

## 8. Ornithology (Technical Appendices)

### Technical Appendix 8.1

#### Technical Appendix 8.1 - Details of Brown and Shepherd Survey Visits (Breeding Period)

Date (DD/MM/YY)	Survey No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
07/07/2022	12	07.00hrs	7	cloudy and humid, light NW breeze	-
20/06/2022	11	07.00hrs	8	warm and sunny, moderate NW breeze	-
24/05/2022	10	06.45hrs	8	sunny spells, rain shower, light NW breeze	good bird activity
19/04/2022	9	07.00hrs	7	sunny spells, light N breeze, rain shower	new expanded survey area
14/07/2021	8	08.00hrs	5	warm and sunny	-
18/06/2021	7	07.30hrs	6	light cloud, warm sunny spells, light N breeze	-
27/05/2021	6	07.00hrs	6	sunny, light S breeze, becoming warm	-
02/04/2021	5	08.00hrs	6	cold start then sunny and mild, light N breeze	-
02/07/2020	4	07.00hrs	5	cloudy, humid, light NW breeze	-
18/06/2020	3	07.00hrs	6	cloudy, warm and humid, light E breeze	-
20/05/2020	2	07.15hrs	6	light cloud then warm and sunny, moderate S breeze, some haze	-
01/04/2020	1	07.00hrs	6	partial cloud, sunny spells, light NW breeze, light rain shower	-

### Technical Appendix 8.2

#### Technical Appendix 8.2 - Details of Brown and Shepherd Survey Visits (Non-breeding Period)

Date (DD/MM/YY)	Survey No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
23/02/2023	12	08.00hrs	6	sunny changing to cloudy, rain shower, light W breeze	sunrise 07.35hrs

Date (DD/MM/YY)	Survey No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
09/02/2023	11	08.30hrs	7	light cloud, bright spells, light W breeze, light rain shower	sunrise 08.06hrs
25/01/2023	10	08.50hrs	6	sunny spells, quite mild, moderate NW breeze	-
10/10/2022	9	08.00hrs	6.5	sunny spells, rain showers, light NW breeze	-
15/02/2022	8	12.30hrs	5	cloudy with some bright spells, moderate SW breeze, cold	sunset 17.36hrs
11/01/2022	7	08.45hrs	5	cold and bright, scattered snow patches above 500m	-
09/11/2021	6	08.00hrs	5	bright and mild, moderate SW breeze	sunrise 08.00hrs
13/10/2021	5	08.00hrs	5	light cloud, mild, light SW breeze	sunrise 07.55hrs
09/02/2021	4	11.30hrs	5	sunny, dry and cold, ground frozen but no lying snow	-
04/01/2021	3	09.00hrs	5	early frost (no lying snow), gradual thaw over day, sunny with light N breeze	sunrise 8.50hrs
07/12/2020	2	08.30hrs	5	early frost then sunny spells and staying cold, nearly calm	sunrise 8.37hrs
16/10/2020	1	08.30hrs	5	sunny spells, light E breeze	

### Technical Appendix 8.3

#### Technical Appendix 8.3 -Details of Vantage Point Watches

**Note:** the VP watches are arranged in date order with the most recent first.

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
27/02/2023	1	13.00hrs	3	light cloud, cold, moderate SE breeze	-
27/02/2023	3	10.00hrs	2	cold and bright, light SE breeze	-
23/02/2023	5	15.00hrs	3	cloudy, bright spells, light W breeze	sunset 17.50hrs
19/02/2023	2	09.00hrs	3	light cloud, mild, light SW breeze	-
19/02/2023	4	13.00hrs	3	light cloud, mild, light SW breeze	-
17/02/2023	3	11.30hrs	4	sunny spells, moderate W breeze	-
17/02/2023	3	08.00hrs	3	sunny then partial cloud, light W breeze	sunrise 07.50hrs
03/02/2023	4	09.00hrs	3	bright spells, mild, light SW breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
03/02/2023	5	13.00hrs	3	cloudy, bright spells, moderate SW breeze	-
02/02/2023	2	12.00hrs	3	light cloud, strong SW breeze, mild	-
02/02/2023	2	08.30hrs	3	light cloud, moderate SW breeze, rain shower	-
30/01/2023	1	13.00hrs	3	light cloud, light NW breeze	Cloud base scuffing top of hill
30/01/2023	1	09.15hrs	3	light cloud, light NW breeze	-
29/01/2023	3	13.30hrs	3.5	bright then overcast on freshening W breeze	sunset 17.00hrs
29/01/2023	3	09.15hrs	3.5	bright with sunny spells, light W breeze	-
26/01/2023	4	14.00hrs	3	light cloud, becoming nearly calm	fine conditions but no raptor activity
26/01/2023	5	10.00hrs	3	light cloud, light N breeze	-
25/01/2023	5	15.45hrs	2	bright with a light NW breeze	-
22/12/2022	5	13.00hrs	3	sunny, patchy hill fog, light SW breeze	-
22/12/2022	5	09.00hrs	3	early hill fog then sunny, cold, light SW breeze	fine conditions but no raptor activity
21/12/2022	1	09.00hrs	4	sunny spells, fresh to strong SW breeze	-
21/12/2022	2	14.00hrs	2.5	bright, mild, moderate SW breeze	sunset 16.05hrs
20/12/2022	4	12.45hrs	3	mainly sunny, fresh SW breeze, hail shower	fine conditions but no raptor activity
20/12/2022	4	09.00hrs	3	partial cloud, bright spells, moderate SW breeze	-
01/12/2022	1	13.30hrs	3	grey cloud, mild, light S breeze	sunset 16.10hrs
01/12/2022	2	08.45hrs	4	cloudy, mild, light S breeze	sunrise 08.30
05/11/2022	3	12.30hrs	3	sunny with a moderate SW breeze	-
05/11/2022	3	09.00hrs	3	long sunny spells, moderate W breeze	-
04/11/2022	4	08.00hrs	2	light cloud and a light W breeze	sunrise 07.40
04/11/2022	5	15.00hrs	2	cloudy with bright spells and a light W breeze, rain shower	fine conditions but no raptor activity
04/11/2022	5	11.00hrs	3	light cloud and a light W breeze	fine conditions but no raptor activity

