Figure A.19 Great black-backed gull 2018 breeding season collision risk estimates at 15 – 150 m, per turbine, per snapshot recording zone at 98 % avoidance

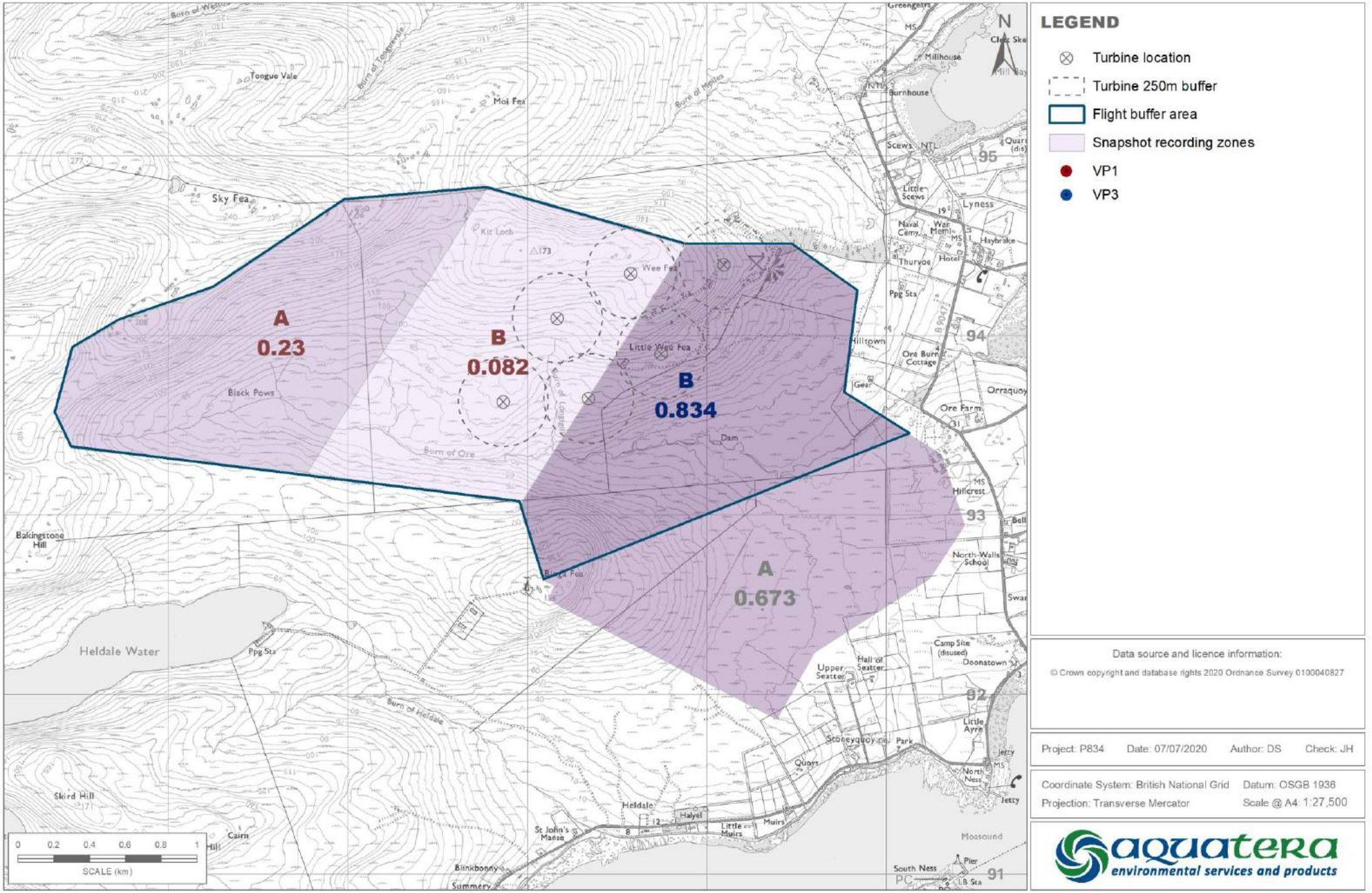


Figure A.20 Great black-backed gull Year 1 non-breeding season collision risk estimates at 15 – 150 m, per turbine, per snapshot recording zone at 98 % avoidance

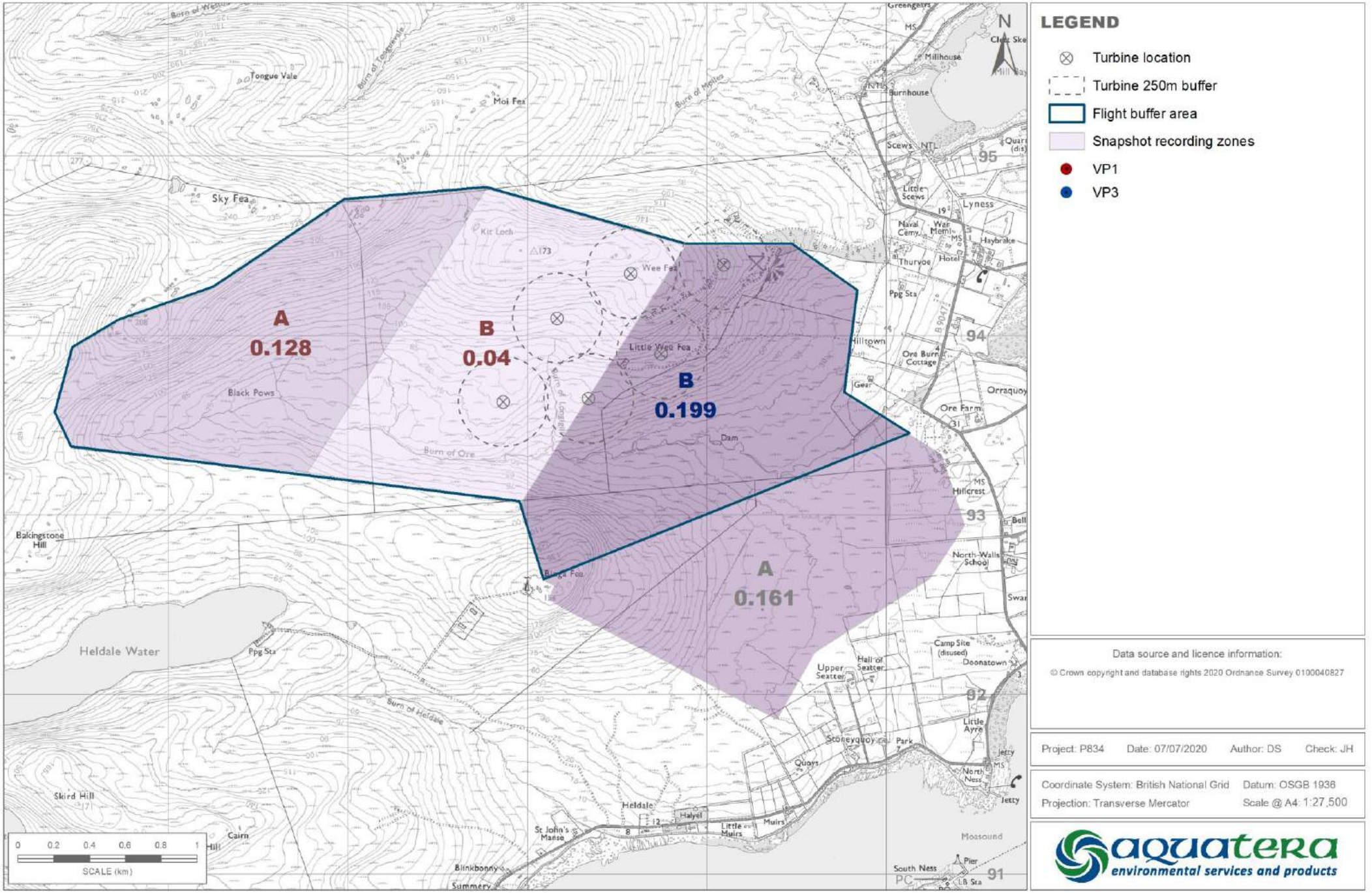


Figure A.21 Great black-backed gull 2019 breeding season collision risk estimates at 15 – 150 m, per turbine, per snapshot recording zone at 98 % avoidance

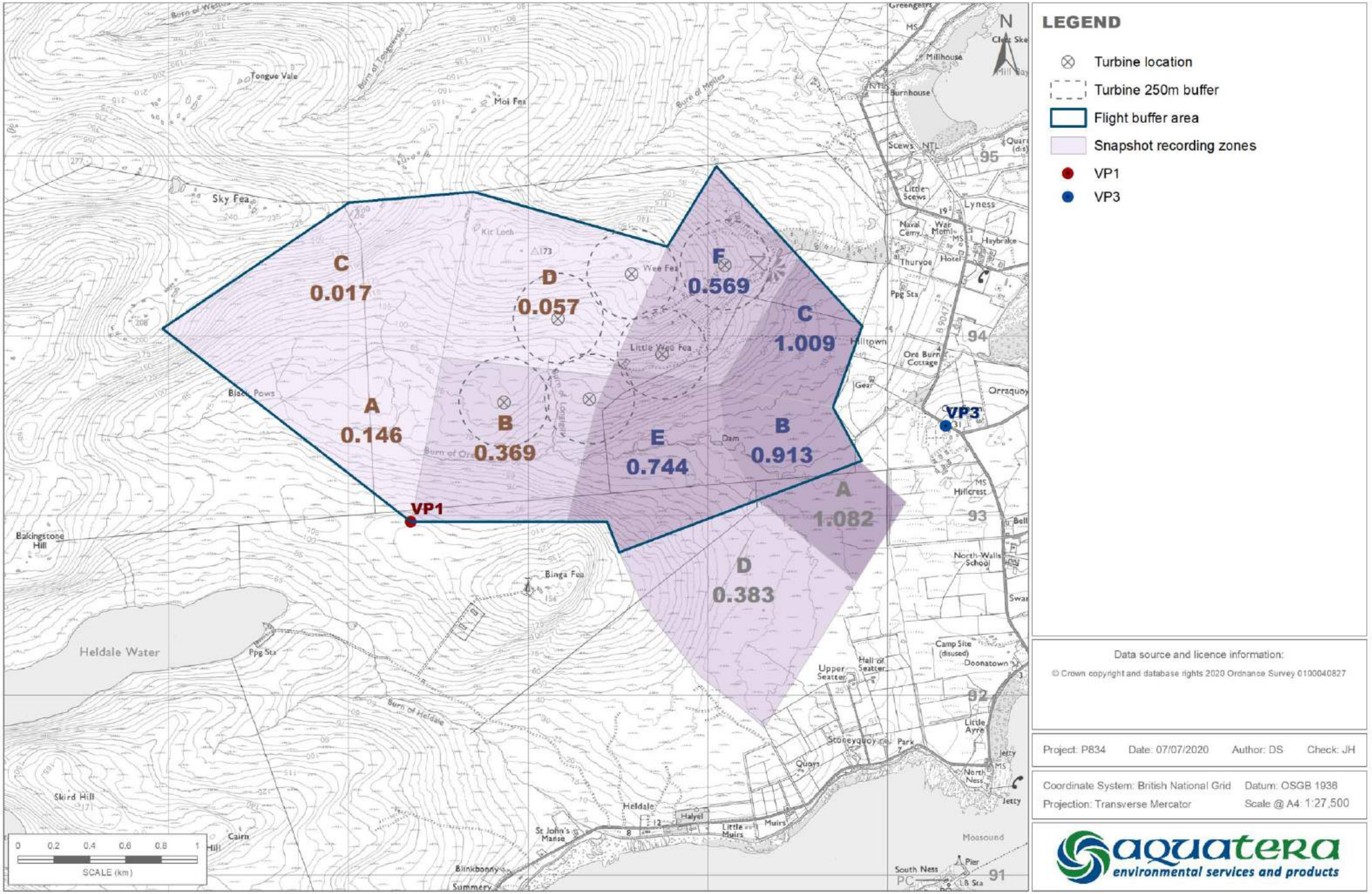
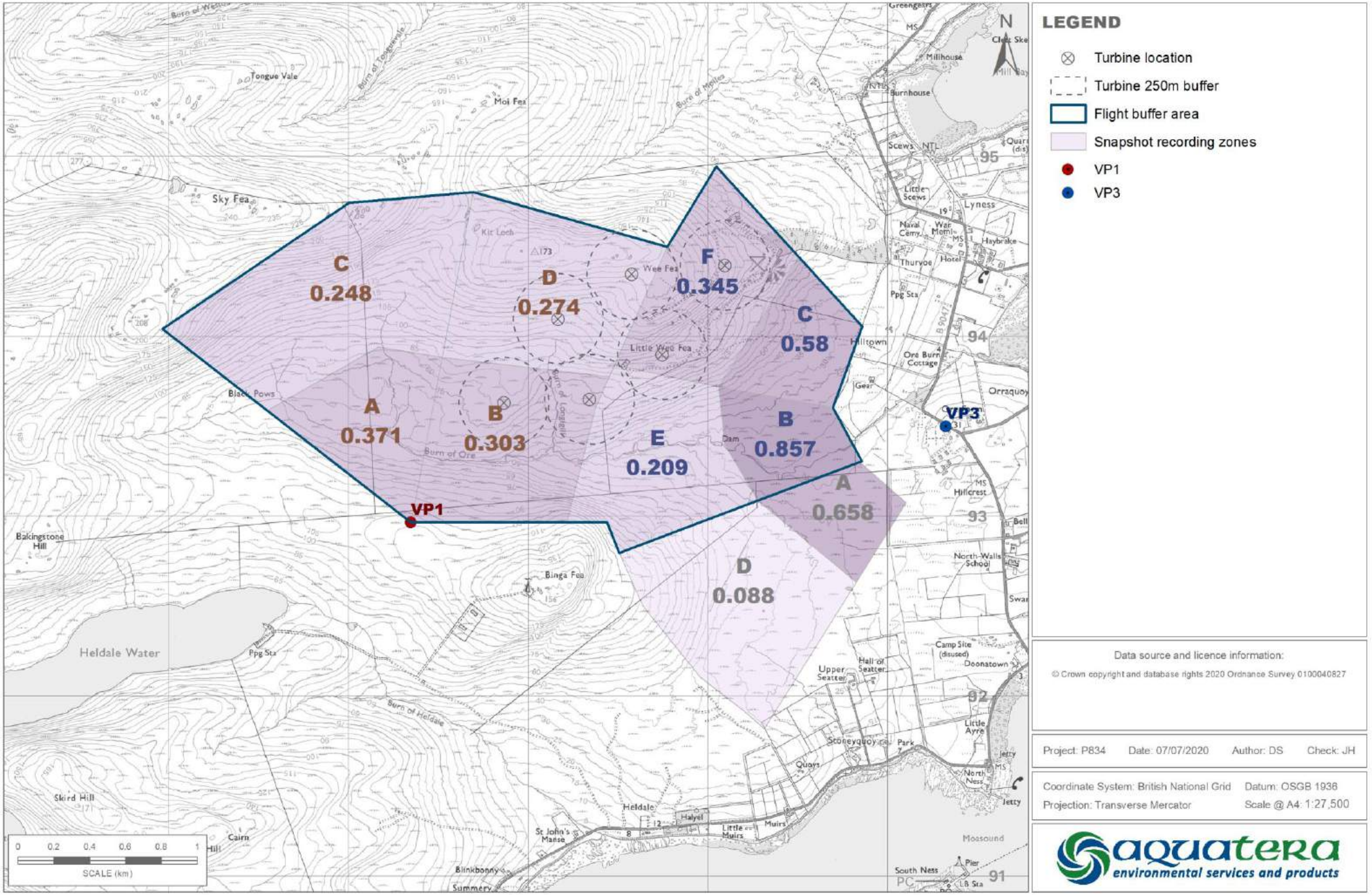


Figure A.22 Great black-backed gull Year 2 non-breeding season collision risk estimates at 15 – 150 m, per turbine, per snapshot recording zone at 98 % avoidance



APPENDIX B RED-THROATED DIVER COLLISION RISK WORKINGS

This appendix presents a description of the workings of the collision risk calculations undertaken for red-throated diver. The accompanying Excel spreadsheet 'Annex 1 Red-throated Diver Data' provides full details of the red-throated diver flight activity data for each year used in these calculations.

The 'Birds through a risk window' model is the most appropriate for this species.

B.1 EXTRAPOLATION TO ACCOUNT FOR MISSED FLIGHT LINES

Many red-throated diver flight lines were first detected by the surveyors when already part-way through the flight buffer, with the earlier portion of the flight line occurring prior to detection. During the interim risk calculations these flight lines were extended backwards to account for the missed portion of the flight line in order to give a better picture of the spatial distribution of risk across the site. This was carried out on a 500 m x 500 m grid square basis by attributing the overall risk (calculated at that stage on a timed basis across the whole site) to each square based on the number of birds flying through it at 15 – 150 m. These maps were used to inform the layout design (in combination with those for hen harrier and great skua) showing clearly where the highest risk areas were located and enabling approximate estimates of risk for any proposed layout. These flight extensions, some of them very approximate, and the time allowances for missed birds or missing parts of flight paths in this exercise, were not used in the final risk calculations, which followed the standard Band Model 'birds through a risk window' approach. The 500 m x 500 m grid square maps were interim working documents only and are not shown here.

In each year the flight buffer was covered from two VPs. In 2018 these were usually manned one at a time, but in 2019 most watches were carried out simultaneously from both VPs. Red-throated diver detection rates from either VP (individually) were not particularly high in 2019, when many of the birds were flying silently, particularly in June and July. This was apparent from the rather low number of flights that were recorded from both VPs at the same time compared to the actual number that should have been visible from both. The risk window used for the final calculations was close to the boundary between the VP1 and VP3 viewing areas, although target species were mapped wherever they occurred from both VPs. Thus, the use of both VPs at the same time would have ensured good coverage, since red-throated divers at the risk window were visible from both VPs and relatively few were likely to have escaped detection from both. If a bird was observed from both VPs it was only counted once in the calculation and a single composite flight path was mapped. Three hours of simultaneous watches is counted as three hours observation of the risk window.

When only one VP was being used at a time, the lack of efficiency in detection is accounted for by effectively assuming only 50 % coverage of the risk window from each VP, so that every three hours of observation time is made up of three hours from VP1 and three hours from VP3.

B.2 EXTRAPOLATIONS FROM OBSERVATIONS TO A FULL SEASON

An estimate of the number of passes at risk through the risk window is required as an input for this model. The total seasonal number of birds passing has been calculated based on the observed flight paths that were mapped through the risk window and flying within the 15 – 150 m recording height band (or those counted as doing so, see Section 2.1.1). This has then been extrapolated for each month, from April to mid-September, based on the total flying time available and the proportion of observation hours to give monthly sub-totals of birds flying through the risk window; these figures for 2018 and 2019 are shown in Table B.1 and Table B.2, respectively.

Table B.1 Extrapolation of observed risk for 2018 for the 15 – 150 m recording height band

a	b	c	d	e	f	g	h
Month	**Average day length (hh:mm)**	**Twilight time allowed per day (hh:mm)**	**No. days**	**Available flying hours for divers (b+c) x d**	**VP hours**	**No. passes through risk window**	**Extrapolated no. passes through risk window**
April	14:29	1:30	30	479.5	6.0	1	80
May	16:56	1:30	31	571.4	6.0	6	571
June	18:21	1:30	30	595.5	6.0	5.5	546
July	17:42	1:30	31	595.2	9.0	4	265
August	15:29	1:30	31	526.5	9.0	6	351
September	13:29	1:30	15	224.8	3.0	0	0
						Sum of monthly totals	**1,813**
			Single seasonal extrapolation	2,992.9	39.0	22.5	1,727

Table B.2 Extrapolation of observed risk for 2019 for the 15 – 150 m recording height band

a	b	c	d	e	f	g	h
Month	**Average day length (hh:mm)**	**Twilight time allowed per day (hh:mm)**	**No. days**	**Available flying hours for divers (b+c) x d**	**VP hours**	**No. passes through risk window**	**Extrapolated no. passes through risk window**
April	14:29	1:30	30	479.5	9.0	0	0
May	16:56	1:30	31	571.4	12.0	8	381
June	18:21	1:30	30	595.5	15.0	32	1,270
July	17:42	1:30	31	595.2	14.13	21	885
August	15:29	1:30	31	526.5	15.88	20.75	688
September	13:29	1:30	15	224.8	3.0	0	0
						Sum of monthly totals	**3,224**
			Single seasonal extrapolation	2,992.9	69.0	81.75	3,546

It is the monthly stratified totals which are used in the risk calculations below, although the variation in watch hours and the spread of observations meant that a single seasonal calculation would have been lower in 2018 (by about 5 %) and higher in 2019 (by about 10 %).

B.3 CALCULATION OF COLLISION RISK

The workings of the collision risk calculations for the risk window are shown in Table B.3.

