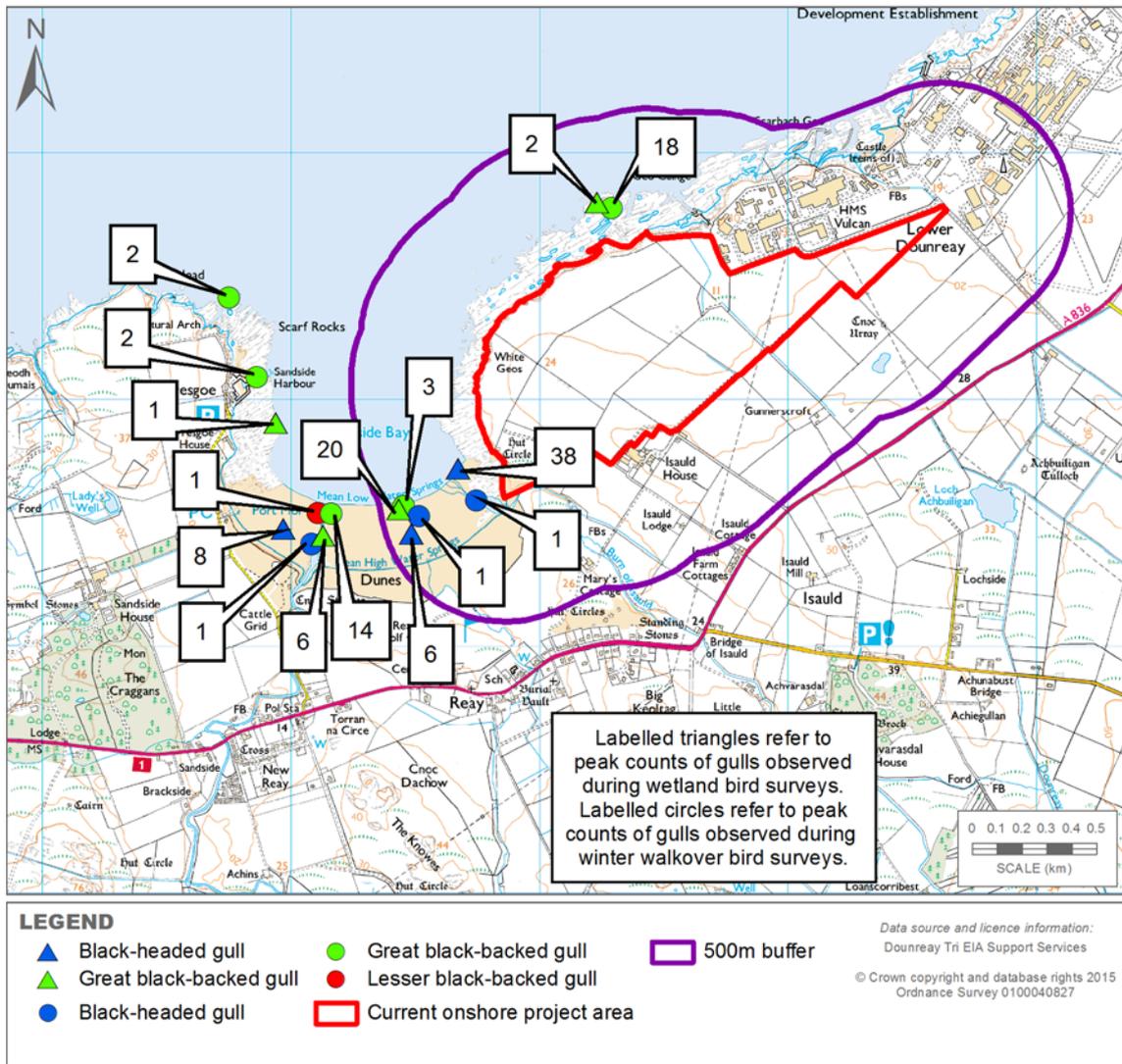


Figure 23A-12: Locations of other gull species observed during winter walkover and wetland bird surveys

