

## Technical Appendix 8 - Ornithology

### Appendix 8.1 - Details of Moorland Bird Survey Visits

#### Appendix 8.1: Details of Moorland Bird Survey Visits

Survey Date	Time Start	Durations (hours)	Remarks
08/07/2021	0700	7	cloudy, calm, warm and humid, some light drizzle
08/06/2021	0700	6.5	cloudy, humid, moderate S breeze, good bird activity
07/05/2021	0800	6	sunny, cool NW breeze
10/04/2021	1000	6	sunny and cold, light N breeze, rapid thaw of lying snow
25/06/2019	0800	8	fine and sunny, light NE breeze
26/04/2019	0800	8	partial cloud, mild, some rain showers
13/07/2018	0700	6	partial cloud, warm sunny spells, light NW breeze
25/06/2018	0745	7	warm and sunny, light breeze

### Appendix 8.2 - Details of Winter Bird Survey Visits

#### Appendix 8.2: Details of Winter Bird Survey Visits

Survey Date	Time Start	Duration (hours)	Remarks
01/03/2022	0830	6	early frost then fine and sunny
17/02/2022	1100	5	light cloud, sunny spells, light W breeze
12/01/2022	0900	6	bright and cold, light S breeze, sunrise 0843
21/12/2021	0900	5	grey cloud, cold, light SE breeze, sunrise 0847
27/02/2019	0730	5	early frost then sunny, hazy, light breeze

09/01/2019	1030	6	light cloud, nearly calm, sunset 16.17
30/10/2018	0800	5	early frost then fine and sunny, light S breeze

## Appendix 8.3 - Details of Vantage Point Watches

### Appendix 8.3.1: Details of Vantage Point Watches (VP1)

Survey Date	VP	Time Start	Duration (hours)	Remarks
28/02/2022	1	1500	3.5	sunset 1756
28/02/2022	1	0800	3	sunrise 0720
26/01/2022	1	1230	3	
13/01/2022	1	1330	3	sunset 1626
13/01/2022	1	1000	3	
20/12/2021	1	1200	4	sunset 1557
20/12/2022	1	0845	3	sunrise 0847
			22.5	
28/09/2021	1	0800	3	sunrise 0721
21/09/2021	1	0830	3	
31/08/2021	1	1430	3	
24/08/2021	1	1500	3	
28/07/2021	1	0800	3	
15/07/2021	1	1100	3	
28/06/2021	1	0930	3	
10/06/2021	1	1800	3	
04/06/2021	1	1130	3	
04/06/2021	1	0800	3	
24/05/2021	1	0800	3	
19/05/2021	1	1800	3	
			36	
15/08/2019	1	1545	3	15/08/2019
26/07/2019	1	0800	3	26/07/2019
30/06/2019	1	1600	3	30/06/2019
07/06/2019	1	0830	3	07/06/2019

12/05/2019	1	1200	3	12/05/2019
12/05/2019	1	0800	3	12/05/2019
10/05/2019	1	0800	3	10/05/2019
13/04/2019	1	1630	3	13/04/2019
13/04/2019	1	1300	3	13/04/2019
10/03/2019	1	1400	3	10/03/2019
10/03/2019	1	1000	3	10/03/2019
05/03/2019	1	1530	3	05/03/2019
			36	
27/02/2019	1	1300	3	
28/01/2019	1	1400	3	sunset 1650
28/01/2019	1	0830	3	sunrise 0825
04/12/2018	1	0830	3	
03/12/2018	1	0830	3	
22/11/2018	1	0830	4	
08/11/2018	1	0800	3	
30/10/2018	1	1500	2.5	sunset 1653
25/10/2018	1	1200	3	
25/10/2018	1	0830	3	
27/09/2018	1	0800	1.5	
27/09/2018	1	1630	1.5	
04/09/2018	1	0800	3	
			36.5	
28/08/2018	1	0915	3	
17/07/2018	1	0900	3	
11/07/2018	1	1500	3	
20/06/2018	1	1430	3	
07/06/2018	1	1800	3	
07/06/2018	1	1400	3	
			18	

**Appendix 8.3.2: Details of Vantage Point Watches (VP2)**

Survey Date	VP	Time Start	Duration (hours)	Remarks
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28/02/2022	2	1130	3	
03/02/2022	2	1200	3	
26/01/2022	2	0900	3	
18/01/2022	2	1230	4	sunset 1635
18/01/2022	2	0900	3	sunrise 0837
13/12/2021	2	1200	4	sunset 1557
13/12/2021	2	0845	3	sunrise 0841
			23	
28/09/2021	2	1130	3	
21/09/2021	2	1500	3	
21/09/2021	2	1200	3	
24/08/2021	2	1130	3	
24/08/2021	2	0800	3	
28/07/2021	2	1200	2	
15/07/2021	2	1400	4	
28/06/2021	2	1300	3	
04/06/2021	2	1500	3	
24/05/2021	2	1500	3	
24/05/2021	2	1130	3	
12/05/2021	2	0800	3	
			36	
25/08/2019	2	1400	4	
15/08/2019	2	1230	3	
15/08/2019	2	0930	3	
12/08/2019	2	1400	4	
26/07/2019	2	1500	3	
26/07/2019	2	1130	3	
07/06/2019	2	1200	4	
23/05/2019	2	1500	3	
26/04/2019	2	1415	3	
04/03/2019	2	1530	3	
04/03/2019	2	1200	3	
			36	
15/01/2019	2	1215	3	