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
03/11/2022	1	14.00hrs	3	bright, cold, light S breeze	sunset 16.50hrs
03/11/2022	2	11.00hrs	2	bright and cold, light S breeze	-
03/11/2022	4	08.00hrs	2	cold and sunny, light S breeze	sunrise 07.35
01/11/2022	1	07.30hrs	3	fine and bright, light SW breeze	sunrise 07.30hrs
01/11/2022	2	11.30hrs	3	sunny then cloudy, light SW breeze	-
01/11/2022	4	15.30hrs	2	light cloud, moderate SW breeze, rain shower	sunset 17.30
25/10/2022	1	14.30hrs	3.5	fine and bright, W breeze falling light	sunset 18.00hrs
25/10/2022	5	09.30hrs	4	fine and bright, light SW breeze	fine conditions but no raptor activity
24/10/2022	3	09.00hrs	4	early hill fog lifting then sunny with a moderate W breeze	-
24/10/2022	5	14.00hrs	4	sunny spells, moderate W breeze	sunset 17.45hrs
18/10/2022	3	08.30hrs	4	fine and bright, light then moderate NW breeze	-
18/10/2022	4	15.00hrs	3	fine and bright, moderate SW breeze	sunset 18.00hrs
14/10/2022	1	15.00hrs	3	sunny spells, moderate W breeze	-
14/10/2022	2	11.30hrs	3	sunny spells, light W breeze, rain shower	-
14/10/2022	2	08.00hrs	3	bright with a moderate W breeze	sunrise 07.56
10/10/2022	4	15.00hrs	3	sunny spells, moderate NW breeze, light rain showers	-
28/09/2022	1	15.00hrs	3	long sunny spells, moderate NW breeze, light rain shower	-
28/09/2022	1	11.30hrs	3	long sunny spells, moderate NW breeze	-
28/09/2022	2	07.00hrs	3.5	sunny spells, light NW breeze	sunrise 07.20hrs
27/09/2022	2	16.30hrs	3	cloudy, bright spells, moderate NW breeze	sunset 19.15hrs
27/09/2022	3	11.30hrs	3	light cloud, cool, dry, light NW breeze	-
27/09/2022	3	08.00hrs	3	sunny then light cloud, cool, light NW breeze	-
16/09/2022	1	18.00hrs	2.5	mainly cloudy, light NW breeze	sunset 20.10hrs
16/09/2022	2	14.00hrs	3	sunny spells, moderate NW breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
16/09/2022	5	10.00hrs	3	sunny spells, brisk NW breeze	-
15/09/2022	4	15.30hrs	3	sunny spells, moderate NW breeze, light rain showers	-
15/09/2022	4	08.00hrs	3	light cloud then sunny, light NW breeze	-
15/09/2022	5	11.30hrs	3	mainly cloudy, cool, passing showers on NW breeze	-
10/09/2022	1	14.00hrs	3	fine and sunny, light breeze	-
10/09/2022	4	10.00hrs	3	warm and sunny, cloudless blue sky	-
25/08/2022	2	16.00hrs	3	cloudy with bright spells, light SW breeze	-
25/08/2022	3	11.30hrs	3	cloudy, light SW breeze, light rain shower	-
25/08/2022	3	08.00hrs	3	sunny spells, light SW breeze	-
24/08/2022	1	16.00hrs	3	light cloud, warm sunny spells, strong SW breeze	-
24/08/2022	2	11.30hrs	3	warm sunny spells, fresh SW breeze	-
24/08/2022	2	08.00hrs	3	sunny spells, moderate SW breeze	-
09/08/2022	1	07.30hrs	3	sunny, becoming warm, light SW breeze	-
09/08/2022	2	11.30hrs	3	warm and sunny, light SW breeze	-
09/08/2022	3	15.30hrs	3	warm and sunny, light SW breeze	-
08/08/2022	1	16.30hrs	3	warm and sunny, light SW breeze	-
08/08/2022	4	08.00hrs	3	warm and sunny, moderate southwest breeze	-
08/08/2022	5	12.00hrs	3	light cloud, becoming warm, light SW breeze	-
05/08/2022	3	16.45hrs	3	cloudy, dry, moderate NW breeze	-
05/08/2022	4	08.00hrs	3	warm sunny spells, moderate NW breeze	-
05/08/2022	5	12.00hrs	3	sunny spells and a moderate NW breeze	-
29/07/2022	4	18.30hrs	2	cloudy, warm and humid, light SW breeze	-
29/07/2022	4	15.00hrs	3	cloudy, warm and humid, fresh SW breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
29/07/2022	5	11.00hrs	3	cloudy, warm and humid, fresh S breeze	good conditions but no raptor activity
21/07/2022	1	15.00hrs	4	light cloud, bright spells, light N breeze, cool	-
21/07/2022	3	08.00hrs	4	light cloud and a light N breeze	-
16/07/2022	1	08.30hrs	3	sunny start, cloud increasing later, warm and humid	-
07/07/2022	5	16.00hrs	3	warm sunny spells, moderate W breeze	-
27/06/2022	4	08.15hrs	3	sunny spells, light W breeze, rain shower	-
27/06/2022	5	12.00hrs	3	sunny spells, moderate W breeze	fine conditions but no raptor activity
20/06/2022	4	17.00hrs	3	sunny with a light NW breeze	-
14/06/2022	1	08.00hrs	3	cloudy, cool, moderate SW breeze	-
14/06/2022	2	12.00hrs	3	cloudy, cool, light SW breeze	-
14/06/2022	3	17.00hrs	3	cloudy with bright spells, moderate SW breeze	-
04/06/2022	1	13.00hrs	4	warm and sunny	-
04/06/2022	2	08.30hrs	3	warm and sunny	-
26/05/2022	1	12.00hrs	3	cloudy, some sunny spells, cool, strong NW breeze	-
26/05/2022	2	08.00hrs	3	sunny spells, fresh NW breeze	-
26/05/2022	3	17.30hrs	3	sunny spells, fresh to strong NW breeze	-
24/05/2022	4	17.00hrs	3	mainly cloudy but dry, light NW breeze	-
19/05/2022	4	08.00hrs	3	sunny, light then moderate SW breeze	-
19/05/2022	5	16.00hrs	3	cloudy, bright spells, moderate SW breeze	-
19/05/2022	5	12.00hrs	3	cloudy, bright spells, fresh SW breeze	good raptor conditions but none seen
14/05/2022	2	17.00hrs	3	light cloud, warm, light SW breeze	-
14/05/2022	3	10.00hrs	4	warm and sunny, light SW breeze	-
29/04/2022	1	12.30hrs	3	sunny, light then moderate SE breeze	-
29/04/2022	1	16.00hrs	2	sunny, moderate SE breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
29/04/2022	4	08.30hrs	3	fine and sunny, calm or light SE breeze	-
20/04/2022	1	08.00hrs	2	light cloud then sunny, freshening S breeze	-
20/04/2022	2	16.00hrs	3	sunny, moderate S breeze	-
20/04/2022	5	12.00hrs	3	sunny with a fresh S breeze	-
19/04/2022	5	15.45hrs	3	sunny spells, light N breeze, rain shower	-
16/04/2022	2	14.00hrs	4	fine and dry, light S breeze	-
16/04/2022	3	08.00hrs	4	fine and bright, becoming warm	-
08/04/2022	2	13.30hrs	3	sunny, cold, brisk N breeze	-
08/04/2022	2	09.30hrs	3	sunny, cold, brisk N breeze	-
26/03/2022	1	15.00hrs	3	sunny and mild with a light breeze	-
26/03/2022	3	09.30hrs	4	sunny and becoming warm, light breeze	-
19/03/2022	3	16.00hrs	2	sunny with a moderate SE breeze	-
19/03/2022	4	12.15hrs	3	sunny, moderate then fresh SE breeze	-
19/03/2022	4	08.15hrs	3	sunny with a moderate SE breeze	-
12/03/2022	4	14.00hrs	4	fine and bright, light S breeze	-
12/03/2022	5	10.00hrs	3	fine and bright, light S breeze	-
05/03/2022	5	13.00hrs	3	fine and sunny, light E breeze	-
05/03/2022	5	08.00hrs	3	frosty start then fine and sunny, light E breeze	-
22/02/2022	1	11.30hrs	3	sunny spells and blustery showers, cold, fresh to strong NW breeze	-
22/02/2022	2	07.30hrs	3	bright with a fresh W breeze	sunrise 07.35hrs
22/02/2022	2	15.45hrs	2	bright and cold, strong NW breeze easing back	sunset 17.48hrs
15/02/2022	3	08.00hrs	3	bright and cold, moderate SW breeze	sunrise 07.53hrs
14/02/2022	1	08.00hrs	3	sunny spells and showers, fresh NW breeze	sunrise 07.55hrs
14/02/2022	2	12.00hrs	4	long sunny spells, moderate NW breeze	-
27/01/2022	2	12.30hrs	3	sunny and mild, light NW breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
27/01/2022	3	08.30hrs	3	sunny spells, light NW breeze, rain shower	sunrise 08.29
25/01/2022	1	13.30hrs	3.5	sunny spells changing to light cloud, light SW breeze	sunset 16.53
25/01/2022	2	08.30hrs	4	light cloud, cold, dry, light SW breeze	sunrise 08.32
17/01/2022	1	09.00hrs	3	early frost then sunny and cold, light S breeze	sunrise 08.43hrs
17/01/2022	3	13.00hrs	3.5	sunny and cold, moderate S breeze	sunset 16.38hrs
11/01/2022	2	14.30hrs	2.5	bright and cold, light SW breeze	sunset 16.27hrs
27/12/2021	1	12.30hrs	2.5	bright spells, cold, light E breeze	
27/12/2021	2	15.30hrs	1	bright and cold, light E breeze	sunset 16.09
27/12/2021	3	08.30hrs	3	light cloud then sunny spells, cold, light E breeze	sunrise 08.54hrs
24/12/2021	2	13.00hrs	3.5	light cloud, moderate SE breeze, cloud base 500m	sunset 16.04hrs
24/12/2021	3	09.00hrs	3	light cloud, moderate SE breeze, cloud base 500m	sunrise 08.51hrs
02/12/2021	2	12.30hrs	4	light cloud, cold, light SW breeze; cloudbase temporarily descended to 450m	sunset 16.06hrs
02/12/2021	3	08.30hrs	3	bright with sunny spells, cold, light SW breeze	sunrise 08.32hrs
23/11/2021	1	08.45hrs	4	sunny start then cloudy	sunrise 08.16
23/11/2021	2	13.30hrs	3	cloudy and cold, light breeze	sunset 16.16
22/11/2021	2	13.00hrs	3.5	cloudy, near-calm, cold	sunset 16.17hrs
22/11/2021	3	08.30hrs	3	frosty start then light cloud, near-calm	-
10/11/2021	1	09.00hrs	3	bright and mild, light W breeze	-
10/11/2021	2	13.30hrs	3	bright and mild, light W breeze	sunset 16.30hrs
09/11/2021	1	13.45hrs	3	fine and bright, moderate SW breeze	sunset 16.30
22/10/2021	1	09.30hrs	3	sunny spells and a moderate W breeze	-
20/10/2021	1	0800hrs	3	long sunny spells, light W breeze, mild	-
20/10/2021	2	12.00hrs	3	long sunny spells, light W breeze, mild	-
05/10/2021	3	12.00hrs	3	sunny spells and showers, blustery NW breeze	-



Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
05/10/2021	3	08.00hrs	3	sunny spells and showers, blustery NW breeze	-
29/09/2021	1	11.30hrs	3	long sunny spells, fresh W breeze	-
29/09/2021	1	08.00hrs	3	sunny spells, cool, fresh NW breeze	-
23/09/2021	1	08.00hrs	3	cloudy, mild, light W breeze	-
23/09/2021	3	12.00hrs	3	cloudy, mild, light W breeze	-
20/09/2021	3	12.00hrs	3	sunny, light W breeze	-
20/09/2021	3	08.00hrs	3	partial cloud, sunny spells, moderate W breeze, rain shower	-
23/08/2021	1	11.30hrs	3	sunny spells, warm and humid, light NW breeze	-
23/08/2021	1	08.00hrs	3	early mist lifting then calm and sunny	-
13/08/2021	1	08.00hrs	3	cloudy and a moderate SW breeze	-
13/08/2021	2	12.00hrs	3	cloudy, sunny spells, strong SW breeze	-
13/08/2021	3	16.00hrs	3	sunny spells and a moderate SW breeze	-
09/08/2021	1	15.30hrs	3	sunny spells, rain shower, light NW breeze	-
09/08/2021	2	12.00hrs	3	sunny spells, rain shower, light NW breeze	-
09/08/2021	3	08.00hrs	3	cloudy, bright spells, light NW breeze	-
26/07/2021	1	17.00hrs	3	cloudy, humid, light NW breeze	-
26/07/2021	2	12.30hrs	3	cloudy, humid, light NW breeze	-
26/07/2021	3	08.00hrs	3	cloudy, warm, humid, light NW breeze	-
14/07/2021	2	14.30hrs	3	warm and sunny then cloudy, moderate SW breeze	-
26/07/2021	1	17.00hrs	3	cloudy, humid, light NW breeze	-
26/07/2021	2	12.30hrs	3	cloudy, humid, light NW breeze	-
26/07/2021	3	08.00hrs	3	cloudy, warm, humid, light NW breeze	-
14/07/2021	2	14.30hrs	3	warm and sunny then cloudy, moderate SW breeze	-
18/06/2021	1	15.00hrs	3	light cloud, warm sunny spells, light N breeze	-
17/06/2021	1	08.00hrs	3	not recorded	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
17/06/2021	2	12.00hrs	3	not recorded	-
17/06/2021	3	18.00hrs	3	not recorded	-
27/05/2021	1	14.00hrs	3	hazy sun, warm, moderate S breeze	-
27/05/2021	2	18.00hrs	3	hazy sun, warm, moderate S breeze	-
06/05/2021	1	15.30hrs	3	sunny, cold, strong NW breeze	-
06/05/2021	2	11.30hrs	3	long sunny spells, cold, dry, moderate NW breeze	-
06/05/2021	3	08.00hrs	3	mostly sunny, cold, wintry shower, light N breeze	-
28/04/2021	1	06.45hrs	3	long sunny spells, light NE breeze	-
28/04/2021	2	10.15hrs	3	light cloud and a light N breeze	-
28/04/2021	3	14.00hrs	3	light cloud and a light N breeze	-
16/04/2021	2	11.00hrs	3	cold start then warm sun, light S breeze	-
16/04/2021	3	15.30hrs	3	hazy sun, moderate to fresh S breeze	-
15/04/2021	2	15.30hrs	3	sunny spells, moderate to fresh S breeze	-
15/04/2021	2	12.00hrs	3	sunny spells, moderate to fresh S breeze	-
15/04/2021	3	08.00hrs	3	sunny, cool, light to moderate SE breeze	-
25/03/2021	3	12.00hrs	3	sunny spells and a strong SW breeze	-
25/03/2021	3	08.00hrs	3	sunny spells and a strong SW breeze	-
19/03/2021	1	12.00hrs	3	sunny spells, mild, light N breeze	-
19/03/2021	1	08.00hrs	3	cloudy, dry, light N breeze	-
16/03/2021	2	10.30hrs	3	long sunny spells, mild, moderate NW breeze	-
02/03/2021	3	15.00hrs	3	hazy sun, cold, light SE breeze	sunset 18.05hrs
02/03/2021	3	09.00hrs	3	sunny, cold, near-calm	-
26/02/2021	1	12.00hrs	3	sunny spells, mild, fresh S breeze	-
26/02/2021	2	16.00hrs	2	sunny spells, moderate S breeze, mild	sunset 17.57hrs
26/02/2021	3	08.00hrs	3	sunny spells and a moderate S breeze	-
22/02/2021	1	08.30hrs	3	early frost then sunny and mild in S breeze	-
11/02/2021	1	12.00hrs	3	light cloud, very cold (ground frozen), strong SE breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
11/02/2021	2	08.00hrs	3	long sunny spells, very cold, dry, light SE breeze	sunrise 07.59hrs
11/02/2021	2	16.00hrs	1.5	bright, very cold, dry (ground frozen), strong SE breeze	sunset 17.26
09/02/2021	1	17.00hrs	1	sunny spells, very cold (light snow flurry), fresh NE breeze	sunset 17.25
09/02/2021	2	08.00hrs	3	sunny, very cold (ground frozen), light NE breeze	sunrise 08.03hrs
27/01/2021	1	11.00hrs	2	light cloud, brighter spells, light S breeze	-
27/01/2021	1	08.45hrs	2	cloudy, some light mist, light S breeze	sunrise 08.27
27/01/2021	3	14.00hrs	3	hazy sun, near-calm	sunset 16.55
25/01/2021	1	12.00hrs	3	sunny, very cold (5cm lying snow), near-calm	-
25/01/2021	2	16.00hrs	1	sunny, very cold (5cm lying snow), near-calm	sunset 16.51hrs
25/01/2021	2	08.30hrs	2.5	sunny, very cold (5cm lying snow), near-calm	sunrise 08.30hrs
04/01/2021	2	14.30hrs	2	fine and clear, light N breeze	sunset 16.15hrs
18/12/2020	1	09.00hrs	3	light cloud, dry, strong S breeze, mild	-
18/12/2020	2	12.30hrs	4	sunny spells, mild, moderate S breeze	sunset 16.02hrs
07/12/2020	2	14.15hrs	2	cold and bright, near-calm	sunset 16.03hrs
09/11/2020	1	08.00hrs	4	cloudy with bright spells, mild, light SE breeze	sunrise 07.48hrs
09/11/2020	2	13.30hrs	3.5	cloudy, brief sunny spells, moderate SE breeze, cloud base descending to 500m	sunset 16.37
06/11/2020	3	13.45hrs	3	sunny spells and a moderate SE breeze	sunset 16.42hrs
06/11/2020	3	08.00hrs	4	sunny spells and a light SE breeze	sunrise 07.42hrs
30/10/2020	1	11.00hrs	2	long sunny spells, moderate W breeze	-
30/10/2020	1	07.30hrs	3	sunny, near-calm then light W breeze	-
30/10/2020	2	14.30hrs	3	sunny and cold, light W breeze	sunset 17.00hrs
23/10/2020	1	08.00hrs	3	sunny with a light SW breeze	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
23/10/2020	3	12.00hrs	4	sunny spells, moderate SW breeze	-
16/10/2020	2	15.00hrs	2.5	light cloud and a moderate E breeze	-
23/09/2020	1	10.30hrs	3	warm sunny spells and a light NW breeze	-
23/09/2020	3	14.30hrs	4	partial cloud, sunny spells, light NW breeze	-
21/09/2020	1	13.30hrs	3	light cloud, bright spells, light SW breeze	-
18/09/2020	2	16.00hrs	3	warm and sunny, moderate E breeze	-
18/09/2020	3	12.00hrs	3	warm and sunny, light then moderate E breeze	-
18/09/2020	3	08.00hrs	3	sunny and a light SE breeze	-
03/09/2020	1	12.30hrs	2	sunny spells, moderate to fresh SW breeze	-
03/09/2020	2	15.30hrs	3	sunny spells and a fresh to strong SW breeze	-
03/09/2020	3	08.00hrs	3	sunny spells, moderate to fresh SW breeze	-
21/08/2020	1	08.00hrs	3	cloudy, brief sunny spells, rain shower, light SW breeze	-
21/08/2020	2	15.30hrs	3	warm sunny spells, dry, moderate SW breeze	-
21/08/2020	2	12.00hrs	3	sunny spells, rain shower, light SW breeze	-
10/08/2020	1	11.30hrs	3	hazy sun, warm and humid, light SE breeze	-
10/08/2020	1	08.00hrs	3	hazy sun, warm and humid, light SE breeze	-
10/08/2020	2	15.30hrs	3	warm and humid, light SE breeze	-
21/07/2020	1	17.30hrs	3	cloudy and humid, breeze falling calm	-
21/07/2020	2	12.00hrs	3	cloudy with a light SW breeze	-
21/07/2020	2	08.00hrs	3	warm sunny spells then cloudy, light SW breeze	-
02/07/2020	1	13.00hrs	3	cloudy, humid, light NW breeze	-
02/07/2020	2	18.00hrs	3	cloudy, humid, light NW breeze falling calm	-
18/06/2020	2	18.00hrs	3	cloudy, warm and humid, light breeze then near-calm	-
18/06/2020	2	14.00hrs	3	partly cloudy, warm and humid, light	-