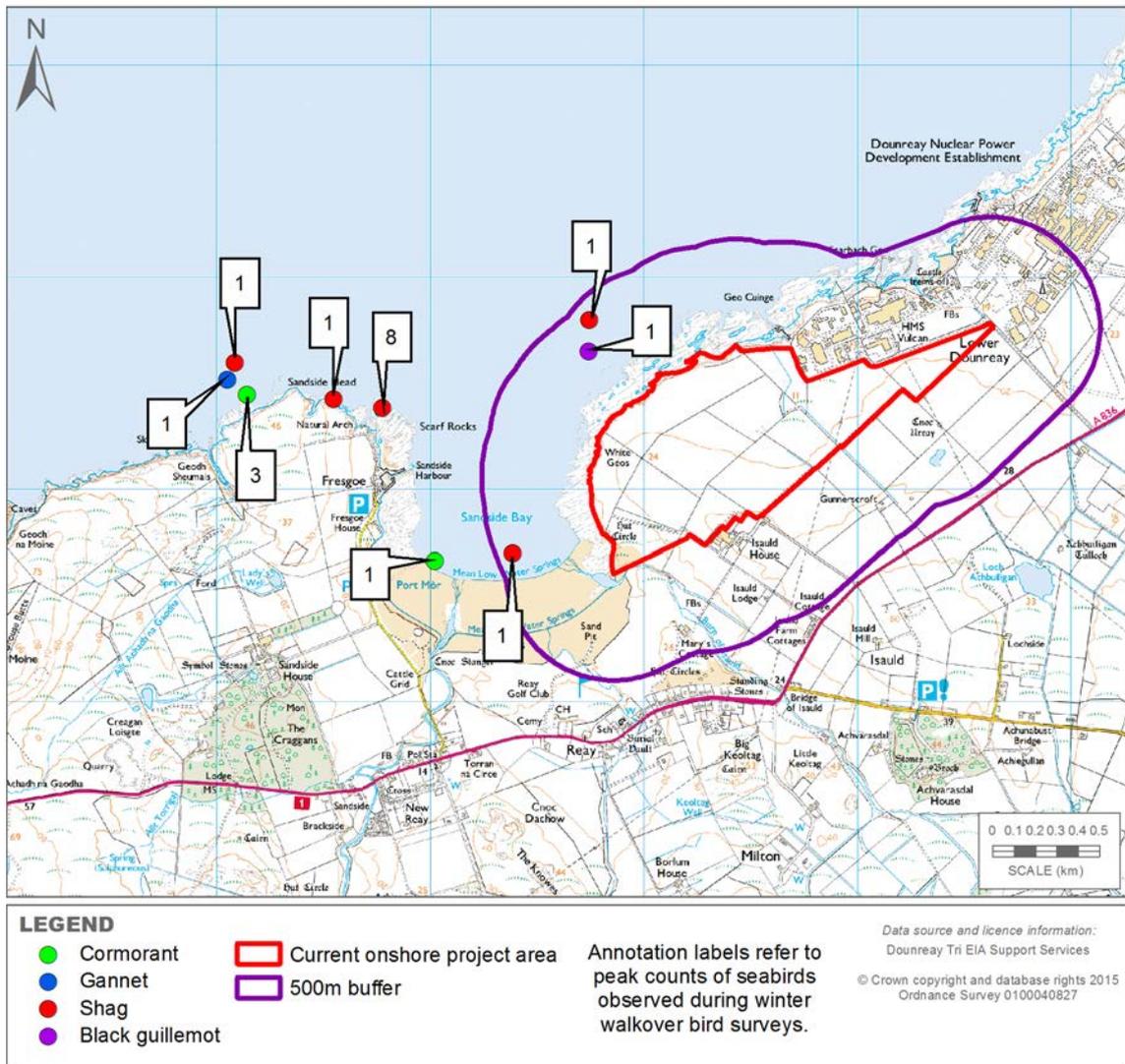


Figure 23A-13: Locations of other seabird species observed during winter walkover and wetland bird surveys