15/01/2019	2	0845	3	sunrise 0845
04/12/2018	2	1200	4	
22/11/2018	2	1300	3.5	sunset 1612
08/11/2018	2	1445	2.5	sunset 1635
17/10/2018	2	1445	3	
17/10/2018	2	0700	4	
27/09/2018	2	0900	4	
27/09/2018	2	1315	3	
27/09/2018	2	1645	2	
03/09/2018	2	0900	4	
			36	
28/08/2018	2	1230	3	
09/08/2018	2	1415	3	
09/08/2018	2	1100	3	
17/07/2018	2	1230	3	
11/07/2018	2	1800	3	
19/06/2018	2	1600	3	
			18	

### Appendix 8.3.3: Details of Vantage Point Watches (VP3)

Survey Date	VP	Time Start	Duration (hours)	Remarks
08/02/2022	3	1000	3	
03/02/2022	3	0830	3	sunrise 0815
19/01/2022	3	1330	3	sunset 1635
19/01/2022	3	1000	3	
30/12/2021	3	0900	3	sunrise 0850
30/12/2021	3	1230	3	
			18	
28/09/2021	3	1500	3	
31/08/2021	3	1800	3	
31/08/2021	3	0930	4	
28/07/2021	3	1830	2	
28/07/2021	3	1500	3	

08/07/2021	3	1830	3	
08/07/2021	3	1500	3	
28/06/2021	3	1700	4	
16/06/2021	3	1500	3	
12/05/2021	3	1130	3	
07/05/2021	3	1830	2	
07/05/2021	3	1500	3	
			36	
11/08/2019	3	1230	3	
11/08/2019	3	0900	3	
19/07/2019	3	1200	3	
07/07/2019	3	1630	3	
07/07/2019	3	1300	3	
30/06/2019	3	0800	3	
30/06/2019	3	1200	3	
10/05/2019	3	1600	3	
10/05/2019	3	1200	3	
13/04/2019	3	0900	3	
21/03/2019	3	1000	3	
04/03/2019	3	0830	3	
			36	
14/02/2019	3	1400	4	sunset 1730
14/02/2019	3	1000	3	
28/01/2019	3	1145	3	
03/12/2018	3	1200	3	
08/11/2018	3	1130	3	
25/10/2018	3	1500	4	sunset 1804
17/10/2018	3	1130	3	
03/10/2018	3	1430	4	
28/09/2018	3	1600	3	
04/09/2018	3	1130	3	
04/09/2018	3	1500	3	
			36	
28/08/2018	3	1600	4	

08/08/2018	3	1500	4	
25/07/2018	3	1700	3	
25/07/2018	3	0700	3	
17/07/2018	3	1600	4	
			18	

**Appendix 8.3.4: Details of Vantage Point Watches (VP4)**

Survey Date	VP	Time Start	Duration (hours)	Remarks
01/03/2022	4	1500	3.5	sunset 1800
17/02/2022	4	0800	3	sunrise 0745
08/02/2022	4	1330	4	sunset 1720
20/01/2022	4	1200	3	
20/01/2022	4	0900	2	
21/12/2021	4	1400	2.5	sunset 1550
			18	
30/07/2021	4	1500	4	
15/07/2021	4	0700	4	
07/07/2021	4	1445	2	
16/06/2021	4	0800	3	
08/06/2021	4	1430	3	
19/05/2021	4	1400	3	
12/05/2021	4	1500	3	
21/04/2021	4	1600	3	
21/04/2021	4	0800	3	
10/04/2021	4	1600	3	
09/04/2021	4	1300	2	
09/04/2021	4	0800	3	
			36	
17/08/2019	4	1600	3	
17/08/2019	4	1200	3	
19/07/2019	4	0850	3	
07/07/2019	4	0830	4	
11/06/2019	4	1600	3	
07/06/2019	4	1630	3	

04/05/2019	4	1530	3	
04/05/2019	4	1200	3	
19/04/2019	4	1430	3	
09/04/2019	4	1000	4	
26/03/2019	4	1400	3	
			35	
15/02/2019	4	0930	3	
15/02/2019	4	1300	3	
14/01/2019	4	0830	4	sunrise 0845
14/01/2019	4	1330	3.5	sunset 1625
12/11/2018	4	1330	3.5	sunset 1627
12/11/2018	4	1000	3	
17/10/2018	1	1800	1	sunset 1823
03/10/2018	4	1100	3	
28/09/2018	4	0800	3	
28/09/2018	4	1200	3	
03/09/2018	4	1830	3	
03/09/2018	4	1500	3	
			36	
24/08/2018	4	1530	3	
24/08/2018	4	1200	3	
09/08/2018	4	0845	3	
25/06/2018	4	1445	3	
20/06/2018	4	1230	2	
20/06/2018	4	0800	4	
			18	