The extrapolated numbers of passes through the risk window at the 15 – 150 m recording height band for 2018 and 2019 are given in Table B.1 and Table B.2 respectively. From these, the sum of the monthly figures is taken to represent each year. The calculation of the number of passes through the rotors assumes an even distribution of activity across the risk window; it is arrived at simply by applying the proportion of the total rotor area for six turbines to the overall area of the risk window.

A turbine operational efficiency factor of 85 % has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 5.9 %. (Table B.4).

The accepted avoidance rate for red-throated diver has then been applied; this is 99.5 % (SNH, 2018a).

Table B.3 Red-throated diver collision risk estimates for the Proposed Development by number of birds through the risk window

Ref.		2018 15–150 m	2019 15–150 m
a	Width of risk window	1,550 m	1,550 m
b	Height of risk band	15–150 m = 135 m	15–150 m = 135 m
c	Area of risk window (a x b)	209,250 m^2	209,250 m^2
d	Rotor diameter	136 m	136 m
e	Rotor depth (maximum)	4.2 m	4.2 m
f	Bird length	0.61 m	0.61 m
g	Effective rotor depth (e + f)	4.81 m	4.81 m
h	Rotor area ($[d/2]^2$ x pi)	14,529 m^2	14,529 m^2

Ref.		2018 15–150 m	2019 15–150 m
i	Total rotor area for 6 turbines (h x 6)	87,174 m^2	87,174 m^2
j	Rotor area as a proportion of risk window (j/c)	0.4166	0.4166
k	Total extrapolated number of divers at risk (from Table B.1 and Table B.2).	1,813	3,224
m	Number passing through the rotor area (k x j)	755	1,343
n	No. passes through rotors at 85 % operational efficiency (m x 0.85)	642	1,141
p	No. passes expected to collide at Band Model % of 5.9 (n x 0.059)	37.9	67.3
q	**Number of collisions at 99.5% avoidance rate (p x 0.005)**	**0.19**	**0.34**

Table B.4 Band model percentage calculation for red-throated diver (the probability of collision for a single rotor transit)

						Upwind:		Downwind:	
NoBlades	3								
MaxChord	4.20	m	r/R	c/C	α	collide		collide	
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)	length	p(collision)
Species name	Red-throated Diver		0.00				1.000		1.000
BirdLength	0.61	m	0.05	0.73	4.45	18.90	0.597	17.31	0.547
Wingspan	1.11	m	0.10	0.79	2.22	10.45	0.330	8.74	0.276
F: flapping (0) or gliding (+1)	0		0.15	0.88	1.48	7.89	0.249	5.98	0.189
Proportion of flights upwind	50%	%	0.20	0.96	1.11	6.61	0.209	4.52	0.143
Bird speed	19	m/sec	0.25	1.00	0.89	5.68	0.179	3.51	0.111
Rotor Radius	68	m	0.30	0.98	0.74	4.83	0.153	2.70	0.085
Rotation Speed	12	rpm	0.35	0.92	0.64	4.08	0.129	2.08	0.066
Rotation Period	5.00	sec	0.40	0.85	0.56	3.46	0.109	1.61	0.051
			0.45	0.80	0.49	3.08	0.097	1.34	0.042
			0.50	0.75	0.44	2.78	0.088	1.15	0.036
Bird aspect ratio: β	0.55		0.55	0.70	0.40	2.52	0.080	1.00	0.031
			0.60	0.64	0.37	2.27	0.072	0.88	0.028
Integration interval	0.05		0.65	0.58	0.34	2.05	0.065	0.78	0.025
			0.70	0.52	0.32	1.85	0.058	0.71	0.023
			0.75	0.47	0.30	1.69	0.053	0.66	0.021
			0.80	0.41	0.28	1.52	0.048	0.63	0.020
			0.85	0.37	0.26	1.40	0.044	0.62	0.020
			0.90	0.30	0.25	1.24	0.039	0.64	0.020
			0.95	0.24	0.23	1.10	0.035	0.64	0.020
			1.00	0.00	0.22	0.61	0.019	0.61	0.019

Overall p(collision) integrated over disk

Proportion upwind:	downwind
50%	50%

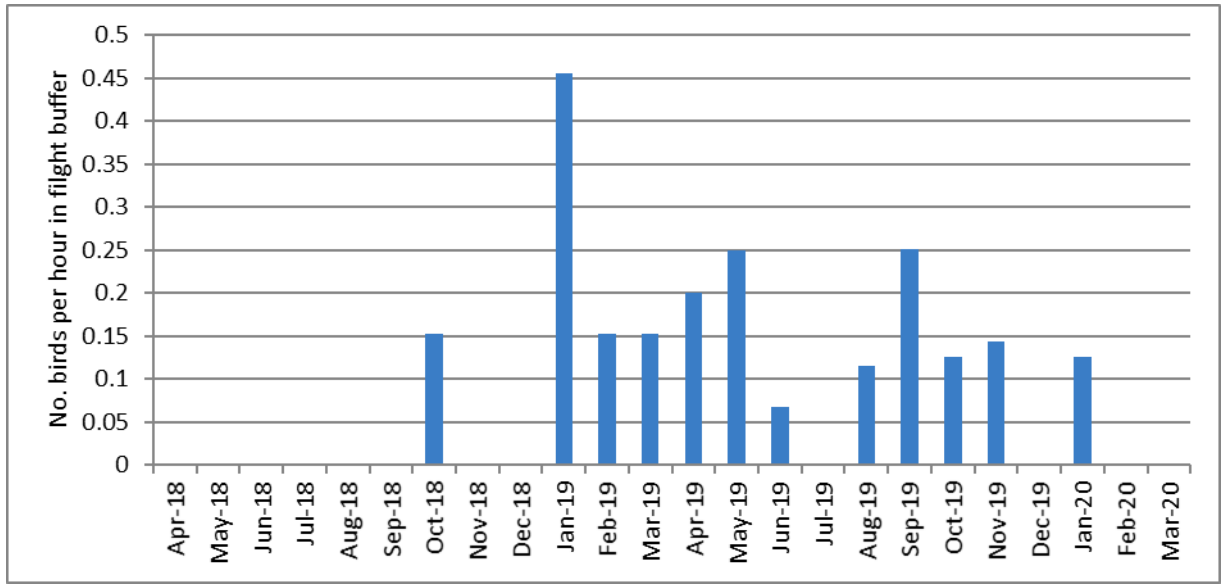
Upwind	**7.7%**	**Downwind**	**4.1%**
Average	**5.9%**		

APPENDIX C PEREGRINE COLLISION RISK WORKINGS

This appendix presents a description of the collision risk calculations undertaken for peregrine. Full details of the peregrine flight activity data for each year used in these calculations are shown in Appendix 7.1 Ornithology Technical Report. The 'Birds using the windfarm airspace' model is the most appropriate for peregrine.

Figure C.1 shows the number of birds per hour within the flight buffer in each month of survey, from April 2018 to March 2020. Monthly rates of sightings were low (zero to three each month) with numerous gaps and no obvious seasonal pattern. The only age class confirmed from VP watches was adult, for which there were six birds out of the 23 seen in total across all parts of the survey area. All of the other birds were unaged, but likely to have included some young birds in their first year.

Figure C.1 Peregrine: birds-per-hour within the flight buffer area for each month of the two-year survey period (all age classes combined)



C.1 EXTRAPOLATION OF DATA

C.1.1 Effective hours watched across the wind farm buffer

The peregrine flights at risk were often rapidly transiting across the survey area at some height. This means that peregrines would have been harder to pick up than hen harriers, particularly since they are less bulky and usually lighter coloured beneath, and the effective coverage from the VPs would have been lower. The coverage assumed is therefore out

to 2 km only from either VP. In addition, four flights found already at risk height within the wind farm buffer have had time extensions of 30, 45, 60 and 75 seconds added to account for missed portions of flight lines.

The wind farm buffer straddles the 2 km viewing arcs from the two VPs and the basic measurement of coverage from each VP is taken as the proportion of the wind farm buffer within 2 km that overlapped with the viewshed at 15 m above ground. Because VP1 was shifted eastwards between years, its coverage of the final wind farm buffer was greater in the second survey year:

VP1, year 1 – 58.5 % coverage at 15 m above ground
VP1, year 2 – 81.5 % coverage at 15 m above ground
VP3, both years – 51.3 % coverage at 15 m above ground

The coverage from each VP for each month is tabulated below (see Table C.1).

Where both VPs were manned simultaneously for a three-hour watch, the effective observation hours were capped at three hours, which occurred for most of the 2019 breeding season and for occasional watches in the 2019/20 non-breeding season.

Table C.1 Effective coverage of the wind farm buffer for peregrine from each VP at the 15 – 150 m height band

Month	VP1 observation time (hrs)	Multiplier < 2 km	Effective VP1 hours	VP3 observation time (hrs)	Multiplier < 2 km	Effective VP3 hours	TOTAL effective hrs from both VPs[4]
Mar-18	6	0.585	3.51	6	0.513	3.08	6.59
Apr-18	6	0.585	3.51	6	0.513	3.08	6.59
May-18	6	0.585	3.51	6	0.513	3.08	6.59
Jun-18	9	0.585	5.27	9	0.513	4.62	9.89
Jul-18	9	0.585	5.27	9	0.513	4.62	9.89
Aug-18	6	0.585	3.51	6	0.513	3.08	6.59
Sep-18	6	0.585	3.51	6	0.513	3.08	6.59
Oct-18	6	0.585	3.51	6	0.513	3.08	6.59
Nov-18	6	0.585	3.51	6	0.513	3.08	6.59

[4] 'cap' means some or all watches capped at 3 hours when being manned simultaneously from both VPs.

Month	VP1 observation time (hrs)	Multiplier < 2 km	Effective VP1 hours	VP3 observation time (hrs)	Multiplier < 2 km	Effective VP3 hours	TOTAL effective hrs from both VPs[4]
Dec-18	6	0.585	3.51	6	0.513	3.08	6.59
Jan-19	6	0.585	3.51	6	0.513	3.08	6.59
Feb-19	6	0.585	3.51	6	0.513	3.08	6.59
Mar-19	6	0.585	3.51	6	0.513	3.08	6.59
Apr-19	9	0.815	7.34	9	0.513	4.62	9.98 (cap)
May-19	12	0.815	9.78	12	0.513	6.16	12.00 (cap)
Jun-19	15	0.815	12.23	15	0.513	7.70	15.00 (cap)
Jul-19	13.25	0.815	10.80	15	0.513	7.70	14.56 (cap)
Aug-19	16.75	0.815	13.65	15	0.513	7.70	17.41 (cap)
Sep-19	6	0.815	4.89	6	0.513	3.08	7.97
Oct-19	6	0.815	4.89	6	0.513	3.08	7.97
Nov-19	6	0.815	4.89	6	0.513	3.08	6.98 (cap)
Dec-19	6	0.815	4.89	6	0.513	3.08	7.97
Jan-20	6	0.815	4.89	6	0.513	3.08	7.97
Feb-20	6	0.815	4.89	6	0.513	3.08	7.97
Mar-20	6	0.815	4.89	6	0.513	3.08	6.98 (cap)
	186		**133.67**	**186**		**95.48**	**208.44**

C.1.2 Extrapolations from observations to a full year

An estimate of the bird occupancy within the flight risk volume is required as an input for this model. The details of each peregrine flight line for 2018/19 and 2019/20, showing the observed times at each height band estimated within the wind farm buffer are shown in Appendix 7.1 Ornithology Technical Report. Bird occupancy has been calculated based on the observed flight time at risk within the whole risk height band. These values have then been extrapolated for each month, and on an annual basis, using the total flying time available and the total effective observation hours (Table C.1). Because of the number of zero months, the single annual calculation is taken as the better representative figure for yearly risk.

Bird occupancy for the 15 – 150 m height band for the 2019 (and partial 2020) breeding season is shown in Table C.2.

Table C.2 Extrapolation of observed risk for the 15 – 150 m recording height band

a	b	c	d	e
Month	**Available flying hours for peregrines (at 58.8˚latitude per Band, 2012)**	**Effective VP hours**	**Seconds observed at risk within the wind farm buffer**	**Extrapolated time at-risk (seconds) (d x b/c)**
March	365	13.57	0	0
April	432	16.57	132	3,441
May	522	18.59	228	6,402
June	549	21.59	15	381
July	547	24.44	0	0
August	480	27.29	0	0
September	387	14.56	195	5,183
October	319	14.56	0	0
November	236	13.57	0	0
December	198	14.56	0	0
January	220	14.56	50	755
February	258	14.56	26	461
			Sum of monthly totals	**16,623**
Single, pooled annual calculation	**4,513**	**208.42**	**646**	**13,988**

C.1.3 Calculation of collision risk

The full workings of the peregrine collision risk calculation for the wind farm buffer area (all data pooled into a single annual calculation) is shown in Table C.3. The total extrapolated flight times for the wind farm buffer area for the 15 – 150 m height band (Table C.2) have been used to derive values of bird occupancy of the rotor swept volume. Applying an average flight speed (12 metres per second for peregrine) gives the flight length through the rotor swept volume and dividing by the effective rotor depth (maximum blade depth plus bird length) gives the number of passes through the rotors.

A turbine operational efficiency factor of 85 % has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 6.4 % (Table C.4).

The accepted avoidance rate for peregrine has then been applied; this is 98 % (SNH, 2018a).

Table C.3 Peregrine collision risk estimate for the Proposed Development by timed flights across the wind farm buffer area– all data pooled into a single annual calculation

Ref.		Whole year (single annual calculation)
a	Ground area of wind farm buffer	1.3763 km^2 or 1.3763 x 10^6 m^2
b	Height of risk band	15–150 m = 135 m
c	Volume of wind farm buffer (a x b)	1.8508 x 10^8 m^3
d	Rotor diameter	136 m
e	Rotor depth (maximum)	4.2 m
f	Bird length	0.42 m
g	Effective rotor depth (e + f)	4.62 m
h	Effective rotor volume per turbine ($[d/2]^2$ x pi x g)	6.7124 x 10^4 m^3
i	Total rotor volume for 6 turbines (h x 6)	4.0274 x 10^5 m^3
j	Rotor volume as a proportion of flight buffer (j/c)	0.002176
k	Total extrapolated time for peregrines at risk (from Table C.2)	13,988 secs
m	Time within rotor volume (k x j)	30.4 secs
n	Equivalent flight length within rotor volume at 12 m/sec (m x 12)	365 m

Ref.		Whole year (single annual calculation)
p	No. passes through rotors (n/g)	79
q	No. passes through rotors at 85 % operational efficiency (p x 0.85)	67.1
r	No. passes expected to collide at Band Model % of 6.4 % (q x 0.064)	4.29
s	**Number of collisions at 98 % avoidance rate (r x 0.02)**	**0.09**

Table C.4 Band model percentage calculation for peregrine (the probability of collision for a single rotor transit)

			Calculation of alpha and p(collision) as a function of radius								
NoBlades	3					**Upwind:**			**Downwind:**	
MaxChord	4.20	m	r/R	c/C	α	collide			collide	
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)		length	p(collision)
Species name	Peregrine		0.00				1.000			1.000
BirdLength	0.42	m	0.05	0.73	2.81	12.00	0.600		10.42	0.521
Wingspan	1.03	m	0.10	0.79	1.40	6.81	0.340		5.09	0.254
F: flapping (0) or gliding (+1)	0		0.15	0.88	0.94	5.26	0.263		3.35	0.168
Proportion of flights upwind	50%	%	0.20	0.96	0.70	4.50	0.225		2.41	0.121
Bird speed	12	m/sec	0.25	1.00	0.56	3.94	0.197		1.77	0.089
Rotor Radius	68	m	0.30	0.98	0.47	3.41	0.170		1.28	0.064
Rotation Speed	12	rpm	0.35	0.92	0.40	2.92	0.146		0.92	0.046
Rotation Period	5.00	sec	0.40	0.85	0.35	2.55	0.128		0.71	0.035
			0.45	0.80	0.31	2.30	0.115		0.56	0.028
			0.50	0.75	0.28	2.09	0.104		0.46	0.023
Bird aspect ratio: β	0.41		0.55	0.70	0.26	1.91	0.095		0.46	0.023
			0.60	0.64	0.23	1.72	0.086		0.51	0.025
Integration interval	0.05		0.65	0.58	0.22	1.56	0.078		0.54	0.027
			0.70	0.52	0.20	1.41	0.070		0.56	0.028
			0.75	0.47	0.19	1.29	0.064		0.57	0.029
			0.80	0.41	0.18	1.16	0.058		0.57	0.029
			0.85	0.37	0.17	1.07	0.054		0.57	0.029
			0.90	0.30	0.16	0.94	0.047		0.56	0.028
			0.95	0.24	0.15	0.82	0.041		0.54	0.027
			1.00	0.00	0.14	0.42	0.021		0.42	0.021

Overall p(collision) integrated over disk

		Upwind	**8.9%**	**Downwind** **3.9%**
Proportion upwind:	downwind			
50%	50%	**Average**	**6.4%**	

APPENDIX D HEN HARRIER COLLISION RISK WORKINGS

This appendix presents a description of the collision risk calculations undertaken for hen harrier. The accompanying spreadsheet 'Annex 2 Hen Harrier Data' provides full details of the hen harrier flight activity data for each year used in these calculations. The 'Birds using the windfarm airspace' model is the most appropriate for hen harrier.

The calculations of collision risk for the breeding season period (April to August) presented here for 2018 and 2019 separately represent the bulk of the collision risk for each full year. There were only two hen harrier flights recorded at risk height during the first non-breeding season (September 2018 to March 2019). Both of these flight lines were well away from the final wind farm buffer and therefore did not generate any calculated risk. There were twelve flights at risk height in the 2019/20 non-breeding season, several of which were partly within the final wind farm buffer, generating some risk.

The extrapolations to full seasons are shown in Table D.2 and Table D.3 below, carried out monthly to allow for the variable daylight hours and variable VP watch times, and also presented as a single seasonal calculation. The breeding season extrapolation for each year is taken as the sum of the monthly extrapolations but, given the number of months with zero observed flight at risk, the combined non-breeding season is based on a single seasonal calculation.

D.1 EXTRAPOLATION OF DATA

D.1.1 Effective hours watched across the wind farm buffer

The hen harrier flights at risk were often slow, circling or gliding within a confined part of the survey area, and at relatively low levels compared to the red-throated diver flights that transited right across both VP viewing areas at considerable height. This made the hen harriers relatively easy to pick up and it follows that the detection rates were substantially higher for this species than for red-throated divers. No adjustments to flight times for missed portions of hen harrier flights within the survey area have been made.

Based on the observed flights at risk within the wind farm buffer from VP3 at distances up to 2.5 km from the VP, an adjustment has been made in the calculation to allow for this additional coverage in visibility as detailed below. No flights at risk were seen from VP1 in the wind farm buffer beyond 2 km, even though coverage would have extended there to some extent, particularly when viewing up to the top of the eastern end of the Wee Fea ridge in 2018. However, no additional coverage in visibility is assumed in the workings here.

The calculation of effective coverage of the wind farm buffer area is shown in Table D.1. The effective observation time across the wind farm area each month was calculated as the sum of the observation time from each VP multiplied by the proportion of the wind farm buffer visible from that VP (within a 2 km cut-off viewing distance from each VP and with an additional viewing distance of 2 km – 2.5 km for VP3 only).

The wind farm buffer straddles the 2 km viewing arcs from the two VPs and the basic measurement of VP coverage is taken as the proportion of the wind farm buffer within 2 km that overlapped with the viewshed at 15 m above ground. Because VP1 was shifted eastwards between years, its coverage of the final wind farm buffer was greater in the second survey year:

- VP1, year 1 – 58.5 % coverage at 15 m above ground
- VP1, year 2 – 81.5 % coverage at 15 m above ground
- VP3, both years – 51.3 % coverage at 15 m above ground

The view from VP3 was up along the valley of the Burn of Ore, framed by the summits of Binga Fea and the east end of Wee Fea, both of which lay at 2 km - 2.5 km from the VP. The eye of the observer was therefore easily drawn out beyond 2 km and it was clear that watches from VP3 detected a considerable amount of hen harrier flight at risk height beyond the 2 km cut-off, much of which was within the wind farm buffer. If these flights were simply excluded the calculated risk would be reduced by about 45 %, which is too much either to be excluded completely, or to be included without acknowledging the effective VP3 coverage beyond 2 km. In order not to ignore this substantial element of at-risk flight, the coverage from VP3 was extended out to 2.5 km, estimated as follows:

The at-risk flight lengths from VP3 within the wind farm buffer were attributed between those less than 2 km from the VP and those at 2.0 km - 2.5 km. Measurement of most of the flight segments was made by GIS with some estimation by direct measurement on the flight maps.