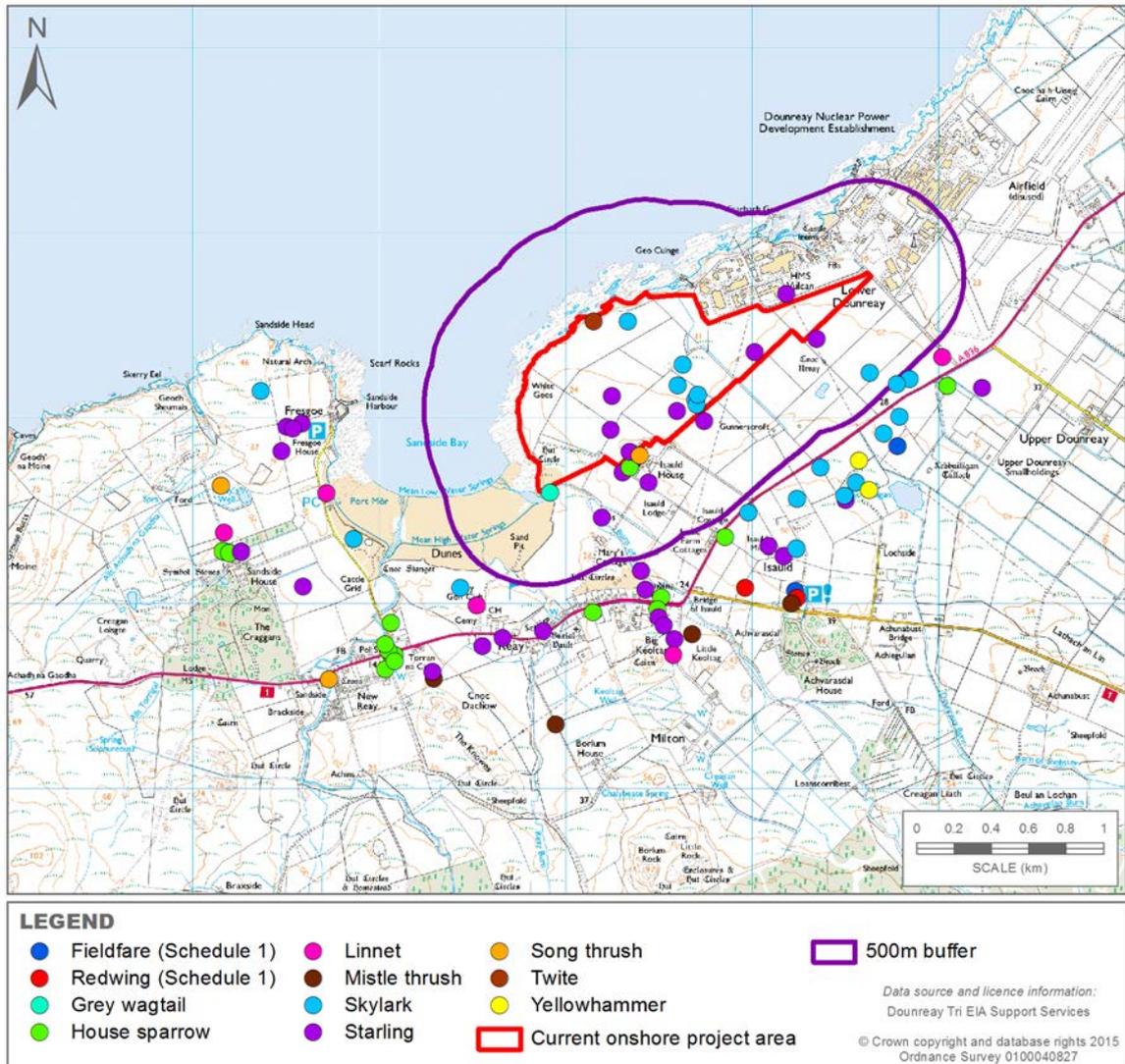


Figure 23A-14: Locations of Red-listed passerine species observed during winter walkover surveys