## Appendix 8.4 - Details of Vantage Point Locations

### Appendix 8.4: Details of Vantage Point Locations

VP	Latitude	Longitude	Principal Viewing Direction (Degrees)	Principal Viewing Arc (degrees)	Extent of View
1	55.03006	-6.24043	South (180)	180	2 km
2	55.02125	-6.25755	Southeast	180	2 km



VP	Latitude	Longitude	Principal Viewing Direction (Degrees)	Principal Viewing Arc (degrees)	Extent of View
			(150)		
3	55.02193	-6.27619	East (90)	180	2 km
4	55.02421	-6.22308	North (0)	180	2 km

## Appendix 8.5 - IEEM Probability Table

### Appendix 8.5 - IEEM Probability Table

The IEEM probability scale and terminology used in the assessment of likely significant effects is given below:

- Certain / near-certain - probability estimated at 95% or higher
- Likely - probability estimated at above 50% but below 95%
- Unlikely - probability estimated at above 5% but below 50%
- Highly unlikely - probability estimated at less than 5%

## Appendix 8.6 - Details of Red Grouse Observations

### Appendix 8.6 - Details of Red Grouse Observations

Species	Date	Method	Count	Remarks
red grouse	01/03/2022	MBS	3	flock disturbed from ground
red grouse	28/02/2022	incidental obs.	4	flock disturbed from ground
red grouse	13/01/2022	VP	1	calling male
red grouse	21/12/2021	MBS	1+	fresh droppings
red grouse	21/12/2021	VP	1	calling male
red grouse	13/12/2021	incidental obs.	1+	fresh droppings
red grouse	09/01/2019	MBS	2	pair
red grouse	12/11/2018	VP	1	calling male
red grouse	30/10/2018	MBS	1+	fresh droppings
red grouse	30/10/2018	MBS	1+	fresh droppings
red grouse	30/10/2018	MBS	1+	fresh droppings
red grouse	25/06/2018	MBS	2	pair
red grouse	25/06/2018	MBS	1+	fresh droppings

## Appendix 8.7 - Details of Snipe Observations

### Appendix 8.7 - Details of Snipe Observations

Species	Date	Method	Count	Remarks
snipe	08/06/2021	MBS	1	calling from ground
snipe	08/06/2021	MBS	1	calling from ground
snipe	04/06/2021	VP	1	drumming display
snipe	07/06/2019	VP	1	calling from ground
snipe	26/04/2019	MBS	1	calling from ground
snipe	13/07/2018	MBS	1	calling from ground
snipe	25/06/2018	MBS	1	calling from ground
snipe	25/06/2018	MBS	1	calling from ground

## Appendix 8.8 - Details of Curlew Observation

### Appendix 8.8 - Details of Curlew Observation

Species	Date	Method	Count	Remarks
curlew	07/05/2021	MBS	1	single curlew flying and calling

## Appendix 8.9 - Details of Moorland Bird Survey Observations

### Appendix 8.9: Details of Moorland Bird Survey Observations

Species	Date	Count	Remarks
golden plover	01/03/2022	13	flock on ground
golden plover	01/03/2022	7	flock on ground
golden plover	17/02/2022	7	flock disturbed from ground

Species	Date	Count	Remarks
golden plover	21/12/2021	1+	flock on ground
golden plover	27/02/2019	22	flock on ground at "Location 1"
golden plover	09/01/2019	35	flock on ground at "Location 1"
golden plover	30/10/2018	90	flock on ground at "Location 1"
snipe	01/03/2022	4	
snipe	17/02/2022	4	
snipe	21/12/2021	6	
snipe	27/02/2019	6	
snipe	09/01/2019	6	
snipe	03/10/2018	4	
jack snipe	01/03/2022	1	Flushed from heather
great black-backed gull	01/03/2022	3	at sheep carcass
great black-backed gull	17/02/2022	2	
great black-backed gull	08/02/2022	3	
great black-backed gull	03/02/2022	2	
great black-backed gull	03/10/2018	3	
fieldfare	03/02/2022	100	flock
fieldfare	12/01/2022	10	flock
fieldfare	30/12/2021	400	flock
fieldfare	09/01/2019	30	
fieldfare	04/12/2018	70	
redwing	12/01/2022	1	
stonechat	01/03/2022	2	pair
stonechat	04/12/2018	1	
starling	03/02/2022	100	flock
starling	12/01/2022	20	flock
starling	30/12/2021	200	flock
starling	09/01/2019	500	Flock
wren	01/03/2022	2	
wren	09/01/2019	2	
meadow pipit	21/12/2021	10	flock