- The basic VP3 coverage of the wind farm buffer, out to 2 km was: 709,564 m^2 at 15 m above ground, from 745,323 m^2 ground area in total i.e. 95 %. The observed flight length at risk height here (across the whole survey period) was 17,262 m; applying the basic coverage of 95 % gives the total at-risk flight out to 2 km of 18,170 m.
- The additional coverage out to 2.5 km can be estimated relative to the basic coverage, assuming uniform at-risk flight distribution across the whole wind farm buffer. This appears reasonable, since the buffer is compact and relatively small.
- The wind farm buffer proportion within 2 km is 0.54; 95 % coverage gives a total expected at-risk flight of 18,170 m.
- The wind farm buffer proportion at 2.0 km – 2.5 km is 0.38; this implies a total of at-risk flight of 18,170 x 0.38/0.54 = 12,786 m; the actual flight observed of 10,743 m implies 84 % coverage – this has been rounded down to 80 %, implying that four times more flight has been missed here than within 2 km.
- The wind farm buffer proportion at over 2.5 km is 0.08; zero coverage is assumed here.

The coverage from each VP for each season is tabulated below, indicating the additional VP3 cover as 0.304, being the area proportion of 0.38 x 80 %.

The additional coverage from VP3 is not applicable when both the VPs were being manned together, indeed during these watches the VP hours are capped at the actual number of watch hours. This occurred for most of the 2019 breeding season and for occasional watches in the 2019/20 non-breeding season.

Table D.1 Effective coverage of the wind farm buffer for hen harrier from each VP at the 15 – 150 m height band

Month	VP1 observation time (hrs)	Multiplier < 2 km	Effective VP1 hours	VP3 observation time (hrs)	Multiplier < 2 km	Multiplier (2 km – 2.5 km)	Overall	Effective VP3 hours	TOTAL effective hrs from both VPs[5]
Apr-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
May-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Jun-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Jul-18	9	0.585	5.27	9	0.513	0.304	0.817	7.35	12.62
Aug-18	9	0.585	5.27	9	0.513	0.304	0.817	7.35	12.62
			21.06					29.41	50.47
Sep-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Oct-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Nov-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Dec-18	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Jan-19	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Feb-19	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
Mar-19	6	0.585	3.51	6	0.513	0.304	0.817	4.90	8.41
			24.57					34.31	58.88
Apr-19	9	0.815	7.34	9	0.513	0.152	0.665	5.99	10.44 (cap)
May-19	12	0.815	9.78	12	0.513	0	0.513	6.16	12.00 (cap)
Jun-19	15	0.815	12.23	15	0.513	0	0.513	7.70	15.00 (cap)
Jul-19	13.25	0.815	10.80	15	0.513	0.061	0.574	8.61	15.47 (cap)

[5] 'cap' means some or all watches capped at 3 hours when being manned simultaneously from both VPs.

Month	VP1 observation time (hrs)	Multiplier < 2 km	Effective VP1 hours	VP3 observation time (hrs)	Multiplier < 2 km	Multiplier (2 km – 2.5 km)	Overall	Effective VP3 hours	TOTAL effective hrs from both VPs[5]
Aug-19	16.75	0.815	13.65	15	0.513	0.061	0.574	8.61	18.32 (cap)
			53.79					37.06	71.23
Sep-19	6	0.815	4.89	6	0.513	0.304	0.817	4.90	9.79
Oct-19	6	0.815	4.89	6	0.513	0.304	0.817	4.90	9.79
Nov-19	6	0.815	4.89	6	0.513	0.152	0.665	3.99	7.90 (cap)
Dec-19	6	0.815	4.89	6	0.513	0.304	0.817	4.90	9.79
Jan-20	6	0.815	4.89	6	0.513	0.304	0.817	4.90	9.79
Feb-20	6	0.815	4.89	6	0.513	0.304	0.817	4.90	9.79
Mar-20	6	0.815	4.89	6	0.513	0.152	0.665	3.99	7.90 (cap)
			34.23					32.49	64.75

D.1.2 Extrapolations from observations to a full year

An estimate of the bird occupancy within the flight risk volume is required as an input for this model. 'Annex 2 Hen Harrier Data' presents the details of each hen harrier flight line for 2018/19 and 2019/20, showing the observed times at each height band within the flight buffer areas. Bird occupancy has been calculated based on the observed flight time at risk within the whole risk height band. These observed values have been extrapolated for each month based on the total flying time available and the total effective observation hours (Table D.1) to give a total sum of monthly flight time within the risk height band. The extrapolations are shown for April to August 2018 in Table D.2; for April 2019 to August 2019 in Table D.3 and for the pooled non-breeding season from September to March, in Table D.4.

The time at risk height within the wind farm buffer was calculated for each flight line using GIS, by comparing the length of the drawn flight paths at risk height within the whole flight buffer to its clipped length within the wind farm buffer. The overall time at risk height for each flight, as recorded in the field, was then attributed to the wind farm buffer in proportion to the flight length within it. To verify that this approach was supported by the data, checks were made of the apparent flight speeds resulting from the GIS distance measurements and the times recorded in the field. There was considerable variation when looking at individual flights, no doubt related to real differences in speed and also to inaccuracies in drawing flight paths. However, the overall credibility was looked at in two different ways:

- Taking the overall distance of the clipped flights at greater than 20 m or 15 m above ground within the flight buffers for the 2018 and 2019 breeding seasons and the 2019/20 non-breeding season and comparing to the overall times recorded within the flight buffers – this gave 135,648 m timed at 15,020 seconds, giving an average flight speed of 9.0 ms^{-1}.
- Taking the subset of flights occurring at more than 20 m or 15 m inside the wind farm buffer from the same time periods and taking a straight average of their apparent flight speeds – this gave an average of 10.7 ms^{-1} from 36 flights.

The above figures lie close on either side of the assumed flight speed at risk height for a hen harrier of 10 ms^{-1} and therefore allow for confidence in both the field recordings and the approach taken.

An uplift of 6 % has been applied to the 2018 breeding season data to account for flights at 15 – 20 m above ground. Analysis of the detection heights at 0 – 20 m in 2019, from April to August, shows that of those flights at 20 m or less, a maximum of 9.2 % were in the height band 15 – 20 m. Rounding this up to 10 % and applying to the 0 – 20 m height band in the 2018 breeding season gives a figure for the missing 15 – 20 m birds as: 2,215 seconds observed x 0.1 = 222 additional seconds at risk. This was tested by comparing the overall time at 15 – 150 m per hour between the 2018 and 2019 breeding seasons: these were 7,515/66 = 114 in 2019, and (3,815 + 222)/36 = 112 in 2018. The closeness of these figures implies that there is no remaining substantial underestimation of risk, particularly since there was an additional breeding female present within the survey area during the early part of the 2019 season. This additional 222 seconds at risk is equivalent to 5.8 % (rounded up to 6 %) of the recorded time at 20 – 150 m in the 2018 breeding season.

Table D.2 Extrapolation of observed risk for the 2018 breeding season for the 15 – 150 m recording height band

a	b	c	d	e
Month	**Available flying hours for hen harriers (at 58.8˚latitude per Band, 2012)**	**Effective VP hours**	**Seconds observed at risk (20 – 150 m) within the wind farm buffer**	**Extrapolated time at-risk (15-150m) (seconds) (d x b/c) x 1.06* *(to allow for flight at 15 - 20 m)**
April	432	8.41	147	8,004
May	522	8.41	0	0
June	549	8.41	158	10,933
July	547	12.62	371	17,045
August	480	12.62	135	5,443
			Sum of monthly totals	**41,425**
Single breeding season calculation	**2,530**	**50.47**	**811**	**43,094**

Table D.3 Extrapolation of observed risk for the 2019 breeding season for the 15 – 150 m recording height band

a	b	c	d	e
Month	**Available flying hours for hen harriers (at 58.8˚latitude per Band, 2012)**	**Effective VP hours**	**Seconds observed at risk within the wind farm buffer**	**Extrapolated time at-risk (seconds) (d x b/c)**
April	432	10.44	343	14,193
May	522	12.00	135	5,872
June	549	15.00	759	27,779
July	547	15.47	857	30,302
August	480	18.32	252	6,603
			Sum of monthly totals	**84,749**
Single breeding season calculation	**2,530**	**71.23**	**2,346**	**83,327**

Table D.4 Extrapolation of observed risk for the pooled non-breeding seasons for the 15 – 150 m recording height band

a	b	c	d	e
Month	**Available flying hours for hen harriers (at 58.8˚latitude per Band, 2012)**	**Effective VP hours**	**Seconds observed at risk within the wind farm buffer**	**Extrapolated time at-risk (seconds) (d x b/c)**
September	387	18.20	10	213
October	319	18.20	629	11,025
November	236	16.31	0	0
December	198	18.20	94	1,023
January	220	18.20	0	0
February	258	18.20	0	0
March	365	16.31	316	7,072
			Sum of monthly totals	**19,333**
Single non-breeding season calculation	**1,983**	**123.62**	**1,049**	**16,827**

It is the monthly stratified totals which are used in the breeding season collision risk calculations below and the single seasonal calculation for the non-breeding season (because of the number of months with zero observed risk).

D.2 CALCULATION OF COLLISION RISK

The full workings of the hen harrier collision risk calculations for the wind farm buffer area for the 15 – 150 m height band for each season are shown in Table D.5. The monthly total extrapolated flight times for the wind farm buffer area for the 15 – 150 m height band (Table D.2 and Table D.3) have been used to derive values of bird occupancy of the rotor swept volume in each breeding season. For the pooled non-breeding season, there were many fewer observations at risk and the single seasonal extrapolation in Table D.4 is used. Applying an average flight speed (10 metres per second for hen harrier) gives the flight length through the rotor swept volume and dividing by the effective rotor depth (maximum blade depth plus bird length) gives the number of passes through the rotors.

A turbine operational efficiency factor of 85% has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 7.5 % (Table D.6).

The accepted avoidance rate for hen harrier has then been applied; this is 99 % (SNH, 2018a).

Table D.5 Hen harrier collision risk estimates for the Proposed Development by timed flights across the wind farm buffer area

Ref.		2018 breeding season 15–150 m	2019 breeding season 15–150 m	Pooled non-breeding seasons 15 – 150 m
a	Ground area of wind farm buffer	1.3763 km^2 or 1.3763 x 10^6 m^2	1.3763 km^2 or 1.3763 x 10^6 m^2	1.3763 km^2 or 1.3763 x 10^6 m^2
b	Height of risk band	15–150 m = 135 m	15–150 m = 135 m	15–150 m = 135 m
c	Volume of wind farm buffer (a x b)	1.8508 x 10^8 m^3	1.8508 x 10^8 m^3	1.8508 x 10^8 m^3
d	Rotor diameter	136 m	136 m	136 m
e	Rotor depth (maximum)	4.2 m	4.2 m	4.2 m
f	Bird length	0.48 m	0.48 m	0.48 m
g	Effective rotor depth (e + f)	4.68 m	4.68 m	4.68 m

Ref.		2018 breeding season 15–150 m	2019 breeding season 15–150 m	Pooled non-breeding seasons 15 – 150 m
h	Effective rotor volume per turbine ($[d/2]^2$ x pi x g)	6.7996 x 10^4 m^3	6.7996 x 10^4 m^3	6.7996 x 10^4 m^3
i	Total rotor volume for 6 turbines (h x 6)	4.0797 x 10^5 m^3	4.0797 x 10^5 m^3	4.0797 x 10^5 m^3
j	Rotor volume as a proportion of flight buffer (j/c)	0.002196	0.002196	0.002196
k	Total extrapolated time for hen harriers at risk (from Table D.2, Table D.3 and Table D.4)	41,425 secs	84,749 secs	16,827 secs
m	Time within rotor volume (k x j)	91 secs	186 secs	37 secs
n	Equivalent flight length within rotor volume at 10 m/sec (m x 10)	910 m	1,861 m	370 m
p	No. passes through rotors (n/g)	194	398	79
q	No. passes through rotors at 85% operational efficiency (p x 0.85)	165	338	67
r	No. passes expected to collide at Band Model % of 7.5 % (q x 0.075)	12.4	25.4	5.04
s	**Number of collisions at 99 % avoidance rate (r x 0.01)**	**0.124**	**0.254**	**0.050**

Table D.6 Band model percentage calculation for hen harrier (the probability of collision for a single rotor transit)

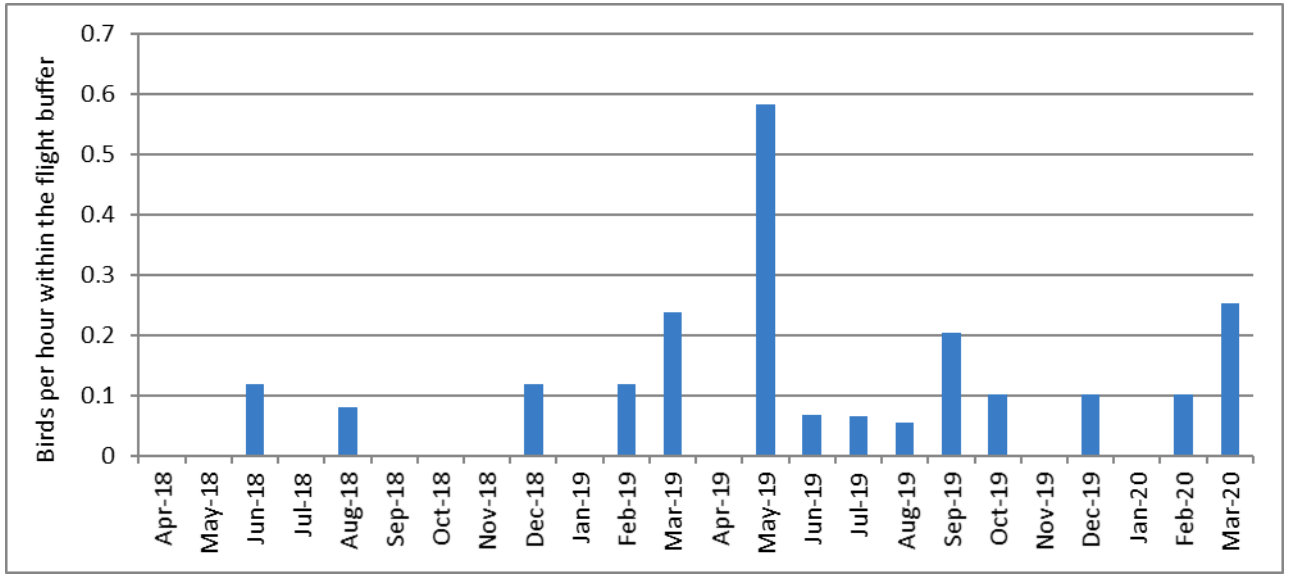
			Calculation of alpha and p(collision) as a function of radius							
NoBlades	3					Upwind:			Downwind:	
MaxChord	4.20	m	r/R	c/C	α	collide			collide	
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)		length	p(collision)
Species name	Hen Harrier		0.00				1.000			1.000
BirdLength	0.48	m	0.05	0.73	2.34	10.30	0.618		8.71	0.523
Wingspan	1.10	m	0.10	0.79	1.17	5.90	0.354		4.18	0.251
F: flapping (0) or gliding (+1)	0		0.15	0.88	0.78	4.60	0.276		2.69	0.161
Proportion of flights upwind	50%	%	0.20	0.96	0.59	3.97	0.238		1.88	0.113
Bird speed	10	m/sec	0.25	1.00	0.47	3.50	0.210		1.33	0.080
Rotor Radius	68	m	0.30	0.98	0.39	3.10	0.186		0.97	0.058
Rotation Speed	12	rpm	0.35	0.92	0.33	2.73	0.164		0.73	0.044
Rotation Period	5.00	sec	0.40	0.85	0.29	2.41	0.145		0.56	0.034
			0.45	0.80	0.26	2.19	0.132		0.51	0.030
			0.50	0.75	0.23	2.01	0.120		0.58	0.035
Bird aspect ratio: β	0.44		0.55	0.70	0.21	1.85	0.111		0.64	0.038
			0.60	0.64	0.20	1.68	0.101		0.67	0.040
Integration interval	0.05		0.65	0.58	0.18	1.53	0.092		0.69	0.041
			0.70	0.52	0.17	1.40	0.084		0.69	0.042
			0.75	0.47	0.16	1.29	0.077		0.69	0.042
			0.80	0.41	0.15	1.17	0.070		0.68	0.041
			0.85	0.37	0.14	1.09	0.065		0.68	0.041
			0.90	0.30	0.13	0.96	0.058		0.65	0.039
			0.95	0.24	0.12	0.86	0.052		0.62	0.037
			1.00	0.00	0.12	0.48	0.029		0.48	0.029
			Overall p(collision) integrated over disk							
						Upwind	10.2%		Downwind	4.8%
		Proportion	upwind:	downwind						
			50%	50%			Average	7.5%		

APPENDIX E WHITE-TAILED EAGLE COLLISION RISK WORKINGS

This appendix presents a description of the collision risk calculations undertaken for white-tailed eagle. Full details of the white-tailed eagle flight activity data for each year used in these calculations is shown in Appendix 7.1 Ornithology Technical Report. The 'Birds using the windfarm airspace' model is the most appropriate for this species.

Figure E.1 shows the number of birds per hour within the flight buffer in each month of survey, from April 2018 to March 2020. Apart from the spike in activity in May 2019, monthly rates of sightings were low, and the overall birds-per-hour figure was similar in each survey year. There were fewer birds in Year 1 (April 2018 to March 2019) than in Year 2, partly because of the lower hours watched from the VPs. On an hourly basis, white-tailed eagles were seen in the flight buffer in Year 1 at a rate of 0.07 birds per hour; in Year 2 (excluding the May spike) they were seen at 0.08 birds per hour.

Figure E.1 White-tailed eagle: birds-per-hour within the flight buffer area for each month of the two-year survey period (all age classes combined)



The age classes seen on Hoy were:

- adult (six years and older);
- sub-adult (one year to five years old); and
- juvenile (less than one year old i.e. birds in their first year).

There was one confirmed juvenile sighting in December 2018 and two further observations of wing-tagged immatures in March 2019 that may have been juveniles. Of the sub-adults that were seen well enough to be aged more precisely, all were two – three years olds. All young birds that were not confirmed as juveniles have been counted as sub-adults.

There was a distinct difference between years in the relative proportions of the different age groups, with adults as one out of six birds (17 %) in Year 1, and eight out of 17 (47 %) in Year 2. The adult proportion in Year 2 would increase to six out of 10 (60 %) if all birds in the May 2019 spike were excluded.

Such a difference in adult proportion each year is not expected from the known birds on Hoy, which was similar each year. In 2018 there was one breeding adult pair, fledging two young, with at least one sub-adult present. In 2019 there was one breeding adult pair, fledging one young with at least one sub-adult present. This disparity in the proportion of adults observed in the flight buffer area is likely to be due either to the random nature of the small samples, or possibly because additional, non-breeding adults were present at times from May 2019 onwards.

E.1 EXTRAPOLATION OF DATA

E.1.1 Effective hours watched across the wind farm buffer

For white-tailed eagle the effective VP hours are taken as the same as those for hen harrier (Table D.1 above), as explained in Section D.1.1.

E.1.2 Extrapolations from observations to a full year

An estimate of the bird occupancy within the flight risk volume is required as an input for this model. The details of each white-tailed eagle flight line for 2018/19 and 2019/20, showing the observed times at each height band estimated within the wind farm buffer are shown in Appendix 7.1 Ornithology Technical Report. Bird occupancy has been calculated based on the observed flight time at risk within the whole risk height band. These values have then been extrapolated on a seasonal basis, using the total flying time available and the total effective observation hours (Table D.1) from the two years of survey work. The breeding season is taken as February to August and the non-breeding season from September to January (SNH, 2017). Bird occupancy for the 15 – 150 m height band is shown in Table E.1.

The time at risk height within the wind farm buffer was calculated for each flight line using GIS, by comparing the length of the drawn flight paths at risk height within the whole flight buffer to its clipped length within the wind farm buffer. The overall time at risk height for each flight, as recorded in the field, was then attributed to the wind farm buffer in proportion to the flight length within it.

Calculations have been pooled for all age classes and for both survey years into two seasonal workings. This is due to the low number of flights at risk in the wind farm buffer across the two years (just five adults and four immatures) meaning that separate calculations for each individual year and age class would be subject to a large amount of random bias. There is some indication of an overall seasonal pattern to the activity within the flight buffer, coinciding with the breeding and non-breeding seasons (Figure E.2). This is more apparent for immatures than for adults, probably related to a tendency for young birds to wander widely in the spring. The pooled calculations are presented in Table E.1 below, with all of the seasonal observations at risk, for all age classes, and all the effective VP hours from across the two survey years, used in each season. By way of comparison, a single, pooled annual calculation results in an overall risk that is about 7 % lower than this seasonal approach.