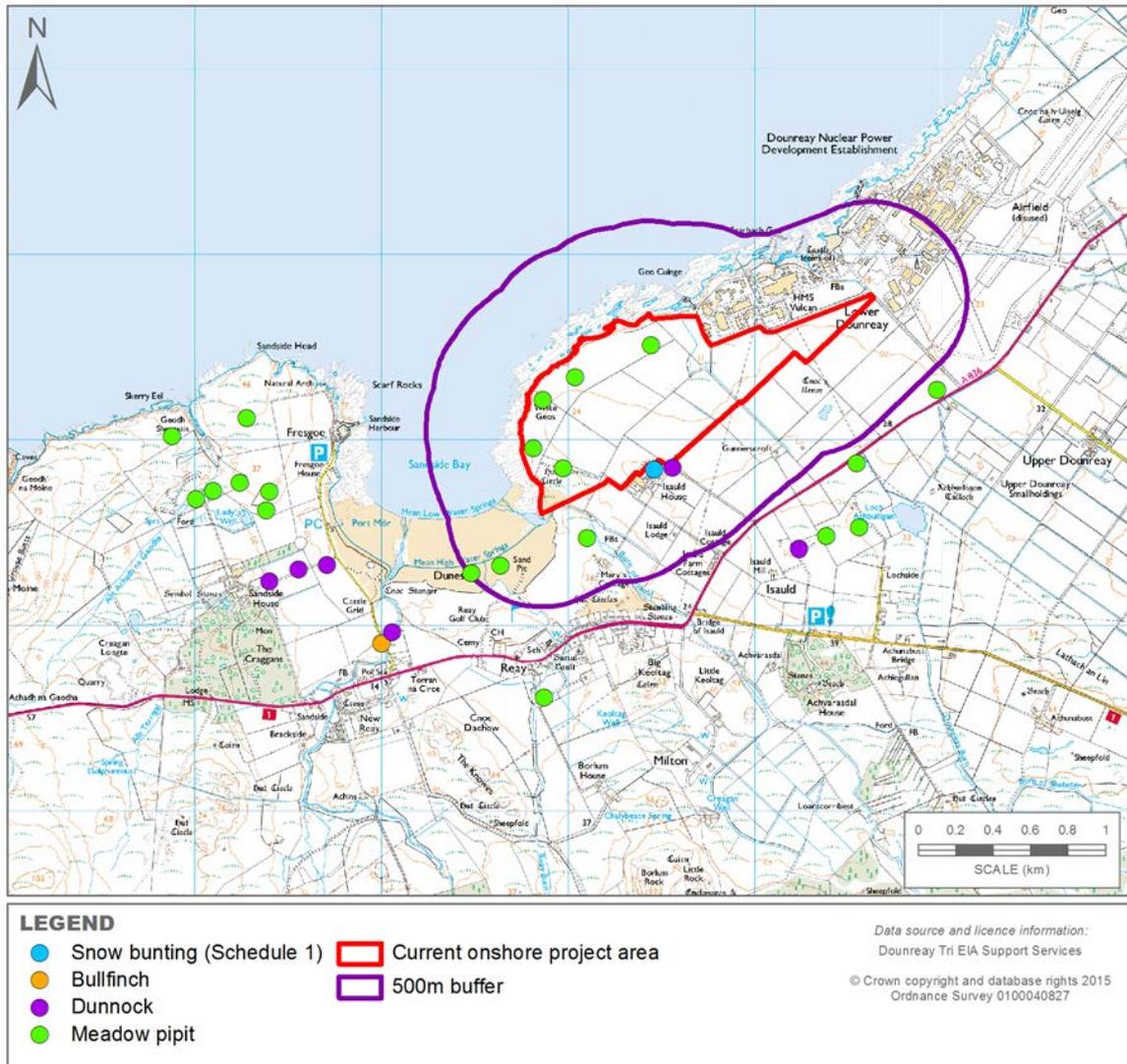


Figure 23A-15: Locations of Amber-listed passerine species observed during winter walkover surveys