Species	Date	Count	Remarks
meadow pipit	27/02/2019	3	
meadow pipit	09/01/2019	4	
hooded crow	01/03/2022	4	
hooded crow	17/02/2022	6	
hooded crow	12/01/2022	4	
hooded crow	15/08/2019	25	flock
hooded crow	27/02/2019	6	
hooded crow	09/01/2019	3	
hooded crow	22/11/2018	6	
hooded crow	03/10/2018	4	
raven	01/03/2022	6	
raven	17/02/2022	10	
raven	12/01/2022	2	
raven	21/12/2021	4	
raven	15/08/2019	150	loose flock feeding on Skerry Hill
raven	27/02/2019	12	
raven	09/01/2019	8	
raven	03/10/2018	6	
jay	17/10/2018	4	flying southwest
magpie	01/03/2022	2	
magpie	17/02/2022	2	
chaffinch	12/01/2022	6	flock
siskin	27/02/2019	1	flyover
reed bunting	01/03/2022	1	
reed bunting	12/01/2022	2	
reed bunting	09/01/2019	6	flock
reed bunting	22/11/2018	6	flock

## Appendix 8.10 - Details of Records of Annex 1 Raptor Species

### Appendix 8.10.1 - Details of Records of Hen Harriers

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Hen harrier	13/01/2022	1410	1	1	adult male	150	30	high travelling flight
Hen harrier	31/08/2021	1620	1	1	1CY	55	0	foraging
Hen harrier	15/07/2021	1345	1	1	female or imm.	390	0	foraging
Hen harrier	22/11/2018	1030	1	1	1CY	100	0	foraging
Hen harrier	28/02/2022	1315	2	1	2CY male	181	0	foraging
Hen harrier	21/09/2021	1515	2	1	3CY male	321	0	foraging
Hen harrier	21/09/2021	1305	2	1	3CY male	600	0	foraging
Hen harrier	21/09/2021	1430	2	1	3CY male	310	0	foraging
Hen harrier	15/07/2021	1615	2	1	Female	561	460	soaring on thermal
Hen harrier	26/04/2019	1540	2	1	adult male	120	0	foraging
Hen harrier	17/10/2018	1650	2	1	1CY	345	0	foraging
Hen harrier	09/08/2018	1130	2	1	adult male	65	0	foraging
Hen harrier	09/08/2018	1610	2	1	adult male	200	0	foraging
Hen harrier	03/02/2022	1105	3	1	female or imm.	100	0	foraging
Hen harrier	17/10/2018	1825	4	1	1CY	30	0	travelling flight
Hen harrier	03/09/2018	1215	4	1	female or imm.	60	0	foraging

#### Appendix 8.10.2 - Details of Records of Peregrines

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Peregrine	15/07/2021	1230	1	1	adult	62	62	travelling flight
Peregrine	15/07/2021	1350	1	1	1CY	55	0	low circling
Peregrine	30/10/2018	1625	1	1	adult	46	46	travelling flight
Peregrine	28/09/2021	1315	2	1	1CY	91	55	travelling flight
Peregrine	24/08/2021	1215	2	1	adult	70	70	travelling flight
Peregrine	15/07/2021	1545	2	1	adult	0	0	perched on fence
Peregrine	15/07/2021	1730	2	1	1CY	77	0	foraging
Peregrine	24/05/2021	1500	2	1		72	72	travelling flight
Peregrine	19/07/2019	0915	4	1	1CY	80	80	travelling flight
Peregrine	25/06/2019	1700	4	1	2CY	60	0	travelling flight
Peregrine	09/04/2019	1230	4	1	adult	120	0	travelling flight
Peregrine	26/03/2019	1515	4	1	2CY	65	0	travelling flight

#### Appendix 8.10.3 - Details of Records of Merlins

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Merlin	08/02/2022	1255	3	1	female	30	0	travelling flight
Merlin	04/06/2021	1515	2	1	female	70	0	flying with prey
Merlin	26/07/2019	0945	1	1	female	65	0	travelling flight
Merlin	07/06/2019	0835	1	1	adult male	90	0	travelling flight

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Merlin	26/03/2019	1620	4	1	adult male	30	0	travelling flight
Merlin	25/10/2018	1305	1	1	Not known	65	0	travelling flight

#### Appendix 8.10.4 - Details of Records of Other Annex 1 Raptor Species

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Red kite	28/02/2022	1230	2	1		150	0	travelling flight
Osprey	26/07/2019	1415	2	1	adult	200	200	travelling flight