Figure E.2 White-tailed eagle: birds per hour each month within the overall flight buffer

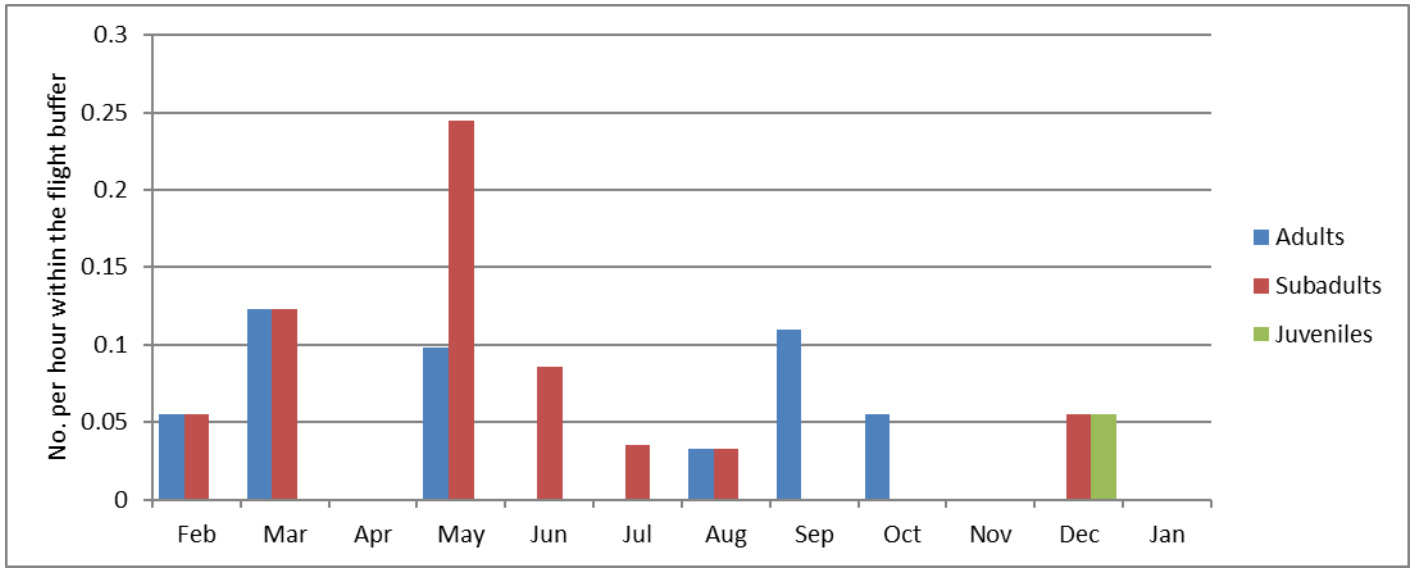


Table E.1 Extrapolation of all white-tailed eagle observed risk for both survey years combined for the 15 – 150 m recording height band

a	b	c	d	e
Month	Available flying hours for white-tailed eagle (at 58.8˚latitude per Band, 2012)	Effective VP hours	Seconds observed at risk within the wind farm buffer	Extrapolated time at-risk (seconds) (d x b/c)
February	258	18.20	133	1,885
March	365	16.31	422	9,444
April	432	18.85	0	0
May	522	20.41	314	8,031
June	549	23.41	85	1,993
July	547	28.09	0	0

a	b	c	d	e
Month	Available flying hours for white-tailed eagle (at 58.8° latitude per Band, 2012)	Effective VP hours	Seconds observed at risk within the wind farm buffer	Extrapolated time at-risk (seconds) (d x b/c)
August	480	30.94	0	0
Breeding season calculation (February to August)	**3,153**	**156.21**	**954**	**19,256**
September	387	18.2	92	1,956
October	319	18.2	0	0
November	236	16.31	0	0
December	198	18.2	0	0
January	220	18.2	0	0
Non-breeding season calculation (September to January)	**1,360**	**89.11**	**92**	**1,404**

E.2 CALCULATION OF COLLISION RISK

The full workings of the white-tailed eagle collision risk calculations for the wind farm buffer area for the 15 – 150 m height band for each season are shown in Table E.2. The total extrapolated flight times for the wind farm buffer area for the 15 – 150 m height band (Table E.1) have been used to derive values of bird occupancy of the rotor swept volume.

Applying an average flight speed gives the flight length through the rotor swept volume and dividing by the effective rotor depth (maximum blade depth plus bird length) gives the number of passes through the rotors.

Checks were made of the apparent flight speeds resulting from the GIS distance measurements and the times recorded in the field. There was some variation when looking at individual flights, no doubt related to real differences in speed and also to some inaccuracies in drawing flight paths. During the VP watches on Hoy in Year 2 (April 2019 to March 2020) there were 16 white-tailed eagle flights in the timed flight buffer, averaging 6.82 ms^{-1}; of these, the eight flights entering the wind farm buffer averaged 6.93 ms^{-1}. From the flight path maps it appeared that most flights were of birds gliding and sailing slowly over the slopes, or gliding across the Burn of Ore valley, so the measured flight speeds do

not appear unrealistic; therefore, a rounded figure of 7 ms^{-1} is used for white-tailed eagle in the calculations. This is in contrast with the flight speed value of 13.6 ms^{-1} for white-tailed eagle in Alerstam et al. (2007), which is based on birds in continuous flapping flight, from just two flight measurements. As stated in SNH guidance (SNH, 2014) "*A slower (or faster) flight speed may be used where there is good empirical evidence from the VP watches that a particular type of flight behaviour (e.g. foraging flight) predominates over other flight behaviours*." The VP observations here provide evidence that the majority of birds near the Proposed Development were not in level flapping flight, and most were presumably foraging as they flew more slowly above the site. Gliding flight predominated over flapping for this species, and the flight mode is set as 'gliding' in its Band Model Percentage calculation table (Table E.3).

A turbine operational efficiency factor of 85 % has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 12.5 % (Table E.3).

The accepted avoidance rate for white-tailed eagle has then been applied; this is 95 % (SNH, 2018a).

Table E.2 White-tailed eagle collision risk estimates for the Proposed Development by timed flights across the wind farm buffer area

Ref.		All birds in the breeding season at 15–150 m	All birds in the non-breeding season at 15 – 150 m
a	Ground area of wind farm buffer	1.3763 km^2 or 1.3763 x 10^6 m^2	1.3763 km^2 or 1.3763 x 10^6 m^2
b	Height of risk band	15–150 m = 135 m	15–150 m = 135 m
c	Volume of wind farm buffer (a x b)	1.8508 x 10^8 m^3	1.8508 x 10^8 m^3
d	Rotor diameter	136 m	136 m
e	Rotor depth (maximum)	4.2 m	4.2 m
f	Bird length	0.8 m	0.8 m
g	Effective rotor depth (e + f)	5.0 m	5.0 m
h	Effective rotor volume per turbine ($[d/2]^2$ x pi x g)	7.2633 x 10^4 m^3	7.2633 x 10^4 m^3

Ref.		All birds in the breeding season at 15–150 m	All birds in the non-breeding season at 15 – 150 m
i	Total rotor volume for 6 turbines (h x 6)	4.3587 x 10^5 m^3	4.3587 x 10^5 m^3
j	Rotor volume as a proportion of flight buffer (j/c)	0.002346	0.002346
k	Total extrapolated time for white-tailed eagles at risk (from Table E.1)	19,256 secs	1,404 secs
m	Time within rotor volume (k x j)	45 secs	3.3 secs
n	Equivalent flight length within rotor volume at 7 m/sec (m x 7)	316.2 m	23.1 m
p	No. passes through rotors (n/g)	63.2	4.6
q	No. passes through rotors at 85% operational efficiency (p x 0.85)	53.7	3.9
r	No. passes expected to collide at Band Model % of 12.5 % (q x 0.125)	6.71	0.49
s	**Number of collisions at 95 % avoidance rate (r x 0.05)**	**0.336**	**0.024**

Table E.3 Band model percentage calculation for white-tailed eagle (the probability of collision for a single rotor transit)

			Calculation of alpha and p(collision) as a function of radius								
NoBlades	3					Upwind:			Downwind:		
MaxChord	4.20	m	r/R	c/C	α	collide			collide		
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)		length	p(collision)	
Species name	White-tailed eagle		0.00				1.000			1.000	
BirdLength	0.80	m	0.05	0.73	1.64	7.94	0.681		6.35	0.545	
Wingspan	2.20	m	0.10	0.79	0.82	4.63	0.397		2.91	0.250	
F: flapping (0) or gliding (+1)	1		0.15	0.88	0.55	3.67	0.315		1.76	0.151	
Proportion of flights upwind	50%	%	0.20	0.96	0.41	3.21	0.275		1.13	0.096	
Bird speed	7	m/sec	0.25	1.00	0.33	3.22	0.276		1.04	0.089	
Rotor Radius	68	m	0.30	0.98	0.27	2.95	0.253		0.82	0.070	
Rotation Speed	12	rpm	0.35	0.92	0.23	2.67	0.229		0.93	0.079	
Rotation Period	5.00	sec	0.40	0.85	0.20	2.43	0.208		1.02	0.087	
			0.45	0.80	0.18	2.26	0.194		1.08	0.092	
			0.50	0.75	0.16	2.11	0.181		1.12	0.096	
Bird aspect ratio: β	0.36		0.55	0.70	0.15	1.98	0.170		1.14	0.098	
			0.60	0.64	0.14	1.85	0.159		1.14	0.098	
Integration interval	0.05		0.65	0.58	0.13	1.73	0.148		1.13	0.097	
			0.70	0.52	0.12	1.61	0.138		1.12	0.096	
			0.75	0.47	0.11	1.52	0.130		1.10	0.095	
			0.80	0.41	0.10	1.42	0.121		1.08	0.092	
			0.85	0.37	0.10	1.35	0.115		1.06	0.091	
			0.90	0.30	0.09	1.24	0.106		1.02	0.087	
			0.95	0.24	0.09	1.14	0.098		0.98	0.084	
			1.00	0.00	0.08	0.80	0.069		0.80	0.069	

Overall p(collision) integrated over disk

		Upwind	**15.6%**	**Downwind**	**9.5%**
Proportion upwind:	downwind				
50%	50%	**Average**	**12.5%**		

APPENDIX F GREAT SKUA COLLISION RISK WORKINGS

This appendix presents a description of the workings of the collision risk calculations undertaken for great skua. The accompanying spreadsheet 'Annex 3 Great Skua Data provides full details of the data used in the calculations and the delated workings of the collision risk calculations for 2018 and 2019.

The 'Birds using the windfarm airspace' model is the most appropriate for this species. An estimate of the bird occupancy within the flight risk volume is required as an input for this model. Bird occupancy has been calculated based on the flight length per cubic metre of airspace. The bird density value for each snapshot count zone for each month was converted to flight length by applying an average bird flight speed of 14 metres per second (i.e. at a density of one bird per km^2, the flight length is 14 metres per second per km^2). This has then been extrapolated for each month based on the total flying time available (taken from the SNH 'offshore model' spreadsheets at latitude 58.8° (Band, 2012)) to give a total monthly flight length within the risk height band.

The flight length through the rotors assumes even distribution of activity throughout the airspace of the 15 – 150 m height band; it is arrived at simply by applying the proportion of the effective rotor volume to the overall volume of the flight zone at that height. Dividing by the effective rotor depth (maximum blade depth plus bird length) gives the number of passes through the rotors.

A turbine operational efficiency factor of 85 % has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 6.6 % (Table F.1).

The accepted avoidance rate for great skua has then been applied; this is 99.5 % (SNH, 2018a).

Collision risk has then been summed across all months to provide a collision risk estimate for each snapshot recording zone.

This approach is conceptually straightforward – it has been tested against the more complex SNH 'offshore model' spreadsheets (Band, 2012) and, based on the same input parameters, was found to produce an answer that was approximately 1.3 % higher. Such a similar result in both methods indicates the robustness of this simpler approach.

Table F.1 Band model percentage calculation for great skua (the probability of collision for a single rotor transit)

			Calculation of alpha and p(collision) as a function of radius							
NoBlades	3					Upwind:			Downwind:	
MaxChord	4.20	m	r/R	c/C	α	collide			collide	
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)		length	p(collision)
Species name	Great Skua		0.00				1.000			1.000
BirdLength	0.56	m	0.05	0.73	3.28	14.95	0.641		13.37	0.573
Wingspan	1.36	m	0.10	0.79	1.64	8.34	0.357		6.62	0.284
F: flapping (0) or gliding (+1)	0		0.15	0.88	1.09	6.34	0.272		4.43	0.190
Proportion of flights upwind	50%	%	0.20	0.96	0.82	5.35	0.229		3.26	0.140
Bird speed	14	m/sec	0.25	1.00	0.66	4.64	0.199		2.46	0.106
Rotor Radius	68	m	0.30	0.98	0.55	3.98	0.171		1.85	0.079
Rotation Speed	12	rpm	0.35	0.92	0.47	3.38	0.145		1.38	0.059
Rotation Period	5.00	sec	0.40	0.85	0.41	2.90	0.124		1.05	0.045
			0.45	0.80	0.36	2.61	0.112		0.87	0.037
			0.50	0.75	0.33	2.37	0.102		0.74	0.032
Bird aspect ratio: β	0.41		0.55	0.70	0.30	2.17	0.093		0.65	0.028
			0.60	0.64	0.27	1.96	0.084		0.57	0.025
Integration interval	0.05		0.65	0.58	0.25	1.78	0.076		0.60	0.026
			0.70	0.52	0.23	1.62	0.069		0.63	0.027
			0.75	0.47	0.22	1.49	0.064		0.65	0.028
			0.80	0.41	0.20	1.35	0.058		0.67	0.029
			0.85	0.37	0.19	1.25	0.054		0.67	0.029
			0.90	0.30	0.18	1.11	0.047		0.66	0.028
			0.95	0.24	0.17	0.99	0.042		0.65	0.028
			1.00	0.00	0.16	0.56	0.024		0.56	0.024
			Overall p(collision) integrated over disk							
						Upwind	8.9%		Downwind	4.3%
		Proportion	upwind: downwind							
			50%	50%			Average	6.6%		

APPENDIX G GREAT BLACK-BACKED GULL COLLISION RISK WORKINGS

This appendix presents a description of the workings of the collision risk calculations undertaken for great black-backed gull. The accompanying spreadsheet 'Annex 4 Great Black-backed Gull Data' provides full details of the data used in the calculations and the related workings of the collision risk calculations for each year.

The 'Birds using the windfarm airspace' model is the most appropriate for this species. An estimate of the bird occupancy within the flight risk volume is required as an input for this model. Bird occupancy has been calculated based on the flight length per cubic metre of airspace. The bird density value for each snapshot count zone for each month was converted to flight length by applying an average bird flight speed of 14 metres per second (i.e. at a density of one bird per km^2, the flight length is 14 metres per second per km^2). This has then been extrapolated for each month based on the total flying time available (taken from the SNH 'offshore model' spreadsheets at latitude 58.8° (Band, 2012)) to give a total monthly flight length within the risk height band.

The flight length through the rotors assumes even distribution of activity throughout the airspace of the 15 – 150 m height band; it is arrived at simply by applying the proportion of the effective rotor volume to the overall volume of the flight zone at that height. Dividing by the effective rotor depth (maximum blade depth plus bird length) gives the number of passes through the rotors.

A turbine operational efficiency factor of 85 % has been applied.

The Band Model percentage (i.e. the likelihood of a bird that flies through the rotors actually being hit) has then been applied; this is 7.3 % (Table G.1).

The accepted avoidance rate for great black-backed gull has then been applied; this is 98 % (SNH, 2018a). However, there is strong empirical evidence that clearly indicates that there is much higher avoidance in this species. At present, SNCBs recommend use of a 99.5 % avoidance rate for large gulls at offshore wind farms. This 99.5 % avoidance rate is based on evidence from terrestrial wind farms, reviewed and evaluated thoroughly by the BTO (Cook et al, 2014; JNCC et al, 2014). A recent review by Furness (2019) concludes that it would be appropriate and more consistent for SNH to recommend use of avoidance rates of 99.5 % for large gulls including great black-backed gull at terrestrial wind farms. The equivalent risk figures at 99.5 % would simply be one quarter of those calculated at 98 %.

Collision risk has then been summed across all months to provide a collision risk estimate for each snapshot recording zone.

This approach is conceptually straightforward – it has been tested against the more complex SNH 'offshore model' spreadsheets (Band, 2012) for great skua at this site and, based on the same input parameters, was found to produce an answer that was approximately 1.3 % higher. Such a similar result in both methods indicates the robustness of this simpler approach.

Table G.1 Band model percentage calculation for great black-backed gull (the probability of collision for a single rotor transit)

			Calculation of alpha and p(collision) as a function of radius							
NoBlades	3					Upwind:			Downwind:	
MaxChord	4.20	m	r/R	c/C	α	collide			collide	
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)		length	p(collision)
Species name	Great Black-back		0.00				1.000			1.000
BirdLength	0.71	m	0.05	0.73	3.28	15.67	0.672		14.09	0.604
Wingspan	1.58	m	0.10	0.79	1.64	8.70	0.373		6.98	0.299
F: flapping (0) or gliding (+1)	0		0.15	0.88	1.09	6.58	0.282		4.67	0.200
Proportion of flights upwind	50%	%	0.20	0.96	0.82	5.53	0.237		3.44	0.147
Bird speed	14	m/sec	0.25	1.00	0.66	4.78	0.205		2.61	0.112
Rotor Radius	68	m	0.30	0.98	0.55	4.10	0.176		1.97	0.084
Rotation Speed	12	rpm	0.35	0.92	0.47	3.49	0.149		1.49	0.064
Rotation Period	5.00	sec	0.40	0.85	0.41	3.05	0.131		1.20	0.051
			0.45	0.80	0.36	2.76	0.118		1.02	0.044
			0.50	0.75	0.33	2.52	0.108		0.89	0.038
Bird aspect ratio: β	0.45		0.55	0.70	0.30	2.32	0.099		0.80	0.034
			0.60	0.64	0.27	2.11	0.091		0.72	0.031
Integration interval	0.05		0.65	0.58	0.25	1.93	0.083		0.75	0.032
			0.70	0.52	0.23	1.77	0.076		0.78	0.033
			0.75	0.47	0.22	1.64	0.070		0.80	0.034
			0.80	0.41	0.20	1.50	0.064		0.82	0.035
			0.85	0.37	0.19	1.40	0.060		0.82	0.035
			0.90	0.30	0.18	1.26	0.054		0.81	0.035
			0.95	0.24	0.17	1.14	0.049		0.80	0.034
			1.00	0.00	0.16	0.71	0.030		0.71	0.030
			Overall p(collision) integrated over disk							
						Upwind	9.6%		Downwind	5.0%
		Proportion	upwind: downwind							
			50%	50%			Average	7.3%		