Date (DD/MM/YY)	VP No.	Time Start	Duration (hrs)	Weather Conditions	Remarks
				E breeze	
20/05/2020	1	18.30hrs	3	light cloud and a moderate S breeze	-
20/05/2020	1	14.00hrs	3	light cloud, hazy sun, moderate S breeze	-
05/05/2020	1	12.00hrs	3	sunny, cool, moderate to fresh SE breeze	-
05/05/2020	2	16.00hrs	3	sunny, cool, moderate SE breeze	-
05/05/2020	2	08.00hrs	3	sunny, cool, light then moderate SE breeze	-
16/04/2020	1	11.30hrs	3	light cloud then warm and sunny, light NE breeze	-
16/04/2020	1	08.00hrs	3	light cloud, cool, light NE breeze	-
16/04/2020	2	16.00hrs	3	warm and sunny, light then moderate E breeze	-
01/04/2020	1	14.00hrs	3	partial cloud, sunny spells, moderate NW breeze, cool	-

## Technical Appendix 8.4

### Technical Appendix 8.4 - Details of Vantage Point Locations

VP	Grid Reference	Latitude	Longitude	Direction of View (degrees)	Viewing Arc (degrees)	Viewing Extent (km)	Area Visible (ha)
1	H 50207 97337	54.821505	-7.2195813	180	180	2	527.6
2	H 50532 96170	54.810990	-7.2147265	150	180	2	356.9
3	H 51054 92837	54.78100	-7.20720	0	180	2.5	605.5
4	H 52147 97546	54.82319	-7.18936	135	180	2	502.0
5	H 53127 96842	54.816764	-7.1742459	210	180	2.5	562.3

### Notes

Further details of vantage point selection and any significant exceptions to the NatureScot guidelines are as follows:

- **General point** - In order to ensure that access permissions were in place, all vantage points (bar VP3 which was located on a public road outside the Site) were located on or within the boundary of the Site. Lands located outside the Site did not have access permissions in place and therefore (except for public roads) it was not possible to locate vantage points in these areas.