### Appendix 8.11 - Details of Records of Non-Annex 1 Raptor Species

#### Appendix 8.11.1 - Details of Records of Kestrels

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Kestrel	31/08/2021	1500	1	1	juvenile	645	300	foraging
Kestrel	04/06/2021	1200	1	1	female	620	0	foraging
Kestrel	26/07/2019	0930	1	1	female	285	0	foraging
Kestrel	26/07/2019	1000	1	1	juvenile	626	0	foraging
Kestrel	22/11/2018	1225	1	1	male	65	0	foraging
Kestrel	25/10/2018	1330	1	1	male	113	0	foraging
Kestrel	27/09/2018	1710	1	1	juvenile	905	0	foraging
Kestrel	08/02/2022	1215	2	1	male	185	0	foraging
Kestrel	28/09/2021	1230	2	1	juvenile	300	0	foraging
Kestrel	28/09/2021	1410	2	1	juvenile	65	0	foraging
Kestrel	21/09/2021	1220	2	1		185	0	foraging

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Kestrel	24/08/2021	1130	2	1	juvenile	665	0	foraging
Kestrel	15/07/2021	1600	2	1	female	630	350	foraging
Kestrel	24/05/2021	1600	2	1	female	60	0	flying with prey
Kestrel	24/05/2021	1200	2	1		300	300	foraging
Kestrel	15/08/2019	1130	2	1	juvenile	0	0	perched
Kestrel	26/07/2019	1205	2	1	juvenile	345	0	foraging
Kestrel	26/07/2019	1215	2	1	juvenile	320	0	foraging
Kestrel	07/06/2019	1600	2	1		195	45	foraging
Kestrel	04/03/2019	1210	2	1	male	150	150	foraging
Kestrel	22/11/2018	1355	2	1	female	406	0	foraging
Kestrel	08/11/2018	1520	2	2	male	4200	652	foraging
Kestrel	28/08/2018	1525	2	1	juvenile	125	0	foraging
Kestrel	09/08/2018	1300	2	1	female	710	0	foraging
Kestrel	17/07/2018	1345	2	1	female	270	0	foraging
Kestrel	08/02/2022	1200	3	1	male	355	0	foraging
Kestrel	03/02/2022	1130	3	2		300	0	foraging
Kestrel	28/09/2021	1600	3	1	juvenile	120	0	foraging
Kestrel	28/07/2021	1630	3	1		70	0	foraging
Kestrel	21/03/2019	1230	3	1	male	252	0	foraging
Kestrel	28/01/2019	1345	3	1		65	25	travelling flight
Kestrel	15/07/2021	1000	4	1	juvenile	0	0	perched
Kestrel	12/08/2019	1530	4	1	juvenile	0	0	perched
Kestrel	19/07/2019	1000	4	2	juvenile	300	0	foraging

#### Appendix 8.11.2 - Details of Records of Buzzards

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	28/02/2022	1500	1	1		165	165	foraging
Buzzard	28/09/2021	1030	1	1		320	0	foraging



Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	31/08/2021	1520	1	2	juveniles	300	150	circling
Buzzard	15/07/2021	1345	1	1		130	130	circling
Buzzard	04/06/2021	1430	1	1		330	0	foraging
Buzzard	27/02/2019	1600	1	1		32	0	travelling flight
Buzzard	25/10/2018	1230	1	1		90	0	travelling flight
Buzzard	27/09/2018	0920	1	1		90	0	travelling flight
Buzzard	03/02/2022	1340	2	1		65	0	foraging
Buzzard	24/08/2021	1205	2	1		110	0	soaring
Buzzard	24/08/2021	1235	2	1		40	0	foraging
Buzzard	15/07/2021	1500	2	1		620	500	foraging
Buzzard	28/06/2021	1500	2	1		490	90	foraging
Buzzard	04/06/2021	1535	2	1		153	0	foraging
Buzzard	24/05/2021	1250	2	1		180	0	foraging
Buzzard	24/05/2021	1400	2	1		65	0	foraging
Buzzard	24/05/2021	1415	2	1		120	0	foraging
Buzzard	12/05/2021	1055	2	1		65	65	circling
Buzzard	07/06/2019	1230	2	1		500	150	foraging
Buzzard	07/06/2019	1310	2	1		619	256	foraging
Buzzard	26/04/2019	1545	2	1		120	0	foraging
Buzzard	21/03/2019	1515	2	2		240	125	foraging
Buzzard	21/03/2019	1530	2	1		262	0	foraging
Buzzard	04/03/2019	1510	2	2		528	0	foraging
Buzzard	04/03/2019	1330	2	1		125	0	travelling flight
Buzzard	04/03/2019	1530	2	1		720	20	foraging
Buzzard	04/12/2018	1600	2	1		90	0	travelling flight
Buzzard	27/09/2018	1530	2	1		58	0	circling
Buzzard	28/08/2018	1235	2	1		65	0	travelling flight

Species	Date	Time	VP	No. Birds	Age / sex	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	17/07/2018	1410	2	1		84	0	travelling flight
Buzzard	16/06/2021	1655	3	1		110	110	foraging
Buzzard	07/05/2021	1635	3	2		40	40	circling
Buzzard	21/03/2019	1100	3	2		105	0	travelling flight
Buzzard	04/03/2019	1030	3	2		185	0	circling
Buzzard	17/10/2018	1205	3	1		105	90	circling
Buzzard	25/06/2018	1500	4	2		120	120	circling
Buzzard	20/06/2018	1200	4	2		167	0	circling

## Appendix 8.12 - Details of Collision Risk Model

### General Comment

The SNH Collision Risk Model (CRM) has been completed for hen harrier, peregrine, buzzard and kestrel using the vantage point observations from the entire baseline period combined.