Annex 1

VP	Observer	date	session	Original flight line no	Flight Ref No.	species	no.birds	height at detection (m)	Time	total mins	mins in buffer	secs <20m	secs 20-150m	secs 150-200m	secs >200m	No. birds x risk	Notes	Check	No. of birds through risk window - adjusted	Comment
OVP3	SJW	18-Apr-18	p.m.	5	1	RH	1	>150	16:02	3	3			180		0		0		>150m
OVP3	SJW	18-Apr-18	p.m.	7	2	RH	1	20-150	16:46	0.5	0.5		30			30		0	1	Seen thro T5, but in risk window by extension - not very far from it
OVP1	AU	01-May-18	early	1	3	RH	2	20-150	06:05	3	3		180			360		0	2	
OVP1	AU	01-May-18	early	2	4	RH	1	<20	06:07	0.5	0.5	30				0	Flew up and around underneath flight no. 1	0		
OVP1	AU	01-May-18	early	5	5	RH	1	20-150	07:14	0.25	0					0	briefly at Sky Fea skyline; did not enter buffer	0		
OVP1	AU	01-May-18	early	8	6	RH	2	20-150	07:43	3	2.25		15	120		30	more or less level out over Sky Fea and soon >15m over falling ground	0	2	>125m - but best to keep in for revised risk height
OVP1	AU	01-May-18	early	11	7	RH	1	>150	08:20	3	2			120		0	stayed high out towards shore	0		
OVP3	SJW	10-May-18	late	1	8	RH	1	20-150	19:03	1.5	1.5		90			90		0	1	
OVP3	SJW	19-May-18	Early	1	9	RH	1	150	05:04	1.5	1.5			90		0	very high well over 150m	0		
OVP3	SJW	19-May-18	Early	3	10	RH	1	120	05:51	1.25	1.25		75			75		0	1	
OVP1	NH	07-Jun-18	early	1	11	RH	2	20-150m	06:13	4	4		240			480	Apparently landing at Site A; time mapped beyond buffer counted as within it, to allow for unseen approach	0	1.5	Count as 3/4 pass at risk (went across parallel to risk window where layout widest)
OVP1	NH	07-Jun-18	early	2	12	RH	2	20-150m	06:13	2.5	2.5		150			300	In view at same time as birds on flight line 1, joining them for part of flight line. Lost whilst following birds on flight line 1; time mapped beyond buffer counted	0		
OVP1	NH	07-Jun-18	early	3	13	RH	1	20-150m	06:13	0.75	0.75		45			45	In view at same time as birds on flight line 1 and flight line 2, lost whilst following them.	0		
OVP1	NH	07-Jun-18	early	4	14	RH	2	20-150m	06:23	10.75	10.25		615			1230	Prolonged flight circling over Site A; eventually lost behind Wee Fea	0	4	Not hitting risk window, but flying extensively over layout to W of it; count as 2 passes across whole site
OVP1	NH	07-Jun-18	early	5	15	RH	2	20-150m	07:12	1.5	1.5		90			180	Landing at Site A	0		
OVP1	NH	07-Jun-18	early	6	16	RH	1	20-150m	07:12	0.25	0.25		15			15	In view at same time as birds on flight line 5; lost whilst following birds on this other flight line.	0		
OVP1	SJW	02-Jul-18	am	3	17	RH	1	120	13:31	2	1.25		75			75		0	1	
OVP3	SJW	03-Jul-18	Early	2	18	RH	1	100	05:28	1.75	1.75		105			105		0	1	
OVP3	SJW	03-Jul-18	Early	4	19	RH	1	120	06:07	1	1		60			60		0		
OVP1	SJW	04-Jul-18	late	1	20	RH	1	100	20:02	1.5	1.5		90			90	Estimated time increased from 1 to 1.5 mins to allow for length of drawn flightpath	0		
OVP1	SJW	04-Jul-18	late	3	21	RH	1	120	20:58	0.5	0.5		30			30		0	1	
OVP1	SJW	04-Jul-18	late	5	22	RH	1	100	21:55	1	1		60			60		0	1	
OVP1	SJW	18-Jul-18	pm	4	23	RH	1	120	13:22	1	1		60			60		0		
OVP1	AU	06-Aug-18	am	1	24	RH	1	c. 50m	11:47	1.5	0.5		30			30		0	1	
OVP1	AU	06-Aug-18	am	2	25	RH	2	300 asl	11:53	2.5	0		0			0	In towards Site G	0		
OVP1	AU	06-Aug-18	am	3	26	RH	1	275 asl	11:55	2	1.25		75			75	Out from direction of Site G- stayed more or less level; estimated time at risk increased from 1 to 1.25 mins to allow for length of drawn flightpath	0	1	
OVP1	AU	06-Aug-18	am	4	27	RH	1	300 asl	12:12	2.25	1.25		75			75	Out from direction of Site G - gradually down at 50-100m above ground; estimated time at-risk increased from 1 to 1.25 mins to allow for length of	0	1	
OVP3	NH	07-Aug-18	early	5	28	RH	1	20-150m	08:20	1.5	1.5		90			90	Bird heading inland along Wee Fea ridge.	0	1	Estimated single turbine attribution, since map not found
OVP1	AU	08-Aug-18	late	1	29	RH	1	300 asl	18:16	6	4.5			270		0	stayed <200m	0		
OVP1	AU	08-Aug-18	late	2	30	RH	1	250 asl	18:26	0.5	0.5		15	15		15	Probably in to Site H	0		
OVP1	AU	08-Aug-18	late	3	31	RH	1	300 asl	18:31	8	2				120	0	120 secs at >200m; climbed to c.400 asl nr Sky Fea, then down steeply to alight on Site I	0		
OVP1	AU	08-Aug-18	late	5	32	RH	2	200 asl	19:12	45	0					0	one with fish; heading down to Site H	0		
OVP1	AU	08-Aug-18	late	6	33	RH	2	350 asl	19:31	2	2				120	0	120 secs at >200m	0		
OVP1	AU	08-Aug-18	late	7	34	RH	1	300 asl	19:32	0.5	0.5				30	0	30 secs at >200m	0		
OVP1	AU	08-Aug-18	late	8	35	RH	1	c.50m	19:54	0.5	0.25		15			15		0		
OVP1	AU	08-Aug-18	late	9	36	RH	1	20-50m	20:06	0.5	0.25		15			15		0		
OVP1	AU	08-Aug-18	late	10	37	RH	2	c.50m	20:27	1	0.25		15			30		0		
OVP1	AU	08-Aug-18	late	11	38	RH	1	100 asl	20:31	2	0					0	down in towards Site H	0		
OVP1	AU	08-Aug-18	late	12	39	RH	2	200-250 asl	20:36	2	0					0	rising and lowish over skyline	0		
OVP1	AU	08-Aug-18	late	13	40	RH	2	350-400 asl	20:43	3.5	1				60	0	60 secs at >200m; very gradually down lower	0		
OVP1	AU	08-Aug-18	late	14	41	RH	1	250 asl	21:04	1	0.25		15			15	down towards Site G at end	0		
OVP1	AU	08-Aug-18	late	15	42	RH	1	350 asl	21:07	3.5	2.25			135		0	gradually down	0		Stayed high out
OVP1	SJW	20-Aug-18	pm	2	43	RH	1	100	13:44	3.25	2.5		150			150		0	1	
OVP1	SJW	20-Aug-18	pm	3	44	RH	1	120	14:06	1.5	1.5		90			90		0	1	
											65	**30**	**2610**	**930**	**330**	**3915**	**TOTAL TIME AT RISK FROM VP WATCHES**	0	**22.5**	

VP	Observer	Date	Session	Original Flight no.	Flight Ref No.	Sp.	No. birds	Height at detection	Time detected	Total duration in flight	Flight duration in buffer	<15m in buffer	15 - 50m in buffer	50 - 100m in buffer	100-150m in buffer	150 - 200m in buffer	>200m in buffer	Time AR x no. birds	Bird(s) calling?	Comment	Check	Check	No. of birds through the risk window - adjusted
VP1	AU	29-Apr-19	a.m.	6	1	RH	1	15-50	14:03	0.25	0							0	silent	silent - briefly seen low beyond the northern skyline	0	0	
VP1	AU	29-Apr-19	late	5	2	RH	1	250 asl	18:12	1.5	1				15	45		15	vocal	vocal - more or less level across	0	0	
VP1	AU	29-Apr-19	late	6	3	RH	1	150 asl	18:23	1	0							0	vocal	vocal - heading down gradually out of sight in towards Site I	0	0	
VP1	AU	29-Apr-19	late	7	4	RH	1	150-200	19:12	1	0							0	vocal	vocal - heard for some time behind VP before coming into view there - down steeply to alight on Site I at end	0	0	
VP3	AU	08-May-19	p.m.	3	5	RH	2	150 asl	15:48	2	0.5		30					60	distant	distant at first - in to north of Wee Fea; climbing slightly and swinging around Site A before away north	0	0	
VP1	SJW	08-May-19	p.m.	3	6	RH	1	75	15:54	2.5	2			120				120	vocal	vocal - dropped a wee bit in height to about 70m gained height to about 100m when headed north	0	0	1
VP1	AU	09-May-19	early	1	7	RH	1	15-50	04:57	2	0							0	silent	silent - in to Site E	0	0	
VP3	SJW	09-May-19	early	1	8	RH	1	100	05:18	3.75	2.75				165			165	silent	silent - level flight out over Fara, second bird seen when following this one heading south	0	0	1
VP1	AU	09-May-19	early	2	9	RH	1	300 asl	05:19	4	0							0	silent	silent - In to Site G and loop round there before descending gradually out of sight	0	0	
VP1	AU	09-May-19	early	5	10	RH	2	400 asl	05:31	2	0							0	distant	distant - crossed with no. 6 which I followed, since these two were clearly above risk height	0	0	
VP3	SJW	09-May-19	early	2	11	RH	2	100	05:31	2.75	2.75				165			330	silent	silent - gained height as it went west up valley	0	0	2
VP1	AU	09-May-19	early	6	12	RH	1	250-275 asl	05:32	1.5	0.5			30				30	silent	silent - S from over Sky Fea and gently down to Site I	0	0	
VP1	AU	09-May-19	early	7	13	RH	2	200-250 asl	05:47	1	1				60			120	vocal	vocal - gliding all the way across from north-east and down steeply in towards Site I at the end;	0	0	
VP1	AU	09-May-19	early	8	14	RH	1	200 asl	05:54	7	1.5		60	30				90	silent	silent - Found climbing away across valley, presumably out from Site I to >300 asl then meandering widely until out of sight beyond Sky Fea	0	0	
VP1	AU	09-May-19	early	9	15	RH	2	200-250 asl	06:22	6	3				60	60	60	120	vocal	vocal - flight calls heard behind VP at 06:21 probably these birds circling up off Site I; already high when over VP and estimated within buffer assuming flight speed of approx 1 km/min. Left them as they looped back in to north to follow no. 10	0	0	
VP3	SJW	09-May-19	early	6	16	RH	2	150	06:27	3.25	2				120			240	vocal	vocal - losing height as approaching VP; out over Fara	0	0	
VP1	AU	09-May-19	early	10	17	RH	2	100-150 asl	06:28	7	2		60	60				240	vocal	vocal - Climbing out from Site I across valley then much looping around Site B before down to Site A	0	0	
VP1	AU	09-May-19	early	11	18	RH	1	150-200 asl	06:30	3	1.5			30	60			90	vocal	vocal - Out from Site I; rising across valley to >300 asl, then lost to view behind Sky Fea	0	0	
VP3	SJW	09-May-19	early	7	19	RH	1	100	06:34	3	3				180			180	vocal	vocal - level flight; lost over Bakingstone	0	0	1
VP1	AU	09-May-19	early	12	20	RH	2	200 asl	06:44	0.5	0.5		15	15				60	silent	silent - In to Site C	0	0	
VP1	AU	09-May-19	early	14	21	RH	2	300 asl	07:19	<1	3						180	0	vocal	vocal - calls heard for a couple of minutes before finally picked up very high over Wee Fea; flight time in buffer v roughly estimated	0	0	
VP1	AU	09-May-19	early	15	22	RH	2	250 asl	07:22	1.5	0.25		15					30	vocal	vocal - pair found at c.50m and soon out to north of buffer away from Site C	0	0	
VP1	AU	09-May-19	early	16	23	RH	1	250-300 asl	07:30	6	3				45	135		45	silent	silent, then vocal - rising slightly at first, then gradually down past Wee Fea (but still c. 250 asl there), finally descending towards Weddell Sound and lost against Flotta terminal: time in buffer v roughly estimated at flight speed of 1 km/min: origin	0	0	1
VP3	SJW	27-May-19	a.m.	1	24	RH	1	150	09:49	1.5	1.5					90		0	silent	silent - rising across site	0	0	1
VP1	AU	27-May-19	a.m.	11	25	RH	2	250 asl	12:12	3	0							0	vocal	vocal - slightly down and out of sight at c.200 asl	0	0	
VP3	AU	27-May-19	late	1	26	RH	2	100 asl	18:47	2.25	0							0	distant	distant - level in behind Binga Fea	0	0	
VP3	AU	27-May-19	late	2	27	RH	2	100 asl	18:54	6.5	1.5			90				180	silent	silent - rising gradually & briefly behind Binga Fea then away higher to N	0	0	
VP3	AU	27-May-19	late	3	28	RH	3	150-200 asl	19:10	3	1.5			60	30			270	silent	silent - rising to 200 asl across valley, 2 birds steeply down towards Site I and one staying high away west	0	0	
VP1	SJW	27-May-19	late	2	29	RH	1	75	19:10	1.5	0							0	silent	silent - in to N of Wee Fea	0	0	1
VP3	AU	27-May-19	late	4	30	RH	2	100 asl	19:23	7	0							0	distant	distant - climbing in beyond Binga Fea; out of view for a minute, then emerging higher and down towards Site G	0	0	
VP3	AU	27-May-19	late	5	31	RH	2	150 asl	19:37	2.5	0							0	distant	distant - out of view behind Wee Fea for 1.25 mins then emerging at 200-250 asl and dropping into Site E	0	0	
VP1	SJW	27-May-19	late	8	32	RH	1	100	19:46	1	0.75			45				45	silent	silent - dropping height as it went over skyline towards Site H	0	0	0
VP3	AU	27-May-19	late	7	33	RH	1	50-100	20:20	1	0							0	silent	silent - not emerging from behind Wee Fea	0	0	
VP3	AU	27-May-19	late	8	34	RH	1	20-50	20:33	1.5	0							0	distant	distant - flying together with great northern diver out over water	0	0	
VP1	SJW	10-Jun-19	late	1	35	RH	1	120	19:02	1.75	1.5				90			90	silent	silent	0	0	1
VP1	SJW	10-Jun-19	late	2	36	RH	2	100	19:14	1.25	1				60			120	silent	silent	0	0	2
VP3	AU	10-Jun-19	late	2	37	RH	1	c.50	20:12	0.5	0							0	distant	distant heading in up Heldale - soon behind Binga Fea	0	0	
VP1	SJW	10-Jun-19	late	5	38	RH	1	75	20:28	1	0.5			30				30	silent	silent - in to Site D	0	0	
VP1	SJW	10-Jun-19	late	6	39	RH	1	100	21:02	3.25	3				180			180	vocal	vocal	0	0	
VP1	SJW	10-Jun-19	late	9	40	RH	1	150 asl	21:53	2	0.5		30					30	silent	silent - descending very gradually and out of sight into Mill Bay	0	0	1
VP1	SJW	12-Jun-19	p.m.	1	41	RH	1	150	16:59	4.5	1.75					105		0	silent	silent - away to Site G or further north	0	0	1
VP3	AU	12-Jun-19	pm/late	1	42	RH	1	200 asl	17:50	1.5	1.25		15	60				75	silent	silent - steadily down, so 15-50m when exiting buffer	0	0	1
VP3	AU	12-Jun-19	pm/late	3	43	RH	1	15-50	18:46	1	0.25		15					15	silent	silent - appeared to be heading in to Site A	0	0	1
VP1	SJW	12-Jun-19	p.m.	6	44	RH	1	75	19:09	1.5	0.75			45				45	silent	silent	0	0	
VP1	SJW	12-Jun-19	p.m.	7	45	RH	1	75	19:45	6	4			195	45			240	silent	silent - gaining height	0	0	1
VP3	AU	12-Jun-19	pm/late	4	46	RH	1	75-100 asl	19:51	3.5	1.5		90					90	silent	silent - angling along slowly into wind; staying at upper end of 15-50m; lost in the murk heading back up Mill Burn and rising there to 100-150m	0	0	1
VP3	AU	12-Jun-19	pm/late	5	47	RH	2	50 asl	20:02	1	0.5		30					60	silent	silent - heading out beyond Ore Bay	0	0	
VP3	SJW	13-Jun-19	a.m.	1	48	RH	1	75	07:23	1.5	0.25			15				15	vocal	vocal - out over Lyness	0	0	1
VP1	AU	13-Jun-19	a.m.	1	49	RH	2	300 asl	07:27	2.5	0							0	distant	distant - back lower away to north	0	0	
VP1	AU	13-Jun-19	a.m.	2	50	RH	1	15	07:30	<0.25	0							0	silent	silent - just seen alighting on Site E from west	0	0	
VP1	AU	13-Jun-19	a.m.	3	51	RH	2	200 asl	07:36	1.75	1.5				90			180	silent	silent - very gradually descending	0	0	
VP1	AU	13-Jun-19	a.m.	5	52	RH	1	15-50	08:20	1	0							0	distant	distant - alighting on Site D from west	0	0	
VP1	AU	13-Jun-19	a.m.	6	53	RH	1	200 asl	08:27	5	1.5	15	75					75	distant	distant - came in to buffer twice at 15-50m, along fence where joined by no. 7 and then again in to Site A	0	0	
VP1	AU	13-Jun-19	a.m.	7	54	RH	1	200 asl	08:28	30	1		60					60	silent	silent - joined no. 6 for a while then away lower down Burn of Moi Fea	0	0	
VP3	SJW	13-Jun-19	a.m.	4	55	RH	1	100	08:32	1	1			60				60	silent	silent	0	0	1
VP1	AU	13-Jun-19	a.m.	8	56	RH	1	200-250 asl	08:35	3	2.5		30	90	30			150	silent	silent- steadily down towards Ore Bay	0	0	1
VP1	AU	13-Jun-19	a.m.	9	57	RH	1	200-250 asl	08:50	2.25	1.5			90				90	vocal	vocal - lower away to southwest along Site I	0	0	
VP1	AU	13-Jun-19	a.m.	10	58	RH	1	250 asl	08:58	5	4			240				240	silent	silent - staying high	0	0	1
VP1	AU	13-Jun-19	a.m.	11	59	RH	1	200 asl	08:58	3	2		120					120	silent	silent - appeared to be following no. 10 at first and probably out from Site E	0	0	
VP1	AU	13-Jun-19	a.m.	12	60	RH	1	150 asl	09:01	1	1		60					60	silent	silent - steadily down	0	0	1
VP1	AU	13-Jun-19	a.m.	13	61	RH	2	150 asl	09:04	1	1		60					120	silent	silent - in to Site A	0	0	2
VP3	SJW	13-Jun-19	a.m.	5	62	RH	1	125	09:12	4.75	3			30	150			180	silent	silent	0	0	1
VP1	AU	13-Jun-19	a.m.	14	63	RH	2	200 asl	09:16	0.5	0.5		30					60	silent	silent - appeared to be up from and back down to Site A	0	0	
VP1	AU	13-Jun-19	a.m.	15	64	RH	1	200 asl	09:24	1.5	0.5		30					30	distant	distant - very approx timing; in to Site D	0	0	
VP1	AU	13-Jun-19	a.m.	16	65	RH	1	200-250 asl	09:46	3.5	2.5			150				150	vocal	vocal - stayed more or less level, even out into the distance	0	0	1
VP1	AU	13-Jun-19	a.m.	17	66	RH	2	200 asl	09:50	5.5	0.25		15					30	distant	distant - much looping to north of buffer, then in to Site A	0	0	
VP1	AU	13-Jun-19	a.m.	18	67	RH	2	200 asl	09:54	2	0							0	distant	distant - rising to west, but lost behind Sky Fea	0	0	
VP1	AU	13-Jun-19	a.m.	19	68	RH	1	200 asl	10:00	0.25	0.25			15				15	vocal	vocal - rapidly downwind near VP	0	0	
VP3	AU	28-Jun-19	p.m.	2	69	RH	1	150 asl	16:52	1.5	0							0	distant	distant - steadily downwards to Mill Bay	0	0	
VP1	SJW	28-Jun-19	p.m.	1	70	RH	1	150	16:53	1	1			60				60			0	0	
VP3	AU	28-Jun-19	p.m.	10	71	RH	2	150-200 asl	18:07	2.75	2.5		30	90	30			300	vocal	vocal - climbing steadily in - very approx height allocations	0	0	2
VP1	SJW	28-Jun-19	p.m.	3	72	RH	1	150	18:07	2.75	1				60			60			0	0	1
VP1	AU	29-Jun-19	early	1	73	RH	1	250-300 asl	04:00	2	2			120				120	silent	silent - gradually losing height - at 50-100m over Wee Fea	0	0	1
VP1	AU	29-Jun-19	early	2	74	RH	1	200-225 asl	04:08	1.5	0.75		15	30				45	silent	silent - in to Site B	0	0	1
VP1	AU	29-Jun-19	early	3	75	RH	1	150 asl	04:11	4.75	2	15	45	60				105	vocal	vocal - presumed out from Site I and seen in to Site C	0	0	
VP1	AU	29-Jun-19	early	4	76	RH	1	250-300 asl	04:26	1.75	1.5			60	30			90	silent	silent - gradually down so at 200-250m asl at end	0	0	1
VP1	AU	29-Jun-19	early	5	77	RH	1	150-200 asl	04:31	4	1.25			75				75	vocal	vocal in towards Site H	0	0	
VP1	AU	29-Jun-19	early	6	78	RH	2	200 asl	04:43	1.5	0.25		15					30	vocal	vocal - perhaps out and back in from/to Site C	0	0	
VP1	AU	29-Jun-19	early	7	79	RH	1	200-225 asl	04:50	1	0.25	15						0	vocal	vocal - out from Site C - perhaps dropping in to Site B	0	0	
VP1	AU	29-Jun-19	early	8	80	RH	1	200-225 asl	04:54	0.5	0.25	15						0	silent	silent - bird no. 7 dropping back in to Site C	0	0	
VP1	AU	29-Jun-19	early	9	81	RH	1	200-225 asl	04:59	0.5	0							0	silent	silent - in to Site B	0	0	
VP1	AU	29-Jun-19	early	10	82	RH	1	200 asl	05:01	4	2.5			90	60			150	vocal	vocal - stayed more or less level	0	0	1
VP1	AU	29-Jun-19	early	11	83	RH	1	250 asl	05:02	4	1				60			60	silent	silent - downwards out of sight at end	0	0	1
VP1	AU	29-Jun-19	early	12	84	RH	2	200 asl	05:14	2.5	2.25		30	75	30			270	silent	silent - more or less level and out of sight behind skyline	0	0	1.5	Count as 3/4 pass at risk (went across parallel to risk window where layout widest)
VP3	SJW	29-Jun-19	early	4	85	RH	1	100	05:20	2	1.25				75			75	silent	silent - level flight out over Fara	0	0	1
VP1	AU	29-Jun-19	early	13	86	RH	2	200 asl	05:28	1	0							0	silent	silent - away level or slightly lower and out of sight beyond skyline	0	0	
VP1	AU	29-Jun-19	early	14	87	RH	1	175 asl	05:43	0.5	0.5		30					30	silent	silent - just seen rising beyond Wee Fea summit then down again - perhaps out and back to Site A?	0	0	
VP1	AU	29-Jun-19	early	15	88	RH	1	200 asl	05:49	1.75	1.25		30	45				75	silent	silent - level, then gradually lower beyond skyline	0	0	1
VP3	SJW	29-Jun-19	early	5	89	RH	1	100	05:52	2.5	1.5				90			90	silent	silent - level flight	0	0	1
VP1	AU	29-Jun-19	early	16	90	RH	2	200 asl	06:05	5.5	0.75		15	15	15			90	distant	distant - in against a stiff breeze now - slid lowish southwest across Sky Fea and on across site	0	0	
VP1	AU	29-Jun-19	early	17	91	RH	1	250 asl	06:39	0.25	0							0	distant	distant - soon out of sight beyond Sky Fea - heading out from Site G	0	0	
VP1	AU	29-Jun-19	early	18	92	RH	2	150-200 asl	06:41	9.5	1.75		15	90				210	silent	silent - level across valley, then long slow loop against wind and in to Site G	0	0	1.5	Count as 3/4 pass at risk (went across parallel to risk window where layout widest)
VP1	SJW	02-Jul-19	a.m.	1a	93	RH	2	125	09:45	4	2.5		15	30	105			300	silent	silent - together with no. 1b - these two were followed and went in to Site A	0	0	
VP1	SJW	02-Jul-19	a.m.	1b	94	RH	1	125	09:45	2	1				120			120	silent	silent - together with no. 1b, this bird breaking away to north (marked by arrow off main flight line)		-60	
VP1	SJW	02-Jul-19	a.m.	2	95	RH	2	100	09:56	2.5	1				60			120	silent	silent	0	0	2
VP1	SJW	02-Jul-19	a.m.	5	97	RH	1	150	10:51	1.5	1.5				90			90	vocal	vocal	0	0	1
VP1	SJW	02-Jul-19	a.m.	6	98	RH	1	150	11:02	0.75	0							0	distant	well to northwest	0	0	
VP1	SJW	02-Jul-19	a.m.	8	99	RH	1	100	12:01	0.25	0.5				30			30			0	0	1
VP3	AU	02-Jul-19	a.m.	5	100	RH	1	200 asl	12:39	6.75	3			120	60			180	silent	silent - in to Site G - v approx height allocations	0	0	
VP1	AU	02-Jul-19	late	1	101	RH	1	200-250 asl	18:46	1	0							0	distant	distant - in to north of Site D	0	0	
VP1	AU	02-Jul-19	late	2	102	RH	1	250 asl	18:54	4.5	2			90	30			120	silent	silent with fish in to Site G	0	0	
VP3	SJW	02-Jul-19	late	1	103	RH	1	75	18:54	2.5	2.5			150				150			0	0	1
VP1	AU	02-Jul-19	late	3	104	RH	1	200 asl	19:26	12.75	5		30	120	150			300	silent	silent - finally in towards Site G; rising into buffer so at 250-300 asl by Wee Fea summit, then level-ish but slightly lower past Bakingstone Hill	0	0	1
VP1	AU	02-Jul-19	late	4	105	RH	2	250-300 asl	19:58	1.5	0							0	distant	distant - visible low beyond the Sky Fea skyline	0	0	
VP1	AU	02-Jul-19	late	5	106	RH	1	200-250 asl	20:04	1	0.5			30				30	silent	silent - fast downwind, more or less level in buffer	0	0	1
VP1	AU	02-Jul-19	late	6	107	RH	1	200 asl	20:07	5	1	15	30	15				45	distant	distant - Nearly alighting at 'S of fence' then looping away	0	0	
VP1	AU	02-Jul-19	late	7	108	RH	1	250 asl	20:18	1.75	0							0	distant	distant - in to Site E	0	0	
VP1	AU	02-Jul-19	late	8	109	RH	1	250 asl	20:31	1.5	0							0	distant	distant - gradually down and out of sight beyond Wee Fea	0	0	
VP1	AU	02-Jul-19	late	9	110	RH	1	150 asl	20:38	2.25	2			120				120	silent	silent - fast downwind, swinging south past Binga Fea	0	0	1
VP1	AU	02-Jul-19	late	10	111	RH	1	150-200 asl	20:57	2.75	0							0	distant	distant - rising to 225-250 asl past Wee Fea summit then steadily down and in towards Site B	0	0	
VP3	SJW	02-Jul-19	late	6	112	RH	1	100	21:09	1	1				60			60	silent	silent	0	0	1
VP1	AU	02-Jul-19	late	11	113	RH	1	150 asl	21:17	7.25	5.5		30	150	150			330	silent	silent - with fish heading in towards Site G; quite direct but slow into wind and not rising much above ridge height	0	0	1
VP1	AU	02-Jul-19	late	12	114	RH	1	150 asl	21:31	1.5	0							0	distant	distant - gradually lower and out of sight	0	0	
VP1	AU	02-Jul-19	late	13	115	RH	1	200 asl	21:42	1.25	1.25			75				75	vocal	vocal - fast downwind	0	0	1
VP1	AU	02-Jul-19	late	14	116	RH	2	200 asl	21:43	8	1.75	15	15	30	45			180	vocal	vocal - may have come off Site C and finally went back in there	0	0	
VP1	AU	16-Jul-19	p.m.	1	117	RH	1	300-350 asl	13:31	3.25	0							0	distant	distant - stayed high to west of Site G, but angling down decisively to north at end	0	0	
VP1	AU	16-Jul-19	p.m.	6	118	RH	1	300 asl	14:53	1	0							0	distant	distant - stayed more or less level, perhaps lower at end but not clearly down to Site G	0	0	
VP3	SJW	16-Jul-19	p.m.	6	119	RH	1	120	15:27	2	2			30	90			120	silent	silent	0	0	1
VP1	AU	16-Jul-19	p.m.	7	120	RH	1	200 asl	15:44	9	4				240			240	silent	silent - in with fish; gaining little height and lost well beyond skyline still heading west - estimated c. 2km beyond map - In to West	0	0	1
VP3	SJW	16-Jul-19	p.m.	8	121	RH	1	150	15:55	7.25	6.25					375		0	silent	silent	0	0	
VP3	SJW	16-Jul-19	p.m.	9	122	RH	1	100	16:12	1.5	1.5			45	45			90	distant	distant - Lost beyond Sky Fea; allocated time of 1 min looks too short for distance flown into a headwind, therefore 30 secs added and height split equally between bands 2 & 3	0	0	1
VP1	AU	16-Jul-19	pm/late	1	123	RH	1	200 asl	16:47	3.25	0							0	distant	distant - with fish; climbing until across ridge, then angling lower and in towards Site C	0	0	
VP1	AU	16-Jul-19	pm/late	2	124	RH	1	200-250 asl	17:15	2.25	0.5		30					30	distant	distant - outgoing, angling downwards throughout	0	0	
VP1	AU	16-Jul-19	pm/late	3	125	RH	1	300-350 asl	17:20	1.75	0							0	silent	silent - with fish; angling gradually down and in to alight west side of Site G	0	0	
VP1	AU	16-Jul-19	pm/late	4	126	RH	1	300-350 asl	17:28	2	0							0	distant	distant - with fish; not followed all the way in since no. 5 crossed with it, but in towards Site G	0	0	
VP1	AU	16-Jul-19	pm/late	5	127	RH	1	200-250 asl	17:29	5	1.5			45	45			90	silent	silent - flying out fast, not losing much height until beyond buffer and finally heading down towards south end of Fara	0	0	1
VP3	SJW	16-Jul-19	pm/late	1	128	RH	1	150	17:43	3.25	2.25					135		0			0	0	
VP3	SJW	16-Jul-19	pm/late	3	129	RH	2	100	17:57	6	0.75				45			90		lost over Shell hill heading north	0	0	
VP1	AU	16-Jul-19	pm/late	6	130	RH	1	250-300 asl	18:02	2.25	0							0	silent	silent - with fish, heading down to alight at west side Site G	0	0	
VP1	AU	16-Jul-19	pm/late	7	131	RH	1	15-50	18:16	0.5	0							0	silent	silent - just seen arriving in to Site E	0	0	
VP1	AU	16-Jul-19	pm/late	8	132	RH	1	300 asl	18:24	0.5	0							0	distant	distant - with fish in to east side of Site G	0	0	
VP1	AU	16-Jul-19	pm/late	9	133	RH	1	250 asl	18:35	3.5	0.75			15	30			45	silent	silent - climbing slightly at start, then gradually down across valley - at c.200 asl past VP and starting glide down to shore already as going out of sight; out from Site G	0	0	
VP3	SJW	16-Jul-19	pm/late	6	134	RH	1	150	18:53	1.5	1.5				90			90			0	0	1
VP1	AU	16-Jul-19	pm/late	10	135	RH	1	200 asl	19:23	3	2				120			120	silent	silent - gradually down through site, so exiting buffer at c.150 asl, then angling down more clearly across to north	0	0	1
VP1	AU	16-Jul-19	pm/late	11	136	RH	1	200 asl	19:43	3	0							0	distant	distant - with fish; climbing steadily then in to east side of Site G	0	0	
VP3	AU	23-Jul-19	early	1	137	RH	1	100 asl	06:12	1.5	0							0	distant	distant - gliding down to alight on sea at end	0	0	
VP3	AU	23-Jul-19	early	8	138	RH	1	50-100	07:51	0.5	0							0	vocal	vocal - heard then seen	0	0	
VP3	AU	23-Jul-19	early	9	139	RH	1	100-150 asl	07:59	2.5	2.5		150					150	silent	silent - with fish, angling down out of sight as if towards Site B	0	0	1