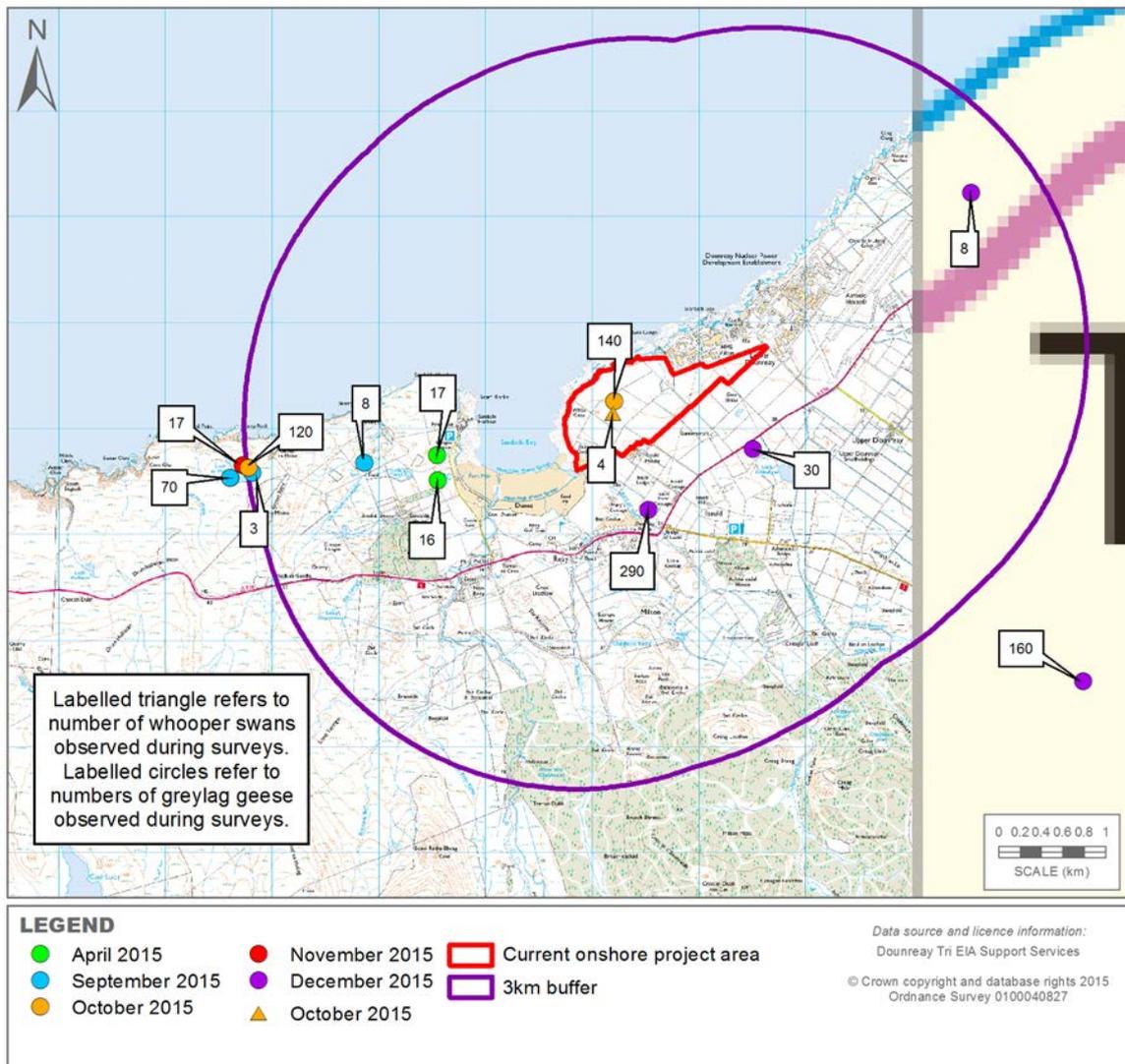


Figure 23A-16: Locations of greylag goose (*Anser anser*) and whooper swan (*Cygnus cygnus*) observed during winter walkover and wetland bird surveys. These species are associated with the nearby Caithness Lochs Special Protection Area (SPA)