### Wind Farm Parameters

The wind farm parameters input to the CRM are given in Table A.

Table A - Wind Farm Parameters Input to the Collision Risk Model

Parameter	Input Value	Remarks
Size of wind farm envelope	1	Optional input (a value of 1 or more must be entered) - this value has no effect on collision risk
Number of turbines	12	
Rotor diameter (m)	138	
Hub height (m)	111	
Rotor depth (m)	-	Not available - optional input
Rotor chord (m)	4.1	
Rotor pitch (degrees)	Variable	Value of 6 is assumed for CRM spreadsheet

Parameter	Input Value	Remarks
Rotation period (seconds)	5.41	
Turbine operation time (%)	95.04	Value is rounded to 95 by the CRM spreadsheet

### Bird Parameters

The bird parameters input to the CRM are given in Table B. In line with SNH guidance<sup>1</sup>, flight speeds and wing-spans are taken from Alerstam *et al.*<sup>2</sup> Bird lengths are taken from Forsman<sup>3</sup>, which is the standard published reference for raptor identification in Europe. [Note: some input values are rounded by the CRM spreadsheet.]

**Table B - Bird Parameters Input to the Collision Risk Model**

Species	Wing-span (m)	Length (m)	Flight speed (m / s)
Buzzard	1.24	0.54	12.5 (range 11.6 - 13.3)
Kestrel	0.73	0.32	10.1
Peregrine	1.02	0.44	12.1
Hen harrier	1.1	0.48	9.1

### Band Used To Define Risk Height

The band used to define risk height in the CRM is:

- Maximum height 180 m;
- Minimum height 42 m

### Duration at Risk Height

Total flight durations and durations at risk height input to the CRM are taken from Appendices 8.10 and 8.11 and are summarised in Table C.

**Table C - Total Durations and Durations at Risk Height**

Species	Total Duration (s)	Duration at Risk Height (s)
Hen harrier	4123	615
Peregrine	798	385
Buzzard	7608	2011
Kestrel	13832	1822

<sup>1</sup> SNH (2014): Flight Speeds and Biometrics for Collision Risk Modelling (SNH Guidance Note, October 2014)

<sup>2</sup> Alerstam, T. *et al.* (2007): Flight Speeds Among Bird Species - Allometric and Phylogenetic Effects (PLoS Biol. 5)

<sup>3</sup> Forsman, D. (1999): The Raptors of Europe and the Middle East - A Handbook of Field Identification (Poyser)

## Watch Data

The watch data input to the CRM are given in Table D. The time spent at each vantage point has been totalled from Appendix 8.3. Areas visible at the minimum risk height (42 m) have been calculated for the 500 m extent turbine envelope from the viewpoint coverage shown in Figure 8.1.

**Table D - Watch Data Input to the Collision Risk Model**

Vantage Point	Area Visible at Risk Height (ha)	Total Observation Time (hours)
VP1	320.02	149.0
VP2	380.9	149.0
VP3	114.95	144.0
VP4	65.43	143.0
Total	881.30	585.0

## Summary of Collision Risk Model Results

The results of the CRM are summarised in Table E. The avoidance rates for each species follow the published SNH guidance<sup>4</sup> except for hen harrier for which a slightly more precautionary value has been used. For all species it has been assumed that birds are potentially present within the survey area year-round for an average of 12 hours per day.

**Table E - Summary of Results of the Collision Risk Model**

Species	Days Assumed Present	Hours Assumed Present	Avoidance Rate	Equivalent Collision Rate
Hen harrier	365	12	98%	one bird every 41 years
Peregrine	365	12	99%	one bird every 74 years
Buzzard	365	12	98%	one bird every 8 years
Kestrel	365	12	95%	one bird every 6 years

## Appendix 8.13 - Details of Habitat Regulations Assessment

Appendix 8.13 is provided separately.

## Appendix 8.14 - Details of Raptor Breeding Activity (CONFIDENTIAL)

Appendix 8.14 is provided separately.

<sup>4</sup> SNH (2016): Avoidance rates for the SNH onshore wind farm Collision Risk Model (SNH Guidance Note, October 2016)

## Appendix 8.15 - Details of Winter Roost Observations (CONFIDENTIAL)

Appendix 8.15 is provided separately.