VP3	AU	23-Jul-19	early	11	140	RH	1	c.50	08:22	0.25	0						0	distant	distant - may simply have been looping offshore	0	0			
VP1	AU	24-Jul-19	early	1	141	RH	2	150-200 asl	04:45	4.25	1.5	15	45	30			150	silent	silent - rising north then in low towards Site A and rising back to 15-50m across and in to Site C	0	0			
VP1	AU	24-Jul-19	early	2a	142	RH	2	50-100	05:03	1	1		15	45			120	vocal	vocal - steeply in to Site A	0	0			
VP1	AU	24-Jul-19	early	2b	143	RH	1	15-50	05:03	1	1		60				60	vocal	vocal - steeply in to Site A	0	0			
VP1	AU	24-Jul-19	early	3	144	RH	3	250 asl	05:08	0.5	0						0	vocal	vocal - calls heard for some time before detection - lost into forming cloud	0	0			
VP1	AU	24-Jul-19	early	4	145	RH	1	200-250 asl	05:23	0.75	0.5			30			30	silent	silent - lost into cloud	0	0	0		
VP1	AU	24-Jul-19	early	5	146	RH	1	150 asl	05:38	2.5	2.5			90	60		150	silent	silent - out from Site I & avoiding the cloud cap beginning to sit on Wee Fea	0	0	1		
VP1	AU	05-Aug-19	p.m.	1	147	RH	1	250 asl	12:45	2	1.25		45	30			75	silent	silent - level until angling down beyond Wee Fea	0	0			
VP1	AU	05-Aug-19	p.m.	2	148	RH	1	200 asl	13:38	2	1			60			60	silent	silent - down gradually so that c.50m at end	0	0	1		
VP1	AU	05-Aug-19	p.m.	4	149	RH	1	150-200 asl	15:06	1.75	1.5		30	45	15		90	silent	silent - in with fish; lost in cloud beyond Sky Fea at c250 asl	0	0	1		
VP1	AU	05-Aug-19	p.m.	5	150	RH	1	250-300 asl	15:53	1	1			60			60	silent	silent - level into a patch of low cloud and not seen reappearing, but was angling away N	0	0			
VP1	AU	05-Aug-19	p.m.	7	151	RH	1	300 asl	16:26	1.25	0						0	silent	silent - in to Site G from south	0	0			
VP1	AU	05-Aug-19	p.m.	8	152	RH	1	250 asl	16:27	2.5	0.25			15			15	silent	silent - in to Site G	0	0	0		
VP1	AU	05-Aug-19	pm/late	2	153	RH	1	200 asl	17:29	0.75	0						0	distant	distant - more or less level & out of sight beyond Sky Fea	0	0			
VP1	AU	05-Aug-19	pm/late	3	154	RH	1	150 asl	17:34	0.5	0						0	vocal	vocal - heard behind VP and seen away S - out from Site I	0	0			
VP1	AU	05-Aug-19	pm/late	4	155	RH	1	200-250 asl	18:17	4	0.5		30				30	distant	distant - looked as if it wanted to go in at Site D, but low cloud was sitting there; lost still at height	0	0			
VP1	AU	05-Aug-19	pm/late	5	156	RH	1	150-200 asl	18:28	4.25	1.25			60	15		75	silent	silent - very gradually down and out of sight towards Flotta pier	0	0	1		
VP1	AU	05-Aug-19	pm/late	6	157	RH	1	200 asl	18:35	3	0						0	vocal	vocal - level out, still at c.200m towards shore - out from Site I	0	0			
VP3	AU	06-Aug-19	p.m.	2	158	RH	1	200-250 asl	13:35	2	0.25				15		15	silent	silent - descending gently, then steeper past site down to Mill Bay	0	0			
VP3	AU	06-Aug-19	p.m.	3	159	RH	1	200-250 asl	14:20	3	2.75			150	15		165	silent	silent - level, then angling suddenly to south and gently losing height from there to join 2 birds well up in the middle of the valley, then all apparently in towards Site I	0	0	1		
VP3	AU	06-Aug-19	p.m.	5	160	RH	1	150 asl	15:52	2.5	2.5		30	105	15		150	silent	silent - in with fish, climbing gradually; lost into clouds in upper valley	0	0	1		
VP1	AU	20-Aug-19	late	2	161	RH	1	175 asl	17:31	1	0						0	distant	distant - gently down beyond skyline in towards Site H	0	0			
VP1	AU	20-Aug-19	late	3	162	RH	3	250 asl	17:37	5	1.25			45	30		225	vocal	vocal - climbing to 300-350 asl then down steeply at end in to Site G	0	0	3		
VP1	AU	20-Aug-19	late	4	163	RH	1	175 asl	17:52	0.5	0						0	distant	distant - descending gently towards Site H	0	0			
VP3	SJW	20-Aug-19	late	1	164	RH	1	100	18:11	3.25	1.75				105		105	silent	Silent - dropping height over Bakingstone Hill towards Site H	0	0	1		
VP1	AU	20-Aug-19	late	5	165	RH	1	250 asl	18:23	7	0.5				30		30	silent	silent - climbing to c. 300 asl then gradually down from north-most point and away down Heldale Burn	0	0			
VP1	AU	20-Aug-19	late	6	166	RH	1	200 asl	18:30	2.75	0						0	silent	silent - with fish - in towards Site H	0	0			
VP1	AU	20-Aug-19	late	7	167	RH	1	250-300 asl	18:44	3.25	0.5				30		30	silent	silent - at c. 200 asl through buffer then on downwards - probably out from Site G	0	0			
VP1	AU	20-Aug-19	late	8	168	RH	2	250-300 asl	18:50	6.75	0						0	silent	silent - climbed to 350 asl - left them circling distantly to north as no. 9 flew by	0	0			
VP1	AU	20-Aug-19	late	9	169	RH	1	200 asl	18:57	2	0.5			30			30	silent	silent - with fish - in to Site G	0	0	0		
VP1	AU	20-Aug-19	late	10	170	RH	1	200 asl	19:14	4.75	0						0	silent	silent - with fish - in to Site G	0	0			
VP1	AU	20-Aug-19	late	11	171	RH	2	200 asl	19:18	2.25	2			30	90		240	vocal	vocal - stayed fairly level - out from Site I	0	0	2		
VP1	AU	20-Aug-19	late	12	172	RH	3	300 asl	19:21	2	1					60	0	vocal	vocal	0	0			
VP3	SJW	20-Aug-19	late	5	173	RH	1	150	19:33	6.25	5.25				270	45	270	vocal	vocal - picked it up and it was gaining height heading west did loop over Little Wee Fea then out towards Fara	0	0	4		
VP1	AU	20-Aug-19	late	13	174	RH	1	150-200 asl	20:07	0.75	0						0	silent	silent - with fish - probably in to Site F (from height; climbing only slightly and lost beyond ridge)	0	0			
VP3	SJW	21-Aug-19	a.m.	1	175	RH	1	150	10:37	2	2			60	30	30	90	silent	silent - lost behind Wee Fea in level flight	0	0	1		
VP3	SJW	21-Aug-19	a.m.	3	176	RH	1	150	10:44	4	3.5		15	90	75	30	180	silent	silent - in with fish; more or less level flight over top of Bakingstone Hill and in towards Site G	0	0	1		
VP1	AU	21-Aug-19	a.m.	2	177	RH	1	250 asl	11:04	4	1.5					90	0	vocal	vocal - gradually down to 200 asl at edge of buffer and stil high near shore - probably out from Site G	0	0			
VP3	SJW	21-Aug-19	a.m.	4	178	RH	1	150	11:42	3.25	2.25				15	120	15	silent	silent - level, lost south behind Binga fea	0	0	0.75	Count as 3/4 pass at risk (went across parallel to risk window where layout widest)	
VP1	AU	28-Aug-19	pm/late	1	179	RH	1	250-300 asl	16:06	1	1				45	15	45	silent	silent - fast downwind; lost in wisps of lower cloud, still at 200-250m asl	0	0	1		
VP1	AU	28-Aug-19	pm/late	2	180	RH	2	250 asl	16:37	3.5	0.5		30				60	distant	distant - descending gradually away	0	0			
VP3	SJW	28-Aug-19	pm/late	4	181	RH	1	150	17:12	6.5	5.5			30	240	60	270	silent	silent - more or less level flight	0	0	1		
VP3	SJW	28-Aug-19	pm/late	5	182	RH	1	100	17:50	1	1		30	30			60	silent	silent - level lost behind Wee Fea	0	0	1		
VP1	SJW	29-Aug-19	early	1	183	RH	2	150	06:40	6.5	3				30	150	60	silent	silent - incoming about 150m (or may have come off Site A?) gaining height circled up to about 175m then joined by a 3rd bird (VP3 no. 1) that was picked up heading east; lost behind Wee Fea for a while, then followed better from VP3, out level at c.200m, descending when near shore and then steeply on swing round into Mill Bay. Only the initial flight of this pair was at risk, estimated at 3 minutes	0	0			
VP3	AU	29-Aug-19	early	3	185	RH	1	50-100	07:52	1	0						0	distant	distant - out of view behind Binga Fea at c.100 asl	0	0			
VP1	SJW	29-Aug-19	early	5	186	RH	1	20	09:23	2.75	2		15	105			120	silent	silent - heading southwest gaining height all the time, about 100m when lost to view north of Sky Fea ridge reappeared heading east over Site C	0	0			
VP1	SJW	04-Sep-19	p.m.	1	187	RH	1	150	17:25	6	3					180	0	silent	silent - with fish; level flight dropping height into Sands Water	0	0			
VP1	SJW	04-Sep-19	p.m.	3	188	RH	1	150	18:18	3.5	1			15	45		60	silent	silent - dropped slightly in height but mostly level over site then down towards Site H	0	0	0		
VP3	SJW	05-Sep-19	early	2	189	RH	1	150	08:02	3.25	2.5					150	0	silent	silent - level flight over site, dropping down west of Bakingstone hill in towards Site H	0	0			
											221.25	105	1710	4575	4830	1815	300	13635	0			0	0	-60	**81.75**