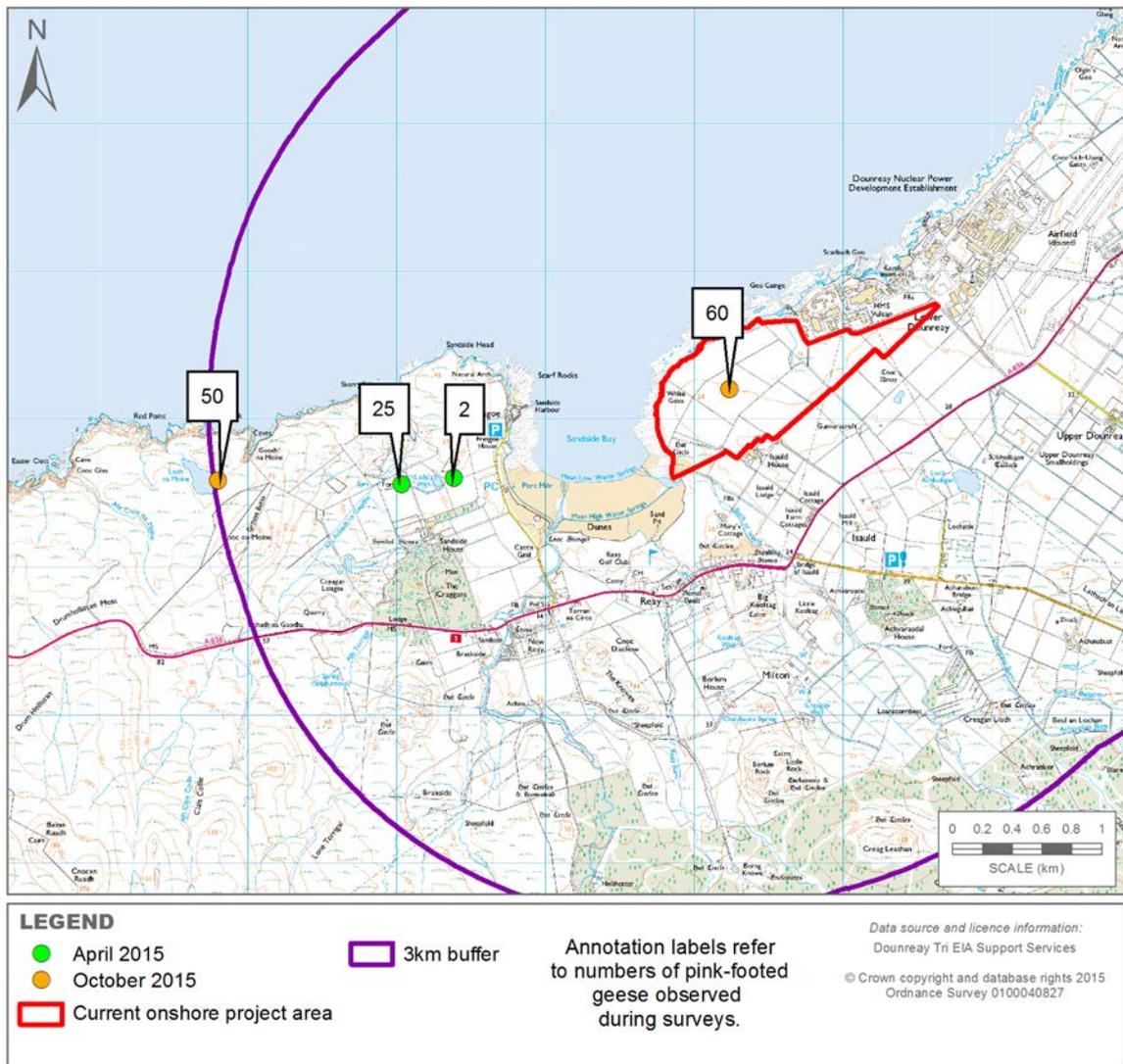


Figure 23A-17: Locations of pink-footed goose (*Anser brachyrhynchus*) observed during winter walkover and wetland bird surveys

23.5 References

- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. Bird Atlas 2007–11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford.
- Barn Owl Trust. (2001). *Survey Techniques. Leaflet No. 8*. The Barn Owl Trust, Ashburton.
- Barn Owl Trust. (2012). *Barn Owl Conservation Handbook*. Pelagic Publishing, Exeter.
- Brown, A.F. & Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40, 189-195.
- Calladine, J., Garber, G., Wernham, C. & Thiel, A. (2009). The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study* 56 381 – 388.
- Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.
- Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.
- Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. And Thompson, D. (2013). *Raptors: a field guide to survey and monitoring, 3rd edition*. SNH, Inverness.
- Mitchell, P.I., Newton, S.F., Ratcliffe, N. & Dunn, T.E. (eds.) (2004) Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002). T. & A.D. Poyser, London.
- Ruddock, M. and Whitfield, D.P. (2007). *A review of disturbance distances in selected bird species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage (SNH)*. SNH, Inverness.
- Scottish Natural Heritage (2010). *Survey Methods for Use in assessing the Impacts of Onshore Wind farms on Bird Communities. November 2005 (revised December 2010)*. SNH, Battleby.
- Scottish Natural Heritage (2014). *Recommended bird survey methods to inform impact assessment of onshore wind farms*. May 2014. SNH, Inverness.
- Whitfield, D.P., Ruddock, M. & Bullman, R. (2008). Expert opinion as a tool for quantifying bird tolerance to human disturbance. *Biological Conservation* 141, 2708-2717.