- **VP1** - is located just within the boundary of the Site and is well outside the 500 m extent turbine envelope therefore it is considered that there are no significant issues with the location of this vantage point.
- **VP2** - is located within the 500 m extent turbine envelope and the presence of an observer might be considered to potentially affect bird activity within this area however the VP is located on an existing farm track and it was therefore possible to use a parked vehicle as a screen / hide in order to avoid any possible disturbance. With this mitigation in place it is therefore considered that there are no significant issues with the location of this vantage point.
- **VP3** - is located on a public road outside the Site and in order to include parts of the southern aspect of the 500 m extent turbine envelope it was necessary to increase the viewing extent from the vantage point to 2.5 km. It is considered that this represents a relatively minor and reasonable variation to the recommended default extent (2 km). For an experienced observer this is highly unlikely to have a significant adverse effect on the detection of birds within the target area: the larger species (e.g. buzzard) are readily visible at distances of up to 3 km and for the smaller species (e.g. kestrel) it was possible to employ increased observer diligence (e.g. by increased periods of scanning with binoculars) in order to mitigate for any slight reduction in detectability within the more distant area. With this mitigation in place it is therefore considered that there are no significant issues with the location of this vantage point.
- **VP4** - is located just within the boundary of the Site and is well outside the 500 m extent turbine envelope therefore it is considered that there are no significant issues with the location of this vantage point.
- **VP5** - is located within the Site and is close to a proposed turbine location (T10) however the vantage point was not used to view this turbine location (which is visible from VP4). A potential alternative spot for VP5 was identified however the location was outside the boundary of the Site on private land without access permissions. The location for VP5 is not close to any other turbine locations therefore there are no significant issues in terms of possible effects on bird activity (due to the presence of an observer) within the relevant parts of the 500 m extent turbine envelope.
- **VP5** - in order to include the area of the col (and the proposed location of T6) it was necessary to increase the viewing extent from the vantage point to 2.5 km. It is considered that this represents a relatively minor and reasonable variation to the recommended default extent (2 km). For an experienced observer this is highly unlikely to have a significant adverse effect on the detection of birds within the target area: see note for VP3.

## Technical Appendix 8.5

### Technical Appendix 8.5 - IEEM Probability Table

The IEEM probability scale used in the Assessment of 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%

## Technical Appendix 8.6

### Technical Appendix 8.6: Summary of Baseline for Breeding Birds

Species (BTO Code)	No. Breeding Pairs or Territorial Males	Breeding Status <sup>1</sup>	Remarks
Mallard (MA)	1	Probable	-
Red grouse (RG)	4	Probable	-
Curlew (CU)	0	-	Non-breeding transient
Golden plover (GP)	0	-	Non-breeding transient
Snipe (SN)	3	Probable	-
Woodpigeon (WP)	4+	Confirmed	-
Cuckoo (CK)	3	Probable	Singing males
Skylark (S.)	27	Confirmed	-
Sand martin (SM)	1	Confirmed	One active nest burrow in a small sand cliff along stream
Swallow (SL)	2+	Confirmed	-
Meadow pipit (MP)	56	Confirmed	-
Grey wagtail (PW)	2	Confirmed	Linear territories along streams
Pied wagtail (PW)	2	Confirmed	-
Dipper (DI)	1	Confirmed	Linear territory along stream
Wren (WR)	7+	Confirmed	-

<sup>1</sup> Breeding status has been defined following published British Trust for Ornithology guidance

Species (BTO Code)	No. Breeding Pairs or Territorial Males	Breeding Status <sup>1</sup>	Remarks
Stonechat (SC)	9	Confirmed	-
Robin (R.)	4	Confirmed	-
Dunnock (D.)	2	Probable	-
Wheatear (W.)	0	-	Non-breeding transient
Blackbird (B.)	4+	Probable	-
Song thrush (ST)	3+	Probable	-
Mistle thrush (M.)	3+	Confirmed	-
Willow warbler (WW)	4	Probable	-
Blackcap (BC)	2+	Probable	-
Coal tit (CT)	4+	Probable	-
Blue tit (BT)	2+	Probable	-
Great tit (GT)	1+	Probable	-
Magpie (MG)	2+	Confirmed	-
Jackdaw (JD)	2+	Probable	-
Hood crow (HC)	4	Confirmed	-
Starling (SG)	2+	Probable	-
Chaffinch (CH)	8+	Confirmed	-
Goldfinch (GO)	2	Confirmed	-
Siskin (SK)	1+	Probable	-
Redpoll (LR)	1	Probable	-
Reed bunting (RB)	7	Confirmed	-

## Technical Appendix 8.7

### Technical Appendix 8.7 - Details of Red Grouse Observations

Species (BTO Code)	Date (DD/MM/YY)	Count	Methodology	Remarks
RG	23/02/23	2	Brown and Shepherd Survey	Pair flushed from ground
RG	09/02/23	1+	Brown and Shepherd Survey	Fresh droppings
RG	26/01/23	1	Vantage Point Observation	Calling male



Species (BTO Code)	Date (DD/MM/YY)	Count	Methodology	Remarks
RG	25/01/23	3	Brown and Shepherd Survey	Flock (one male and two females) flushed from ground
RG	25/01/23	2+	Brown and Shepherd Survey	Fresh droppings
RG	07/07/22	1+	Brown and Shepherd Survey	Fresh droppings
RG	24/05/22	1+	Brown and Shepherd Survey	Fresh droppings
RG	08/04/22	3	Vantage Point Observation	Three territorial males calling simultaneously
RG	11/01/22	4+	Brown and Shepherd Survey	Fresh droppings
RG	9/11/21	6	Brown and Shepherd Survey	Flock (two males and four females) flushed from ground
RG	16/10/20	1+	Brown and Shepherd Survey	Fresh droppings
RG	01/04/20	2+	Brown and Shepherd Survey	Fresh droppings

## Technical Appendix 8.8

### Technical Appendix 8.8 - Details of Snipe Observations

Species (BTO)	Date	Count	Methodology	Remarks
SN	07/07/2022	1	Brown and Shepherd Survey	calling from ground
SN	20/06/2022	3	Brown and Shepherd Survey	calling from ground
SN	19/05/2022	1	Vantage Point Observation	calling from ground
SN	18/06/2021	2	Brown and Shepherd Survey	display flight
SN	17/06/2021	1	Vantage Point Observation	calling from ground

Species (BTO)	Date	Count	Methodology	Remarks
SN	27/05/2021	1	Brown and Shepherd Survey	calling from ground
SN	18/06/2020	1	Brown and Shepherd Survey	calling from ground
SN	20/05/2020	1	Brown and Shepherd Survey	display flight