## Technical Appendix 8.13: Habitat Regulations Assessment

## Habitats Regulations Assessment

### ANTRIM HILLS SPECIAL PROTECTION AREA

#### Stage 1: Test of Likely Significance

Name of Project or Plan.	CARBUCK WIND FARM
Project reference (Planning ref. etc.):	-
File number:	-
Name and location of Natura 2000 site.	Antrim Hills SPA (EC Site Code UK9020301)
Natura 2000 site features:	<b>SPA selection species:</b> the SPA supports nationally important breeding populations of <b>hen harrier</b> and <b>merlin</b>
<b>Description of the Project or Plan</b> <ul style="list-style-type: none"> <li>• <b>Size and scale;</b></li> <li>• <b>Land-take;</b></li> <li>• <b>Distance from Natura 2000 site or key features of the site;</b></li> <li>• <b>Resource requirements (water abstraction etc);</b></li> <li>• <b>Emission (disposal to land, water or air);</b></li> <li>• <b>Excavation requirements;</b></li> <li>• <b>Transportation requirements;</b></li> <li>• <b>Duration of construction, operation, de-commissioning etc;</b></li> <li>• <b>Other.</b></li> </ul>	<u>Size and scale</u> The Proposed Development is for a 12 turbine wind farm and associated infrastructure. The 12 turbines will have a maximum overall height of 180 m and a maximum rotor diameter of 138 m.  <u>Distance from Natura 2000 site or key features of the site</u> The Proposed Development is outside but <b>immediately adjacent</b> to, the boundary of the SPA.  <b>Recent hen harrier nest locations</b> (occupied within the last five years) within the local part of the SPA have not been closer than <b>4.0 km</b> from the Proposed Development. <b>Historical</b> hen harrier nest locations within the SPA have been located <b>&lt; 1.0 km</b> from the Proposed Development however none of these historical locations has been occupied during the last ten years.  <b>Recent merlin nest locations</b> (occupied within the last five years) within the SPA have been located <b>&lt; 1.0 km</b> from the Proposed Development (the locations are alternative nest sites for a single pair of merlins).  Construction duration is estimated at 18 months. Operation duration is 35 years.
Is the proposal directly connected with or necessary to management of the site for conservation of N2K features? If yes proceed no further.	No
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.	Any likely impacts would be due to the construction and operation of a wind farm

N2K Feature: Mention all features	Describe any likely direct or indirect effects to the N2K features arising as a result of:	*Effect Significant/Not Significant? Why?
	<ul style="list-style-type: none"> <li>• loss;</li> <li>• reduction of habitat area;</li> <li>• disturbance;</li> <li>• habitat or species fragmentation;</li> <li>• reduction in species density;</li> <li>• changes in key indicators of conservation value (e.g. water quality, climate change).</li> </ul>	

<b>Merlin</b>	<b>Direct disturbance (nest sites):</b> disturbance of merlin nest sites located within the local part of the SPA	<b>Not significant:</b> <ul style="list-style-type: none"> <li>• An assessment of the published likely upper disturbance distances for nesting merlins and a consideration of other relevant factors indicates that any disturbance of merlin nest sites due to the Proposed Development is unlikely to be significant.</li> <li>• The indicated upper limit of disturbance for nesting merlins is in the range of 300 - 500 m with the caveat that if previously exposed to relatively innocuous disturbance this species can develop a tolerance to relatively high levels of at least some forms of human disturbance (so long as there is no direct interference with the nest site) and merlins nesting within the local part of the SPA will certainly have been exposed to occasional human disturbance due to the location of the nest sites close to public roads.</li> <li>• Considering the above factors and also the locations of confirmed merlin nest sites within the local part of the SPA then any disturbance due to construction activity is unlikely to be significant.</li> <li>• No part of the Proposed Development is within the SPA.</li> <li>• Considering all these factors it is therefore unlikely there would be any significant adverse effects on the SPA merlin population.</li> </ul>
	<b>Direct loss of birds due to collision mortality:</b> loss of birds due to collisions with the turbines	<b>Not significant:</b> <ul style="list-style-type: none"> <li>• There was an insufficient number of observations to justify using the Collision Risk Model for this species. The small size and flight behaviour of merlins would suggest they are likely to be at relatively low risk of collisions compared with most other raptor species.</li> <li>• It is therefore unlikely / highly unlikely there would be any significant adverse effects on the SPA merlin population.</li> </ul>
	<b>Indirect loss of foraging habitat due to displacement:</b> likely to be relatively minor in nature for this species	<b>Not significant:</b> <ul style="list-style-type: none"> <li>• Considering the foraging behaviour and range of this species then any displacement effects are likely to be relatively minor.</li> <li>• It is therefore unlikely / highly unlikely there would be any significant adverse effects on the SPA merlin population.</li> </ul>
<b>Hen harrier</b>	<b>Direct disturbance (nest sites):</b> no likely effect	<b>Not significant</b> (no likely effect)
	<b>Direct loss of potential nesting habitat:</b> no likely effect	<b>Not significant</b> (no likely effect)
	<b>Direct loss of foraging habitat:</b> no likely effect	<b>Not significant</b> (no likely effect)