VP	Observer	Date	Original Flight line ref	Flight Ref No.	Species	No. of birds	incoming/ outgoing/ non-breeders social flight / unknown	Site Ref.	Flight height summary	Total flight duration	Comment	
Diver VP2	SJW	30_may-18	1	1	RH	1	incoming	Site G	level flight	6 min		
Diver VP2	SJW	30_may-18	2	2	RH	1	incoming	sites north	steady height	4 min	lost looking into light	
Diver VP2	SJW	31_may-18	1	3	RH	1	incoming	Site B		4 min	appeared to land on loch	
Diver VP2	SJW	31_may-18	2	4	RH	1	incoming	Site G		5 min	headed west	
Diver VP2	SJW	31_may-18	3	5	RH	1	outgoing	Site G		4 min	gained height as approached Binga Fea ridge	
Diver VP2	SJW	31_may-18	4	6	RH	1	outgoing	Site B		3 min	looked as though came off loch <10m	
Diver VP2	SJW	31_may-18	6	8	RH	1	incoming	Site G		4 min		
Diver VP1a	SJW	03-Jul-18	2	11	RH	1	incoming	sites north	100 - 120m	6min 52 sec	headed north-west over top of Withigill 120m	
Diver VP1a	SJW	03-Jul-18	3	12	RH	1	outgoing	Site B	mostly 100m	9min	bird had just taken off when first seen level flight, lost to view east of SPM's in scapa flow, 1ad and chick still on loch	
Diver VP1a	SJW	03-Jul-18	3	15	RH	1	incoming	sites north		5 min		
Diver VP1a	SJW	03-Jul-18	5	17	RH	1	outgoing	Site J	150 - 0	8 min	looked as though landed in sea to north of Longhope	
Diver VP1a	SJW	03-Jul-18	6	18	RH	1	outgoing	Site B	0-100m	10 min	took off from Site B, lost to view low over flow to east of Cava. Chick swimming in middle of loch	
Diver VP2	NH	04-Jul-18	2	20	RH	1	unknown	Site I	c.230m asl initially, dropping to 170m asl	219s	Circling, and looking as if it might land at Site D, then heading off towards Site I. Lost near loch.	
Diver VP2	NH	04-Jul-18	8	26	RH	1	incoming	Site G	250m asl	111s		
Diver VP2	NH	04-Jul-18	12	30	RH	2	incoming	Site C	0-116s: 230 -270m asl (variable)	116s	2 birds, circling over Site A, first bird landing on lochan	
Diver VP2	NH	04-Jul-18	13	31	RH	1	incoming	sites north	0-58s: 230-270m asl (variable)	58s	2nd bird from previous flight line (12) continuing west	
Diver VP2	SJW	17-Jul-18	1	32	RH	1	incoming	sites north	150m	7 min 19 sec	incoming level flight for whole period see lost to view over shoulder	
Diver VP2	SJW	17-Jul-18	2	33	RH	1	outgoing	sites north	100m dropping to <50m over Scapa Flow	10min 18 sec	lost to view low over the flow	
Diver VP2	SJW	17-Jul-18	3	34	RH	1	incoming	sites north	75 - 100m	4min 53 sec	north-west over top of Withigill 100m	
Diver VP2	SJW	17-Jul-18	1	35	RH	1	incoming	sites north	100-75	12min 19 sec	lost to view to north	
Diver VP2	SJW	17-Jul-18	2	36	RH	1	incoming	Site I	75 - 50	4 min 11 sec	dropping from view heading west over heldale valley	
Diver VP1a	SJW	19-Jul-18	1	38	RH	1	incoming	sites north	100m	4min 14sec	Incoming level flight lost to view north	
Diver VP1a	SJW	19-Jul-18	2	39	RH	2	outgoing	Site B	0-100m		both took off from Site B, circled and headed out into flow, lost to view	
Diver VP1a	SJW	19-Jul-18	4	41	RH	1	outgoing	Site A	<5-50m	4min 37 sec	presumed adult from Site A	
Diver VP1a	SJW	19-Jul-18	6	43	RH	2	incoming	sites north	50-100	8min 51 sec	wide circling flight birds calling lost over top of withigill	
Diver VP1a	SJW	19-Jul-18	1	45	RH	1	incoming	Site C	75 - 0	4min 33 sec	came in and landed on loch Site C	
Diver VP1a	SJW	19-Jul-18	2	46	RH	2	incoming	Site H	50- 25	2min 53 sec	dropping in height towards end of flight lost to view	
Diver VP1a	SJW	19-Jul-18	3	47	RH	1	outgoing	sites north	100	9min 29 sec	out going lost to view Brims - sea	
Diver VP1a	SJW	19-Jul-18	1	49	RH	1	incoming	Site J	100 - 0m	4min 53 sec	in coming flight with fish, looked as though landed Site J	
Diver VP1a	SJW	19-Jul-18	2	50	RH	1	incoming	Site B	50 - 0m	1min 3 sec	in coming flight landed Site B	
Diver VP1a	SJW	19-Jul-18	3	51	RH	1	incoming	Site G	120m	2min 49 sec	lost to view over sky line	
Diver VP1b	NH	07-Aug-18	3	54	RH	2	outgoing	Site G	0-120s: 300m 120s-160s: 240m	160s	Lost eventually.	
	AU	07-Aug-18	10	57	RH	1		sites north	150 - 175m	7 min	across north-east; rising at Wee Fea and joining 7 other birds beyond, all circling widely	
	AU	07-Aug-18	14	58	RH	1	incoming	Site H	around VP and still c.150 asl where lost	3 min	probably in to Site H	
	AU	07-Aug-18	19	59	RH	1	incoming	Site H	found just after take-off; rising in, but staying <150 asl	5 min	in to Site A with fish	
	AU	07-Aug-18	20	60	RH	1	incoming	Site I	to no more than 50m across neck and not really rising until swing back N to max 150 asl; heading slightly down when out of sight behind hill	7 min	In to Site I	
	AU	07-Aug-18	21	61	RH	1	incoming	Site G	Rising from Site I onwards to 250 asl	5.5 min	in towards Site G	
	AU	07-Aug-18	22	62	RH	1	incoming	Site H	rising to 200 asl	4.5 min	in to Site H with fish	
	AU	07-Aug-18	23	63	RH	1	incoming	Site H	rising to 200-225 asl across Bakingstone ridge, then lower	4.5 min	in to Site H with fish	
	AU	07-Aug-18	27	64	RH	1 + 1	incoming	Site H	rising in loops and in at 150 asl; up to 175 asl before levelling past Binga Fea	11 mins	in to Site H with fish	
	AU	07-Aug-18	28	65	RH	2	incoming	Site H	rising to 250-300 asl in past Binga Fea, then gradually down	8 mins	in to Site H	
	AU	07-Aug-18	29	66	RH	3	incoming	Site I	Rising to 250 asl and then in	3 mins	2 landed on Site I one out of sight low at West end	
Diver VP3	NH	08-Aug-18	1	67	RH	2	incoming	Site G	0-60s: Dropping from 200m to 150m 60-100s: Climbing fro 150m to 270m 100- 360s: 270m	360s	Birds heading towards Site G.	
Diver VP3	NH	08-Aug-18	3	69	RH	1	incoming	Site G	0-172s: 300m	172s		
Diver VP3	NH	08-Aug-18	5	71	RH	1	unknown	Site G	0:80s: 320m	80s		
Diver VP3	NH	08-Aug-18	2	73	RH	1	outgoing	Site G	0-120s: 200m 120-160s:120m	160s	Heading from Site G to sea. Lost against vegetation.	
Diver VP1c	AU	09-Aug-18	1	74	RH	1	incoming	Site G	dived away a bit lower as NX made a half-hearted chase	2 mins	In to Site G - WITH FISH	
Diver VP1c	AU	09-Aug-18	2	75	RH	1	outgoing	Site G	Gently down; steeper at end and low over water around Lyness	5 mins	probably out from Site G	
Diver VP1c	AU	09-Aug-18	3	76	RH	1	outgoing	Site G	Gradually down from Wee Fea onwards; lost still descending	3.5 mins	Out from Site G	
Diver VP1c	AU	09-Aug-18	4	77	RH	1	outgoing	Site G	rising to 350 asl and staying at 300 asl well out towards shore	3 mins	Out from Site G	
Diver VP1c	AU	09-Aug-18	5	78	RH	2	non-breeding social flight	Site G	descending gradually to 250 asl on approach to Site G, but not alighting there and away down heading offshore where lost against the water; long-calling from Site H a little later may mean that they went in there	11 mins	Non-breeders - In/Out Site G	
Diver VP1c	AU	09-Aug-18	6	79	RH	2	non-breeding social flight	Site G	down steeply to alight	2 mins	Non-breeders in to Site G; they stayed there for the whole of the next watch	
Diver VP4a	AU	09-Aug-18	7	80	RH	1 ad	outgoing	Site G	low around lochans, then rising slightly away	several	Out from Site G	
Diver VP4a	AU	09-Aug-18	8	81	RH	1 ad	incoming	sites north	gradually rising and lost at >300 asl	several	headed north with fish	
Diver VP4a	AU	09-Aug-18	9	82	RH	1 ad	outgoing	Site G	low away and lost against far slope; not seen rising above skyline	<1 min	Out from Site G	
Diver VP4a	AU	09-Aug-18	10	83	RH	1 ad	outgoing	Site G	out at 250 asl i.e. against ground all the way from VP	3 mins	Out from Site G	
Diver VP4a	AU	09-Aug-18	11	84	RH	1 ad	incoming	Site G	came from below Sky Fea summit	1 min	In to Site G with fish	
Diver VP4a	AU	09-Aug-18	13	86	RH	1	non-breeding social flight	Site G		<1 min	single non-breeder just seen arriving to Site G	
Diver VP4a	AU	09-Aug-18	14	87	RH	2	non-breeding social flight	Site G	around low, then out W at 20-50m and gradually down away offshore	5 min	Non-breeders out from Site G	
Diver VP4a	AU	09-Aug-18	15	88	RH	1	outgoing	Site G	rising slightly to 275-300 asl then long descent to alight in Mill Bay	5 min	Out from Site G	
Diver VP4a	AU	09-Aug-18	16	89	RH	1	outgoing	Site G	out at 275 asl and very gradually down; lost descending more steeply at end against S Walls	6 min	Out from Site G	
Diver VP4a	AU	09-Aug-18	17	90	RH	2	non-breeding social flight	Site G	out more or less level out of sight to N	several	Non-breeders out from Site G - heard for a while then found exiting lochan area	
Diver VP4b	SJW	21_Aug-18	1	91	RH	1	outgoing	Site G	10-120	12 mins		
Diver VP4b	SJW	21_Aug-18	2	92	RH	1	incoming	Site G	100 - 0	3 mins	landed with fish, straight to chick with fish, larger of the two chicks got the fish	
Diver VP4b	SJW	21_Aug-18	3	93	RH	2	incoming	Site G	50 - 0	1 min	landed on loch, 5 ads now on one loch	
Diver VP4b	SJW	21_Aug-18	4	94	RH	5	outgoing	Site G	0 -150	15 mins	5 ads all took of from loch birds broke up into individuals, only able to follow the one	
Diver VP4b	SJW	21_Aug-18	5	95	RH	1	incoming	Site G	100 - 0	4 mins	landed on loch now two ads and two chicks on loch	
Diver VP4b	SJW	21_Aug-18	1	96	RH	5	outgoing	Site G	5-75m	4 mins	appeared to have taken off from large loch, lost to view down burn of ore	
Diver VP4b	SJW	21_Aug-18	3	98	RH	1	incoming	sites north	100m	3 mins	lost to view over head heading towards withigill	
Diver VP4b	SJW	21_Aug-18	4	99	RH	2	outgoing	Site G	20-100m	5 mins	lost to view east of wee fea	
Diver VP4b	SJW	21_Aug-18	5	100	RH	2	incoming	Site G	20-0m	2 mins	incoming flight landed on loch	
Diver VP1c	SJW	22_Aug-18	1	101	RH	1	incoming	Site G		7 mins		
Diver VP1c	SJW	22_Aug-18	2	102	RH	1	outgoing	Site J	75-100	6 mins	gained height flying south	
Diver VP1c	SJW	22_Aug-18	3	103	RH	1	incoming	Site G		3 mins		
Diver VP1c	SJW	22_Aug-18	5	105	RH	1	incoming	Site H	75-0	4 mins	incoming flight with fish to chick Site H	
Diver VP5	SJW	23_Aug-18	1	106	RH	1	outgoing	Site G		3.5 min		
Diver VP5	SJW	23_Aug-18	2	107	RH	2	unknown	Site G	75-100	5 min	pair very vocal	
Diver VP5	SJW	23_Aug-18	3	108	RH	1	non-breeding social flight	Site H	100-0	2.5 min	landed on Site H, went to west end of loch away from adults with chicks	
Diver VP5	SJW	23_Aug-18	4	109	RH	1	non-breeding social flight	sites north		5 min	circled over Site H continued to north	
Diver VP5	SJW	23_Aug-18	5	110	RH	1	unknown	sites north	50-120	6 min	vocal adult	
Diver VP1c	SJW	23_Aug-18	1	111	RH	1	incoming	Site G		4 min	lost dropping into Site G	
Diver VP1c	SJW	23_Aug-18	2	112	RH	1	outgoing	Site H	0-100m	5 min	took off Site H	
Diver VP1c	SJW	23_Aug-18	3	113	RH	1	unknown	Site J	75-100m	6 min	over towards Site J	
Diver VP1c	SJW	23_Aug-18	4	114	RH	1	incoming	Site G	100 -50m	4 min	with fish, presumed incoming to Site G as dropping height .	