## Technical Appendix 8.9

### Technical Appendix 8.9 - Details of Brown and Shepherd Survey Observations (Breeding Period)

Spp.	Survey Date / Species Count (blank cell = zero count)											
	07/07/2022	20/06/2022	24/05/2022	19/04/2022	14/07/2021	18/06/2021	27/05/2021	02/04/2021	02/07/2020	18/06/2020	20/05/2020	01/04/2020
WS												9
MA			2	2								
H.	2		1					1	1			
SH	1				1					1		1
BZ	2	2	2	2	1	1	2		2	2	1	
K	2	1			2			1	2			
ML								1			1	
PE												
RG	1+		1+									2+
L.												
GP								150				12
JS												
SN	1					2	1			1	1	
WK												
CM												
LB		2	1		1		4		1	2		
GB												
SI	10	2	2			2			6	6	2	
WP	6	2	2	4	8	1			4	6	2	
CK			3			3	2			2	2	
S	6	20	22	15	4	24	22	12	12	25	22	6

Spp.	Survey Date / Species Count (blank cell = zero count)											
	07/07/ 2022	20/06/20 22	24/05/20 22	19/04/20 22	14/07/20 21	18/06/20 21	27/05/20 21	02/04/20 21	02/07/20 20	18/06/20 20	20/05/20 20	01/04/20 20
SM		2	2	2								
SL	6	4	6	2	8	4	2		12	10	6	
HM												
MP	120	54	52	35	65	46	22	18	60	22	20	10
GL		4	2	1		4	2	2	1	2	2	
PW		6	4	4	2							
DI		1	1	1								
WR		2	2	2								
R.		2	2	1								
D.												
WC												
SC	6	12	8	6	2	4	6	2	4	4	3	2
W.			2	6							6	
RZ												
B.	4		2	1	4	2	1		4	2	2	
FF												
ST		2		3	3	1			2	2		
RE												
M.	20	6	4		10	6	2		2	4		2
WW		4	4	2		2	2			2	2	
BC		2	2			1	1			1	1	
CT	6	2	2									
BT		2	2									
GT												
MG	6	4	2	4	2	1	2	4	2	4	1	2
JD	10	4	4			4	4			4	4	4
RO												
HC	45	22	6	4	32	15	6	6	12	10	10	6
RN												
J.												

Spp.	Survey Date / Species Count (blank cell = zero count)											
	07/07/ 2022	20/06/20 22	24/05/20 22	19/04/20 22	14/07/20 21	18/06/20 21	27/05/20 21	02/04/20 21	02/07/20 20	18/06/20 20	20/05/20 20	01/04/20 20
SG	120	20	4		40	4	2			4		
CH				8			4			4		
GO	24	2	2		12	4	2			2	2	
BF												
SK		2										
CB												
LI												
TW												
LR		2		1								
LA												
SB												
RB		7	5	5		4	3			3	2	

## Technical Appendix 8.10

### Technical Appendix 8.10: Summary of Baseline for Non-Breeding Birds

Species (BTO Code)	No. of Surveys Species Observed (n=12)	Maximum Count	Remarks
Whooper swan (WS)	1	9	Flock flying north
Mallard (MA)	2	2	-
Heron (H.)	3	1	-
Lapwing (L.)	1	20	Flock flying south-west
Golden plover (GP)	9	150	-
Snipe (SN)	10	10	-
Jack snipe (JS)	1	1	-
Woodcock (WK)	1	1	-
Woodpigeon (WP)	4	20	-
Skylark (S.)	2	2	-
Meadow pipit (MP)	7	100	-
Grey wagtail (GL)	2	1	-
Pied wagtail (PW)	4	2	-
Wren (WR)	8	6	-

Species (BTO Code)	No. of Surveys Species Observed (n=12)	Maximum Count	Remarks
Robin (R.)	4	2	-
Stonechat (SC)	9	6	-
Fieldfare (FF)	5	200	-
Song thrush (ST)	2	2	-
Redwing (RE)	3	20	-
Mistle thrush (M.)	3	6	-
Coal tit (CT)	4	6	-
Magpie (MG)	6	4	-
Jackdaw (JD)	4	12	-
Rook (RO)	3	40	-
Hooded crow (HC)	12	20	-
Raven (RN)	12	20	-
Jay (J.)	2	1	
Starling (SG)	6	300	-
Chaffinch (CH)	3	20	-
Goldfinch (GO)	3	15	-
Bullfinch (BF)	1	6	-
Redpoll (LR)	7	20	-
Siskin (SK)	3	12	-
Crossbill (CB)	2	4	-
Snow bunting (SB)	1	1	-
Reed bunting (RB)	8	30	-

## Technical Appendix 8.11

### Technical Appendix 8.11 - Details of Brown and Shepherd Survey Observations (Non-Breeding Period)

Spp.	Survey Date / Species Count (blank cell = zero count)											
	23/02/ 2023	09/02/20 23	25/01/20 23	10/10/20 22	15/02/20 22	11/01/20 22	09/11/20 21	13/10/20 21	09/02/20 21	04/01/20 21	07/12/20 20	16/10/20 20
WS												
MA	2				2							

Spp.	Survey Date / Species Count (blank cell = zero count)											
	23/02/2023	09/02/2023	25/01/2023	10/10/2022	15/02/2022	11/01/2022	09/11/2021	13/10/2021	09/02/2021	04/01/2021	07/12/2020	16/10/2020
H.	1					1					1	
PE		1									1	1
ML	1					1						
HH												
RG	2	1+	3			4+	6					1+
L.									20			
GP	26			3		1	60	1	55		1	2
JS					1							
SN	6	8		6	6	6	10	8	6		6	8
WK					1							
CM												
LB												
GB												
SI												
WP		6						20		6		12
CK												
S			1						2			
SM												
SL												
HM												
MP				20	6		100	65	6		2	20
GL				1								1
PW			1			2					1	2
DI												6
WR	2	4	2	4			4	4		2	6	
R.	2					1			1			2
D.												
WC												
SC		2	4	5		5	6	4		4	6	6
W.												
RZ												

Spp.	Survey Date / Species Count (blank cell = zero count)											
	23/02/2023	09/02/2023	25/01/2023	10/10/2022	15/02/2022	11/01/2022	09/11/2021	13/10/2021	09/02/2021	04/01/2021	07/12/2020	16/10/2020
B.												
FF	20				100	200				1		4
ST	2									2		
RE	10					20						2
M.			4				6			2		
WW												
BC												
CT	4		6			2					1	
BT												
GT												
MG			4	2		4			2	2	2	
JD		6				12				6		
RO		20		40				20				
HC	4	6	4	6	4	2	6	6	10	20	6	8
RN	20	13	6	6	20	2	10	6	6	10	2	6
J.								1				1
SG	300		50			50		4	20	12		
CH					10				20	6		
GO	15			6					10			
BF					6							
SK			12				1		6			
CB						4			2			
LI												
TW												
LR					20	7	6	1	12	6	4	
LA												
SB								1				
RB		2	2		6	2		6	6	30	2	