	<p><b>Direct loss of birds due to collision mortality:</b> loss of birds due to collisions with the turbines</p>	<p><b>Not significant:</b></p> <ul style="list-style-type: none"> <li>Collision risk for hen harriers was assessed using the NatureScot (SNH) Collision Risk Model - The indicated collision risk for hen harrier due to the Proposed Development is equivalent to one bird every 41 years.</li> <li>This is a very low collision risk and it is therefore highly unlikely there would be any significant adverse effects on the SPA hen harrier population.</li> </ul>
	<p><b>Indirect loss of foraging habitat due to displacement:</b> there is a predicted 52 % reduction in hen harrier foraging activity within a 500 m extent from the Proposed Development</p>	<p><b>Not significant:</b></p> <ul style="list-style-type: none"> <li>Observed low frequency of harrier foraging activity within a 500 m extent from the Proposed Development.</li> <li>The Proposed Development is located significantly beyond the likely core foraging range of hen harriers from recent confirmed nest sites within the local part of the SPA.</li> <li>It is therefore unlikely that the predicted reduction in foraging activity would have a significant adverse effect on the SPA hen harrier population.</li> </ul>

**\*Only mitigation measures designed within the application can be considered at this stage. Any conditions that NIEA would impose must be assessed through the appropriate assessment stage.**

<p><b>Describe any potential effects on the Natura 2000 site as a whole in terms of: interference with the key relationships that define the structure or function of the site</b></p>	<p><b>Effect considered significant/non-significant:</b> Finding of No significant effects Matrix</p>
<p>No likely direct or indirect effects</p>	<p><b>Not significant</b> (no likely effects)</p>

<p><b>Provide details of any other projects or plans that together with the project or plan being assessed could (directly or indirectly) affect the site.</b></p>	<p><b>Provide details of any likely in-combination effects and quantify their significance -</b></p>
<p>Altaveedan Wind Farm (operational) Corkey Wind Farm (operational) Corkey Wind Farm Repowering (consented – intended to replace the operational Corkey Wind Farm) Gruig Wind Farm (operational)</p>	<p><u>Hen harriers</u></p> <ul style="list-style-type: none"> <li><b>additional (cumulative) displacement of foraging harriers:</b> considering hen harrier foraging activity levels within the study area and also the recent locations of breeding pairs within the local part of the SPA then it is unlikely there would be any significant cumulative displacement effect on foraging birds</li> <li>it is therefore unlikely there would be any significant adverse effect on the SPA hen harrier population</li> </ul> <p><u>Merlins</u></p> <ul style="list-style-type: none"> <li><b>Additional (cumulative) disturbance of nesting merlins:</b> Altaveedan Wind</li> </ul>

	<p>Farm (operational) and Corkey Wind Farm (repowering) are not close to any recent confirmed merlin breeding locations within the local part of the SPA (not closer than 2 km) therefore these wind farms are highly unlikely to cause any additional disturbance effects on merlins</p> <ul style="list-style-type: none"> <li>The entrance location for the operational Gruig Wind Farm is 630 m to 800 m from two recent confirmed merlin breeding locations within the local part of the SPA, which is beyond the 300-500 m upper disturbance distance for breeding merlins. The wind farm is long term operational (became operational in 2009) and there has been no indication of any adverse effects on the merlin breeding locations despite their proximity to the wind farm entrance.</li> <li>It is therefore highly unlikely there would be any significant adverse effect on the SPA merlin population</li> </ul>
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<b>Is the potential scale or magnitude of any effect likely to be significant?</b>	
<b>Alone?</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>In-combination with other projects of plans?</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

<b>List of Agencies Consulted:</b>	-
<b>Above consultee response.</b>	-

<b>Conclusion:</b> Is the proposal likely to have a significant effect on an N2K site?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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**IF IT HAS BEEN DETERMINED THAT THE PROPOSAL WILL NOT HAVE A SIGNIFICANT EFFECT THEN ASSESSMENT IS COMPLETED.**

**IF ANY PART OF THE PROPOSAL IS LIKELY TO HAVE A SIGNIFICANT EFFECT AN APPROPRIATE ASSESSMENT WILL BE REQUIRED – STAGE 2 AA.**

**Data collected to carry out the assessment**

<b>Who carried out the assessment?</b>	David Steele B.Sc. (2i Honours), Zoology, University of Aberdeen (1988)
<b>Sources of data</b>	<ul style="list-style-type: none"> <li>Baseline ornithology surveys and desk study completed for the Proposed Development (survey and desk study results are presented in full in the Carnbuck Wind Farm Environmental Statement)</li> <li>Additional data on recent status of hen harriers and merlins within the local part of the SPA: personal data held by David Steele and data provided informally in communications with Northern Ireland Raptor Study Group (not as part of a formal data</li> </ul>

	request)
<b>Level of assessment completed</b>	Stage 1 – Test of Likely Significance
<b>Where can the full results of the assessment be accessed and viewed?</b>	<b>Environmental Statement for Carnbuck Wind Farm</b>
<b>NIEA CDP Response to consultation.</b>	-