## Technical Appendix 8.12

### Technical Appendix 8.12 - Details of Observations of Annex-1 Species (Full Baseline Period)

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Remarks
Peregrine	26/01/2023	12.45hrs	5	1	120	adult
Peregrine	16/09/2022	11.30hrs	5	1	600	1 CY
Peregrine	16/09/2022	14.35hrs	2	1	300	1CY in fast travelling flight
Peregrine	15/09/2022	11.05hrs	4	1	300	1 CY, travelling flight
Peregrine	09/08/2022	12.25hrs	2	1	300	1CY circling
Peregrine	21/07/2022	16.10hrs	1	1	300	1CY circling
Peregrine	16/07/2022	11.10hrs	1	1	300	1CY hunting starlings
Peregrine	14/06/2022	18.00hrs	3	1	300	hunting corvids around cairns
Peregrine	29/09/2021	09.55hrs	1	1	185	circling, interacting with ravens
Peregrine	14/07/2021	15.10hrs	1	1	62	1CY, hunting low along steep slope
Peregrine	14/07/2021	16.00hrs	1	1	100	hunting starlings
Peregrine	15/04/2021	10.00hrs	3	1	300	circling
Peregrine	02/03/2021	10.00hrs	3	1	300	soaring high above cairns
Peregrine	25/01/2021	16.55hrs	2	1	300	adult, travelling flight
Peregrine	18/12/2020	12.00hrs	1	1	60	chasing corvids
Peregrine	07/12/2020	15.00hrs	1	1	65	fast travelling flight
Peregrine	30/10/2020	16.00hrs	2	1	300	fast travelling flight
Peregrine	21/08/2020	13.30hrs	2	1	300	fast travelling flight
Peregrine	02/07/2020	13.15hrs	1	1	300	1CY circling
Peregrine	16/04/2020	17.20hrs	2	1	300	circling
Merlin	27/02/2023	11.45hrs	3	1	300	hunting
Merlin	20/12/2022	11.00hrs	4	1	300	1 <sup>st</sup> cal. Year
Merlin	04/11/2022	09.40hrs	4	1	300	1 <sup>st</sup> cal. Year
Merlin	25/01/2021	12.30hrs	1	1	300	Female
Merlin	23/09/2020	10.45hrs	1	1	300	1 <sup>st</sup> cal. Year
Hen harrier	20/10/2021	12.15hrs	2	1	300	Juvenile / 1 <sup>st</sup> cal. Year
Hen harrier	09/08/2021	13.15hrs	2	1	300	female



Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Remarks
Hen harrier	26/07/2021	13.30hrs	2	1	300	female
Golden eagle	09/11/2020	15.30hrs	2	1	300	Immature / 2 <sup>nd</sup> cal. Year
Golden eagle	02/07/2020	15.15hrs	1	1	300	Immature / 2 <sup>nd</sup> cal. Year

#### Technical Appendix 8.12A - Further Details of Peregrine Observations (Baseline Year 3)

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Duration at Risk Height (s)	Remarks
Peregrine	21/07/2022	16.10hrs	1	1	120	120	1CY circling
Peregrine	16/07/2022	11.10hrs	1	1	300	186	1CY hunting starlings
Peregrine	16/09/2022	14.35hrs	2	1	100	0	1CY in fast travelling flight
Peregrine	09/08/2022	12.25hrs	2	1	180	144	1CY circling
Peregrine	14/06/2022	18.00hrs	3	1	300	210	hunting corvids around cairns
Peregrine	15/09/2022	11.05hrs	4	1	65	65	1 CY, travelling flight
Peregrine	26/01/2023	12.45hrs	5	1	120	30	adult
Peregrine	16/09/2022	11.30hrs	5	1	460	184	1 CY

### Technical Appendix 8.13

#### Technical Appendix 8.13 - Details of Observations of Non Annex-1 Raptor Species (Baseline Year 3)

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	23/02/2023	15.40hrs	5	2	100	0	circling
Buzzard	24/10/2022	16.10hrs	5	1	150	120	-
Buzzard	16/09/2022	13.05hrs	5	1	100	0	-
Buzzard	15/09/2022	13.15hrs	5	1	150	150	-
Buzzard	08/08/2022	12.40hrs	5	5	150	0	five juveniles soaring together
Buzzard	19/04/2022	15.30hrs	5	1	150	0	soaring

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	03/02/2023	10.30hrs	4	1	125	100	-
Buzzard	20/12/2022	11.30hrs	4	1	65	65	-
Buzzard	18/10/2022	15.40hrs	4	1	150	0	-
Buzzard	10/10/2022	15.05hrs	4	1	140	0	-
Buzzard	10/10/2022	15.50hrs	4	2	90	90	-
Buzzard	10/10/2022	16.30hrs	4	1	160	128	-
Buzzard	08/08/2022	10.45hrs	4	1	130	0	perched
Buzzard	05/08/2022	10.45hrs	4	1	125	125	juvenile
Buzzard	24/05/2022	18.05hrs	4	2	75	60	circling
Buzzard	29/04/2022	09.15hrs	4	1	80	0	circling
Buzzard	27/02/2023	11.55hrs	3	2	150	120	above forest edge
Buzzard	17/02/2023	11.40hrs	3	1	150	150	above forest edge
Buzzard	21/07/2022	10.00hrs	3	1	100	0	soaring
Buzzard	14/06/2022	16.30hrs	3	1	90	72	-
Buzzard	14/05/2022	11.15hrs	3	2	60	48	above forest edge
Buzzard	16/04/2022	10.00hrs	3	1	65	52	above forest edge
Buzzard	26/03/2022	10.30hrs	3	2	600	0	soaring
Buzzard	14/10/2022	12.00hrs	2	1	65	0	flying low to ground
Buzzard	27/09/2022	17.00hrs	2	2	90	72	chasing and playing
Buzzard	16/09/2022	14.30hrs	2	1	150	0	-
Buzzard	24/08/2022	13.05hrs	2	1	170	0	-
Buzzard	24/08/2022	13.20hrs	2	1	165	132	-
Buzzard	14/06/2022	12.05hrs	2	1	45	36	-
Buzzard	08/04/2022	15.20hrs	2	2	125	100	-
Buzzard	28/09/2022	12.25hrs	1	1	120	0	-
Buzzard	28/09/2022	16.30hrs	1	2	160	0	-
Buzzard	09/08/2022	10.15hrs	1	6	155	0	six birds soaring together
Buzzard	09/08/2022	10.30hrs	1	1	75	75	single bird foraging
Buzzard	21/07/2022	16.20hrs	1	1	60	0	-

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Duration at Risk Height (s)	Remarks
Buzzard	14/06/2022	10.15hrs	1	1	30	0	travelling flight
Buzzard	20/04/2022	09.55hrs	1	1	80	64	circling
Buzzard	26/03/2022	15.05hrs	1	2	50	50	circling
Buzzard	28/09/2022	12.25hrs	1	1	120	0	-
Buzzard	28/09/2022	16.30hrs	1	2	160	0	-
kestrel	14/10/2022	11.45hrs	1	1	600	150	1 <sup>st</sup> cal. Year
kestrel	28/09/2022	12.25hrs	1	1	300	0	1 <sup>st</sup> cal. Year
kestrel	26/05/2022	12.30hrs	1	1	600	240	male
kestrel	27/09/2022	16.35hrs	2	1	600	0	1 <sup>st</sup> cal. Year
kestrel	05/08/2022	18.00hrs	3	1	300	120	1cal. year, around cairns
kestrel	21/07/2022	10.00hrs	3	1	300	120	1 <sup>st</sup> cal. year, around cairns
kestrel	18/10/2022	15.55hrs	4	1	300	150	foraging
kestrel	10/10/2022	15.15hrs	4	1	600	300	foraging
kestrel	10/10/2022	15.40hrs	4	1	300	210	foraging
kestrel	16/09/2022	11.30hrs	5	1	300	120	1 <sup>st</sup> cal. Year
kestrel	15/09/2022	12.45hrs	5	1	300	120	female
kestrel	19/02/2023	15.25hrs	5	1	900	0	foraging

## Technical Appendix 8.14

### Technical Appendix 8.14 - Summary of Observations of Non Annex-1 Raptor Species (Earlier Baseline Period)

Month	Species / Baseline Year / No. of Observations			
	buzzard		kestrel	
	Year 2	Year 1	Year 2	Year 1
March	7	3	0	0

Month	Species / Baseline Year / No. of Observations			
	buzzard		kestrel	
	Year 2	Year 1	Year 2	Year 1
April	4	6	0	1
May	3	2	1	0
June	2	2	0	0
July	2	1	2	2
August	1	1	2	2
September	2	3	2	3
October	4	3	2	2
November	2	1	3	0
December	0	1	0	0
January	1	1	0	0
February	2	1	1	1
<b>Totals</b>	<b>30</b>	<b>25</b>	<b>13</b>	<b>11</b>

## Technical Appendix 8.15

### Technical Appendix 8.15 - Summary of Observations of Secondary Species

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Remarks
grey goose sp.	28/09/2022	15.10hrs	1	20	300	flock of grey geese flying south, not identified to species
grey goose sp.	22/11/2021	11.30hrs	3	6	300	flock flying south
golden plover	01/12/2022	14.00hrs	1	50	300	flock circling
golden plover	29/04/2022	14.00hrs	1	1+	300	calling high overhead
golden plover	29/04/2022	14.30hrs	1	1+	300	calling high overhead
golden plover	16/04/2021	15.35hrs	3	45	300	circling above cairns
golden plover	15/04/2021	09.00hrs	3	100	300	circling above cairns, settled briefly on steep slope on southern side
golden plover	26/02/2021	10.00hrs	3	50	300	circling above cairns

Species	Date	Time	VP No.	No. Birds	Total Duration (s)	Remarks
golden plover	27/01/2021	14.00hrs	1	1	300	flew southwest
golden plover	23/10/2020	4.00hrs	3	2	300	flew southwest

## Technical Appendix 8.16

### Technical Appendix 8.16 - Details of Wider Area Raptor Locations

Species	Location (1km Grid Square)	Habitat	Breeding Status
buzzard	H 49 97	partly wooded river valley	probable (pair present)
buzzard	H 49 96	partly wooded river valley	probable (pair present)
buzzard	H 49 92	partly wooded farmland / upland boundary habitats	probable (pair present)
buzzard	H 52 98	partly wooded farmland / upland boundary habitats	probable (pair present)
buzzard	H 50 93	commercial conifer plantation	probable (pair present)
sparrowhawk	H 50 93	commercial conifer plantation	confirmed (birds observed carrying prey into trees)
raven	H 529 975 (location 1)	conifer tree at old farm building	confirmed (fledged young)
raven	H 492 951	small natural cliff close to minor public road	confirmed (nest)

## Technical Appendix 8.17

### Technical Appendix 8.17: Details of Collision Risk Model

#### General Note

The SNH Collision Risk Model (CRM) has been completed for those raptor species that are regularly occurring within the vantage point survey area (peregrine, buzzard and kestrel). The CRM has been completed using the vantage point observations from the most recent full baseline year (twelve month period from March 2022 to February 2023 inclusive). The observations indicate that activity by the relevant species during the most recent baseline year is comparable with activity during the earlier baseline periods and can therefore be

taken as typical for the survey area. For other raptor species (e.g. hen harrier and golden eagle) it is considered that there were an insufficient number of observations during the baseline period to warrant collision risk modelling being undertaken for these species.

### 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	11	
Rotor diameter (m)	150	
Hub height (m)	105	
Rotor depth (m)	-	Optional input
Rotor chord (m)	4.2	
Rotor pitch (degrees)	6.0	
Rotation period (seconds)	4.76	Based on Max. 12.6 RPM (at rated power)
Turbine operation time (%)	92.0	Based on data from LiDAR location within the Site

### Bird Parameters

The bird parameters input to the CRM are given in Table B. In line with SNH guidance<sup>2</sup>, flight speeds and wing-spans are taken from Alerstam *et al.*<sup>3</sup> Bird lengths are taken from Forsman<sup>4</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

### Band Used To Define Risk Height

The band used to define risk height in the CRM is for a 105 m hub height combined with a 150 m rotor diameter:

<sup>2</sup> SNH (2014): Flight Speeds and Biometrics for Collision Risk Modelling (SNH Guidance Note, October 2014)

<sup>3</sup> Alerstam, T. *et al.* (2007): Flight Speeds Among Bird Species - Allometric and Phylogenetic Effects (PLoS Biol. 5)

<sup>4</sup> Forsman, D. (1999): The Raptors of Europe and the Middle East - A Handbook of Field Identification (Poyser)

- Maximum height 180 m;
- Minimum height 30 m

### Durations at Risk Height

Total flight durations and durations at risk height input to the CRM are taken from Technical Appendices 8.12 and 8.13 and are summarized in Table C. Due to aspects of their flight behaviour (in particular prolonged hovering and frequent height changes) for kestrels it is often not feasible to record flight durations to the nearest second and in these instances the five-minute summary periods can be used: it is assumed that an individual bird is present within the survey area for all of each five-minute activity period in which it is observed (in most cases this is likely to be a true assumption) and heights are recorded as a range (minimum, maximum and median) for each observation, from which it is then also possible to estimate durations at risk height.

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

Species	Total Duration (s)	Duration at Risk Height (s)
Peregrine	1645	939
Buzzard	4695	1809
Kestrel	5400	1530

### Watch Data

The watch data input to the CRM are given in Table D. The time spent at each vantage point is taken from Table 8.3 in the ES Chapter 8 (Ornithology). Areas visible at the minimum risk height (30 m) are taken from Technical Appendix 8.4 (Details of Vantage Point Locations): areas were calculated from the viewpoint coverage shown in Figure 8.1 in the ES (Ornithology Viewpoint Coverage) and are buffered to the 500 m extent turbine envelope.

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

Vantage Point	Area Visible at Risk Height (ha)	Observation Time (hours)
VP1	527.6	76
VP2	356.9	73
VP3	605.5	72
VP4	502.0	72
VP5	562.3	72

### Summary of Collision Risk Model Results

The results of the CRM are summarized in Table E. The avoidance rates for each species follow the published SNH guidance<sup>5</sup>. For all species it has been assumed that birds are potentially present within the survey area year-round for an average day-length of 12 hours.

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

Species	Days Assumed Present	Hours Assumed Present	Avoidance Rate	Equivalent Collision Rate
Peregrine	365	12	98%	one bird every 27.2 years
Buzzard	365	12	98%	one bird every 12.2 years
Kestrel	365	12	95%	one bird every 8.9 years

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<sup>5</sup> SNH (2016): Avoidance rates for the SNH onshore wind farm Collision Risk Model (SNH Guidance Note, October 2016)