VP name	Observer	Date	Time start	Time finish	Total duration	Time first detected	Original Flight line ref	Flight Ref No.	Species	No. of birds	Flight height at detection	incoming/ outgoing/ non-	Site Ref	Flight height summary	Total flight duration	Comment
VP between site 18 & 51	SJW	30_May_19	04:50	07:50	3	05:40	1	1	RH	2	50m	incoming	Site D	circled then dropped height and landed	180 sec	in to Site D
VP between site 18 & 51	SJW	30_May_19	04:50	07:50	3	07:10	2	2	RH	2	0	outgoing	Site C		240 sec	took off silent but may be due to distance, circled gaining height, to about 100m then off east
VP between site 18 & 51	SJW	30_May_19	04:50	07:50	3	07:40	3	3	RH	1	100m	incoming	Site B	landed on lochan	115 sec	from South calling, landed Site B
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	08:31	1	4	RH	1	75m	incoming	Site C	75m - 0	58 sec	landed, Site C joined the bird already on the loch
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	09:01	3	5	RH	2	150	incoming	Site B	150 - 0	63 sec	calling landed Site B
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	09:04	4	6	RH	2	75	incoming	Site A	75 -0	18 sec	landed Site A
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	09:35	5	7	RH	2	40	outgoing	Site A	40-150	190 sec	presumed Site A pair, out over Lyness
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	10:27	8	8	RH	1	150		Site G	level flight	180 sec	over Sky Fea heading west
VP between site 18 & 51	SJW	30_May_19	08:20	11:20	3	10:35	9	9	RH	1	100	incoming	Site B	level height then quick descent to 0	128 sec	landed Site B
Lower Sky Fea	AU	11_June_19	18:55	21:40		20:05	1	10	RH	1	water	outgoing	Site A	off Site A and staying below Wee Fea summit; gradually down and lost at 50-100m towards shore		
Lower Sky Fea	AU	11_June_19	18:55	21:40		20:25	2	11	RH	1	water	outgoing	Site B	Off Site B - stayed <200m asl and lost at 100-150m descending into Mill Burn		
Lower Sky Fea	AU	11_June_19	18:55	21:40		21:28	3&4 (just digitise as one single	12	RH	1	water	outgoing	Site B			Had arrived back at Site B unseen; low hop across to adjacent lochan then low and direct flight away - soon lost against backdrop
	SJW	3_July_19	06:45	09:45		07:42	3	13	RH	1	water	outgoing	Site B	0-100m	6 min	took off from Site B, by size looked like the male, second adult female present on loch with two chicks
	SJW	3_July_19	06:45	09:45		08:00	4	14	RH	1	100m	incoming	Site J	100 - 0m	4 min	level flight landed Site J
	SJW	3_July_19	06:45	09:45		08:10	5/6 (just digitise as one single flight)	15	RH	2	150m	in/out	Site A	150-0-150m	9 mins	landed Site A, four birds now on loch. pair which was on loch being very aggressive to birds which landed and drove off the pair which landed on loch. Pair remained on loch
	SJW	3_July_19	06:45	09:45		08:30	7	16	RH	1	10	incoming	Site D	10m - 0m	18 secs	landed Site D
	SJW	3_July_19	06:45	09:45		09:04	8	17	RH	1	5	outgoing	Site A	5 - 150m	5 mins	in air north of Site A, 1 adult was present on loch, presumed it had just taken off
Bakingstone Hill E	AU	22_July_19	16:45	17:15	0.5	16:55	1	18	RH	1	50 asl	incoming	Site H	rising just enough to cross ridge		with fish probably in to Site H
Bakingstone Hill W	AU	22_July_19	17:15	17:50		17:25	2	19	RH	1	water	outgoing	Site I	stayed low out over ridge		out from unmarked lochan (ad + chick remaining) and down to Site I
Bakingstone Hill W	AU	22_July_19	17:15	17:50		17:35	3	20	RH	2	200-250 asl	outgoing	Site H	heard off Site H but not picked up until already at some height		Lost into a wall of cloud at Site I - out from Site H
Bakingstone Hill W	AU	22_July_19	18:10	18:20		18:10	4	21	RH	2	250 asl	incoming	Site G	in at c.50m over Site G		In to Site G
	AU	23_July_19	10:00	13:00	3	10:17	1	22	RH	1	150-200 asl	incoming	Site G	rising so at 200-250 asl past VP and 300m or more before down at end	6	with fish - down at end towards Site G
	AU	23_July_19	10:00	13:00		10:56	2	23	RH	1	150 asl	incoming	Site G	rising so at 200-250 asl past VP and 300m or more before down at end	5	with fish - in to Site G
	AU	23_July_19	10:00	13:00		11:28	3	24	RH	1	200 asl	incoming	Site G	losing height into hill (to <150m asl where briefly out of view) then rising strongly on wind to 300-350m asl and down	6.5	with fish - in to Site G
	AU	23_July_19	10:00	13:00		11:43	4	25	RH	1	200-250 asl	incoming	Site G	rising to 250-300m asl past VP and on to >300m before angling down	3.5	with fish - in towards Site G
	AU	23_July_19	10:00	13:00		12:13	5	26	RH	1	170 asl	incoming	Site G	rising to 250m asl past VP then to 300m after circling	7.75	with fish - in towards Site G
South Sky Fea	AU	23_July_19	17:15	21:00	3.75	17:43	1	27	RH	1	100-150 asl	incoming	Site H	gently down	1 min	presumably with fish - in to Site H, joining and ad + 2 chicks
South Sky Fea	AU	23_July_19	17:15	21:00		17:45	2	28	RH	1	water	outgoing	Site H	staying at or below 150 asl i.e. against the far hillside for most of the way	7 min	one of above ads out from Site H
South Sky Fea	AU	23_July_19	17:15	21:00		18:07	3	29	RH	1	<5	outgoing	Site H	rising in tacks to >150m asl to clear ridge, then no losing much height until offshore	5	a non-breeding bird out from Site H
South Sky Fea	AU	23_July_19	17:15	21:00		18:22	4	30	RH	1	water	outgoing	Site H	rising to 175-200m asl, descending only near shore	5	out from Site H - an ad + chick remaining there
South Sky Fea	AU	23_July_19	17:15	21:00		18:32	5	31	RH	1	water	outgoing	Site H	through 'gap' at <150m asl then level out until down quite steeply to alight	6	breeding bird out from Site H
South Sky Fea	AU	23_July_19	17:15	21:00		18:47	6	32	RH	1	250-300 asl	incoming	Site G	level, then gradually down	1	in with fish to Site G
South Sky Fea	AU	23_July_19	17:15	21:00		19:14	8	33	RH	1	150-200 asl	incoming	Site H	fast down to water from ridge	2	a non-breeding bird in to Site H
South Sky Fea	AU	23_July_19	17:15	21:00		19:44	9	34	RH	1	200-250 asl	incoming	Site G	level in	2	with fish to Site G
South Sky Fea	AU	23_July_19	17:15	21:00		19:44	10	35	RH	2	150 asl	incoming	Site I	level back around Site H then rising away and down to land on Site I	4	non-breeding birds; uncertain where from, but in to Site I
South Sky Fea	AU	23_July_19	17:15	21:00		20:11	11	36	RH	1	250 asl	incomin	Site G	level in, then around and out; left it to follow no. 12	2	no fish - probably a non-breeder in towards Site G
South Sky Fea	AU	23_July_19	17:15	21:00		20:13	12	37	RH	1	250 asl	outgoing	Site F	level out as far as mapped	3	Out from Site F
South Sky Fea	AU	23_July_19	17:15	21:00		20:22	13	38	RH	1	200-250 asl	outgoing	Site G	out at 175-200m asl for most of way, angling down at end	3	Out from Site G
South Sky Fea	AU	23_July_19	17:15	21:00		20:40	14	39	RH	1	<5	outgoing	Site H	rising to cross ridge at 150-200m asl then level until down to alight on sea at end	6	Out from Site H
South Sky Fea	AU	23_July_19	17:15	21:00		20:48	15	40	RH	1	100-150 asl	incoming	Site G	climbing gradually and in low to Site G	2	with fish - in to Site G
South Sky Fea	AU	23_July_19	17:15	21:00		20:52	16	41	RH	1	250 asl	incoming	Site G	level in	1.5	with fish - in to Site G
South Sky Fea	AU	23_July_19	17:15	21:00		20:56	17	42	RH	1	200 asl	incoming	Site F	Rising past VP with single alarm call then straight down to Site I	4	with fish - presumably Site F bird again, this time straight on past to Site I - count first part of flight as in to Site F
Upper Sky Fea	AU	4-August_19	17:50	21:05		17:50	1	43	RH	1	water	outgoing	Site D	rising to 250m asl and staying there until close to shore	5	disturbed by me on arrival at VP - out from Site A
Upper Sky Fea	AU	4-August_19	17:50	21:05		18:12	2	44	RH	2	200 asl	incoming	Site H	up the contours and quite low over VP	3	calling loudly over VP but not deviating - apparently down towards Site H
Upper Sky Fea	AU	4-August_19	17:50	21:05		18:35	3	45	RH	1	water	outgoing	Site F	barely gaining height then gently down	4	out from Site F - 1 ad + chick remaining, so one missed coming in
Upper Sky Fea	AU	4-August_19	17:50	21:05		18:39	4	46	RH	2	20m	incoming	Site D	in over VP to alight	<1	In to Site A - 2 birds already there had arrived unseen
Upper Sky Fea	AU	4-August_19	17:50	21:05		18:55	5	47	RH	2	250 asl	incoming	Site D	in from north to alight	<1	In to Site A - 6 birds now there
Upper Sky Fea	AU	4-August_19	17:50	21:05		19:00	6	48	RH	2	water	outgoing	Site D	not gaining much height	2	noisily across and down - out from Site A and in to Site E
Upper Sky Fea	AU	4-August_19	17:50	21:05		19:20	7	49	RH	2	240 asl	incoming	Site B		1	vocal - down to Site B
Upper Sky Fea	AU	4-August_19	17:50	21:05		19:26	8	50	RH	1	200-250 asl	incoming	Site G	slightly gaining height	1	in with fish, lost behind Sky Fea summit - in to Site G
Upper Sky Fea	AU	4-August_19	17:50	21:05		19:35	9	51	RH	2	<20m	outgoing	Site D	slightly gaining height	1	noisily away from Site A
Upper Sky Fea	AU	4-August_19	17:50	21:05		20:44	10	52	RH	1	water	outgoing	Site D	more or less level	4	had been preening prior to take-off - no rings at all - out from Site A
South Sky Fea	AU	5-August_19	19:45	20:30		19:46	1	53	RH	2	water	outgoing	Site D	flying around at 20-50m before away	2	disturbed by me on arrival at VP; lost in low cloud out from Site A
South Sky Fea	AU	5-August_19	19:45	20:30		20:21	2	54	RH	1	250 asl	outgoing	Site G	more or less level and into cloud	1	Out from Site G
Bakingstone Hill	AU	20-August_19	06:30	09:30	3	06:43	1	55	RH	1	water	outgoing	Site H	staying below about 150m asl	33 mins!	out from unmarked lochan: much looping to W - flight path is very simplified, showing the maximum extent; with 3 other birds for c.10 mins, then another 3 for a further 10 mins, and finally down on its own to Site H
Bakingstone Hill	AU	20-August_19	06:30	09:30		06:55	2	56	RH	1	20-50	incoming	Site H	level in	2	with fish, arriving in to Site H beyond no. 1
Bakingstone Hill	AU	20-August_19	06:30	09:30		07:23	3	57	RH	1	<20	outgoing	Site H	rising to c. 150m asl	4	out from unmarked lochan; probably down to Site I
Bakingstone Hill	AU	20-August_19	06:30	09:30		07:56	5	58	RH	1	c.180 asl	incoming	Site G	rising over ridge and on upwards	4	with fish - in to Site G
Bakingstone Hill	AU	20-August_19	06:30	09:30		09:08	7	59	RH	1 + 1	water	outgoing	Site H	to 150-200 asl	several	Off Site H - lost, then picked up again with another, also presumed off Site H - away together and lost against the far slopes as they appeared to be going down to Site I
Bakingstone Hill	AU	20-August_19	06:30	09:30		09:15	8	60	RH	1	water	outgoing	Site H	stayed <20m	<1	Off unmarked lochan and more or less directly down to Site H
Bakingstone Hill	AU	20-August_19	06:30	09:30		09:27	9	61	RH	1	c.20	incoming	Site G	rising in loops	3	In to Site G not carrying a fish
Bakingstone Hill	AU	20-August_19	10:10	13:10	3	10:10	10	62	RH	1	water	incoming	Site I	rising to c.175m asl	7.5	Off unmarked lochan; 5 minutes of looping (very simplified) - briefly with 3 others nr Site H- then away fast down towards Site I
Bakingstone Hill	AU	20-August_19	10:10	13:10		10:44	11	63	RH	1	water	incoming	Site H	rising to 150 - 200m asl at times	17	Off unmarked lochan; extensive looping not far to west (extremely simplified) - with a pair for much of the time - then finally down to Site H
Bakingstone Hill	AU	20-August_19	10:10	13:10		11:03	12	64	RH	2	<5	outgoing	Site H	rising to c. 150m asl	4	Out from Site H; very simplified, then one of them down to unmarked lochan
Bakingstone Hill	AU	20-August_19	10:10	13:10		11:24	13	65	RH	1	250 asl	outgoing	Site G	out level until gradually down towards shore (where still at c.150m)	2.5	Probably out from Site G
Bakingstone Hill	AU	20-August_19	10:10	13:10		11:32	14	66	RH	1	150 - 200 asl	incoming	Site H	up and down a bit offshore, then level in at 150m asl	4	In to unmarked lochan (via a bit if looping near shore with two others)
Bakingstone Hill	AU	20-August_19	10:10	13:10		11:48	15	67	RH	1	water	incoming	Site I	low over ridge	1	Off unmarked lochan; gliding down steeply in to Site I
Bakingstone Hill	AU	20-August_19	10:10	13:10		11:59	16	68	RH	1	100 - 150 asl	incoming	Site H	rising to 200 - 250 asl against wind, then long descent in	4	In to Site H
Bakingstone Hill	AU	20-August_19	10:10	13:10		12:15	17	69	RH	1	c. 150 m asl	incoming	Site H	rising to 200-250 asl over the ridge and down burn; still at c.200m asl at end	4.5	Probably out from Site H
Bakingstone Hill	AU	20-August_19	10:10	13:10		12:37	18	70	RH	1	c. 150 m asl	incoming	Site H	rising to c. 200 asl then long gradual descent	5	with fish - in to Site H
Bakingstone Hill	AU	20-August_19	10:10	13:10		12:44	19	71	RH	1	c. 200m asl	incoming	Site G	rising in	1.5	With fish - in to Site G
Sky Fea	SJW	20-August_19	06:50	09:50	3	07:41	2	72	RH	2	100	outgoing	Site D	level	5 min	came from west side of Site A circled Site A then out over flow towards west side of Flotta
Sky Fea	SJW	20-August_19	06:50	09:50		08:40	3	73	RH	1	100	incoming	Site J	level then direct to loch	3min	with fish, landed Site J
Sky Fea	SJW	20-August_19	06:50	09:50		09:19	4	74	RH	1	75	outgoing	Site G	level	3min	lost to view in Burn of Ore heading east
Sky Fea	SJW	20-August_19	06:50	09:50		09:34	6	75	RH	1	50	incoming	Site D	dropping	21 sec	landed on Site A, three birds now on loch
Sky Fea	SJW	20-August_19	10:25	13:25	3		2	76	RH	1	75	incoming	Site G	level	4 min	with fish into towards Site G
Sky Fea	SJW	20-August_19	10:25	13:25			3	77	RH	1	75	incoming	Site G	level	3	in towards Site G
Bakingstone Hill	SJW	21-August_19	06:05	09:10		06:20	1	78	RH	1	0	outgoing	Site H	0-150	9 min	took off Site H, down Burn of Ore lost out over North Bay heading south dropping height over sea
Bakingstone Hill	SJW	21-August_19	06:05	09:10		06:35	2	79	RH	1	0	outgoing	Site H	0-100	15min	took off Site H very looping flight several circuits and landed on Site I
Bakingstone Hill	SJW	21-August_19	06:05	09:10		07:11	3	80	RH	1	100	incoming	Site H	100 -0	4min	incoming with a fish, landed Site H went to the brood 1 chick south side of loch, no adult with this chick
Bakingstone Hill	SJW	21-August_19	06:05	09:10		08:00	4	81	RH	1	150	incoming	Site G	150	5min	with fish heading into Site G
Bakingstone Hill	SJW	21-August_19	06:05	09:10		08:36	6	82	RH	1	75	incoming	Site G	75-50	3min	with fish 50m when overhead at vp then gained a bit and headed into Site G
Bakingstone Hill	SJW	21-August_19	06:05	09:10		08:50	7	83	RH	1	0	incoming	Site I	0-50-0	4min	took off Site H very focal, adult and chick remained on loch, adult which took off landed Site I
Bakingstone Hill	SJW	21-August_19	06:05	09:10		09:02	9	84	RH	1	100	incoming	Site G	100	6min	west up Burn of Ore into Site G with a fish
Sky Fea	AU	21-August_19	06:20	09:35		06:28	1	85	RH	1	<10	incoming	Site D	staying <20m	1	Off Site E and in to Site A
Sky Fea	AU	21-August_19	06:20	09:35		06:52	2	86	RH	2	c. 250 asl	outgoing	Site D	more or less level	1	perhaps put off from alighting at Site A - lost away into sun, but heard calling on outwards
Sky Fea	AU	21-August_19	06:20	09:35		07:02	3	87	RH	1	c.10	outgoing	Site D	rising to 20-50m	3	Off Site A and then gliding down out of sight towards Site G
Sky Fea	AU	21-August_19	06:20	09:35		07:34	5	88	RH	1	c. 270 asl	incoming	Site G	rising gradually, then angling down out of sight	1	with fish - in to Site G
Sky Fea	AU	21-August_19	06:20	09:35		08:17	7	89	RH	2	water	outgoing	Site D	rising to c.50m	3	off Site A, splitting up as shown, one in to Site F and one out to east
Sky Fea	AU	21-August_19	06:20	09:35		08:35	8	90	RH	2	c.250 asl	incoming	Site A	down to c.200 asl over Site B	4	Initial approach uncertain - both with rapid glide down towards Site A
Sky Fea	AU	21-August_19	06:20	09:35		08:47	9	91	RH	1 + 1	200-250 asl	incoming	Site D	rising up around Site G	13 & 15	9a in from north appeared to check out Site C then joined by a second bird (9b) and both seemed to look at Site E before one down onto Site A and the other away north to alight on Site J
Sky Fea	AU	21-August_19	06:20	09:35		09:13	10	92	RH	1	<20	incoming	Site D	level then down to water	<1	In to Site A

Annex 2

VP	Observer	Date	Session	Original flight no.	Flight Ref no.	Species	No. birds	Age/ sex	Height at detection	Time detected	Total duration in flight (mins)	Flight duration in buffer (mins)	<20m in buffer (secs)	20 - 150m (secs)	150 - 200m (secs)	>200m (secs)	Notes	Check	Flight length at risk in flight buffer area (m)	Flight length at risk in 6-turbine wind farm area	Effective flight speed (m/sec)	Time in 6T buffer	Monthly time in 6T buffer
VP1	NH	18-Apr-18	early	1	1	HH	1	ad m	20-150m	08:00	2.5	2.5		150			Sky dancing male landing with female at end of flight.	0	1,997	0	13.31	0	
VP1	NH	18-Apr-18	early	2	2	HH	1	f	<20m	08:03	0.25	0.25	15				female joined on ground by male no. 1; subsequently taking short flight, below rotor height	0					
VP1	NH	18-Apr-18	early	3	3	HH	1	f	20-150m	09:27	2	2	105	15			At risk for first 15 seconds, then dropping below risk height. Briefly mobbed by NX.	0	221	0	14.73	0	
VP3	SJW	18-Apr-18	p.m.	2	4	HH	1	ad m	<20	15:04	2.5	2.5	150					0					
VP3	SJW	18-Apr-18	p.m.	3	5	HH	1	ad m	<20	15:24	1.75	0.75	15	30			skydancing	0	176	0	5.87	0	
VP3	SJW	18-Apr-18	p.m.	4	6	HH	1	f	<20	15:43	1.25	1.25	75					0					
VP3	SJW	18-Apr-18	p.m.	6	7	HH	1	?	>150	16:06	2.25	1.75	15	30	60		found circling very high; element in wind farm buffer at >150m.	0	1,577	0	17.52	0	
VP3	NH	25-Apr-18	am	1	8	HH	1	ad m	<20m	10:38	1.25	1.25	30	45			Male picked up first. Joined by female (flight line 2) after 40 seconds. Male lost after 75 seconds. Female followed subsequently for another	0	692	337	15.38	22	
VP3	NH	25-Apr-18	am	2	9	HH	1	f	20-150m	10:39	1.75	1.75	15	90			See comments for male detected st 10:38 (flight line 1).	0	907	716	10.08	71	
VP3	NH	25-Apr-18	am	3	10	HH	1	ad m	<20m	11:48	3	3	180				Hunting close to ground	0					
VP1	NH	28-Apr-18	am	1	11	HH	1	f	20-150m	11:39	3.25	3.25	45	150			Pair detected at 11:39; this bird, the female, followed.	0	1,162	418	7.75	54	
VP1	NH	28-Apr-18	am	2	12	HH	1	ad m	20-150m	11:39	3.25	3.25	135	60			Male in pair detected at 11:39; seen briefly behind female at time of detection and also later briefly behind female c. 120 seconds into flight. Attention focussed on female, so path/flight height of male largely unknown, apparently following her, but close to the ground after initial detection. Estimated times shown, including 1 minute allowance at risk	0	278	0	4.63	0	
VP1	NH	28-Apr-18	am	3	13	HH	1	f	20-150m	12:38	6.75	2.25		30	105		Female spiralling upwards over Bakingstone hill then heading northwards across site towards Sky Fea. Site boundaries changed subsequent to field work, so have reestimated times within site	0	929	0	6.88	0	147
VP1	AU	01-May-18	early	9	14	HH	1	f	<20	08:04	4	4	210	30			chasing with HC over willows at first; away level over lower valley where at c.20m above ground for a short way	0	580	0	19.33	0	
VP3	SJW	10-May-18	late	2	15	HH	1	ad m	<5	19:41	0.75	0.75	45				hunting; <5m throughout	0					
VP3	SJW	19-May-18	Early	4	16	HH	1	ad m	5	07:02	1.75	1.75	105				looked as though had prey lost round shoulder of hill heading west	0					0
VP3	SJW	04-Jun-18	late	1	17	HH	1	f	100	19:52	8.25	7.75		465			high circling, then across valley dropped quickly, always between 20-150m	0	3,953	1,269	8.50	149	
VP3	NH	24-Jun-18	am	1	18	HH	1	ad m	<20m	10:25	0.25	0.25	15				Male HH very briefly in view over brow of hiil; lost behind hill almost immediately.	0					
VP3	NH	24-Jun-18	am	2	19	HH	1	ad m	<20m	12:18	1.75	1.75	105				Mobbing buzzard. Landing at end of flight. Lost on ground.	0					
VP1	NH	24-Jun-18	pm	1	20	HH	1	ad m	20-150m	15:15	1.5	1.5	25	65			male flying down Burn of Ore, purposefully, straight, at risk, then dropping into burn, below risk and zigzagging back up. Lost behind	0	1,159	155	17.83	9	158
VP1	SJW	02-Jul-18	am	1	21	HH	1	f	50	12:04	6.75	6.75		405			circling dropped into burn of Ore, lost to view.	0	1,834	0	4.53	0	
VP1	SJW	02-Jul-18	am	2	22	HH	1	f	100	12:17	5.25	5.25		315			across valley always at around 100m.	0	3,099	949	9.84	96	
VP1	SJW	02-Jul-18	am	4	23	HH	1	f	75	13:45	5.25	5.25		270	45		gained height towards end of flight	0	3,722	0	11.82	0	
VP1	SJW	02-Jul-18	am	5	24	HH	1	f	50	13:54	1	1		60			landed, not seen to take off; counted as all at risk since very briefly below 15m	0	1239	965	20.65	47	
VP3	SJW	03-Jul-18	Early	3	25	HH	1	ad m	5	05:58	4.25	4.25	255				hunting	0					
VP1	SJW	04-Jul-18	late	2	26	HH	1	f	50	20:05	8.75	8.75	15	510			circling lost to view into burn of ore	0	6,101	0	11.96	0	
VP1	SJW	04-Jul-18	late	4	27	HH	1	f	40	21:36	0.5	0.5		30				0	690	0	23.00	0	
VP1	SJW	18-Jul-18	pm	2	28	HH	1	f	20	12:41	0.5	0.5		30			lost to view in burn	0	439	0	14.63	0	
VP1	SJW	18-Jul-18	pm	3	29	HH	1	ad m	10	12:48	1	1	60					0					
VP1	SJW	18-Jul-18	pm	5	30	HH	3	juv	10	14:03	0.75	0.75	45				3 fledged juvs lost to view into burn	0					
VP1	SJW	18-Jul-18	pm	6	31	HH	1	f	50	14:16	2.5	2.5	15	135			lost to view not seen to reappear	0	2143	487	15.87	31	
VP3	NH	19-Jul-18	am	1	32	HH	1	ad m	20-150m	10:43	3.75	0.5	30				Male initially at height dropping and interacting with female (poss food pass) within breeding territory, before climbing again, and resuming high flight beyond flight buffer.	0					
VP3	NH	19-Jul-18	am	2	33	HH	1	f	<20m	10:45	0.25	0					Female first seen in background whilst following male on previous flight line (1) and then interacting with this male. Poss food pass with male then landing within territory.	0					
VP3	NH	19-Jul-18	am	3	34	HH	1	ad m	20-150m	11:10	7.25	5	180	120			Landing at end of flight.	0	898	0	7.48	0	
VP3	NH	19-Jul-18	am	4	35	HH	1	f	20-150m	11:35	5	3		180				0	2,467	1,640	13.71	120	
VP3	NH	19-Jul-18	am	5	36	HH	1	f	<20m	11:48	1.75	1.75	105				lost behind vehicle on road.	0					
VP3	NH	19-Jul-18	am	6	37	HH	1	ad m	20-150m	12:09	2	0						0					
VP3	NH	19-Jul-18	am	7	38	HH	1	ad m	20-150m	12:29	1.25	1.25		75			Circling upwards, lost near edge of buffer.	0	1,400	1,117	18.67	60	
VP3	NH	20-Jul-18	pm	1	39	HH	1	f	20-150m	14:21	3.5	3.5		210			Lost at edge of flight buffer as it spiralled upwards - still judged to be below summit of Binga Fea when lost and thus all at risk.	0	1,356	116	6.46	18	
VP3	NH	20-Jul-18	pm	2	40	HH	1	ad m	20-150m	14:44	2.5	2.5	135	15			Quickly dropping below risk on hunting flight	0	187	0	12.47	0	
VP3	NH	20-Jul-18	pm	3	41	HH	1	f	<20m	15:47	0.25	0					Quickly lost behind slope immediately in front of vp, and did not reappear. Just off site, below risk.	0					
VP3	NH	20-Jul-18	pm	4	42	HH	1	f	20-150m	16:49	0.75	0					Detected just outside of buffer: lost behind slope	0					
VP3	NH	20-Jul-18	pm	5	43	HH	1	f	20-150m	17:00	5	0					Stayed beyond buffer; spiralling upwards to 150-200m.	0					371
VP3	NH	07-Aug-18	early	1	44	HH	1	f	20-150m	07:24	2.25	2.25		135			Interacting with 2 Buzzards	0	1,881	1,881	13.93	135	
VP3	NH	07-Aug-18	early	3	45	HH	1	f	20-150m	07:37	1.5	1	60				Female on hunting flight - lower into flight buffer & briefly interacting with another female. Landing at end of flight.	0					
VP3	NH	07-Aug-18	early	4	46	HH	1	f	<20m	07:38	0.25	0.25	15				Female from known territory flying up from ground and interacting with hunting female on previous flight line (3). Quickly lost as following other bird.	0					
VP1	AU	08-Aug-18	late	4	47	HH	1	rt	c.20m	19:08	0.5	0					soon lower and out of sight; briefly again low to W	0					
VP3	NH	20-Aug-18	am	1	48	HH	1	rt	150-200	11:22	3	0.25			15		stayed below 200m; time at 150-200m extended for 30 secs to allow for time at risk before detection	0					
VP3	NH	22-Aug-18	pm	1	49	HH	1	[juv]	<20m	14:40	0.5	0.5	30				Hunting near burn; lost behind slope, did not reappear, possibly landed. Suspect juvenile.	0					
VP3	NH	22-Aug-18	pm	2	50	HH	1	rt	<20m	15:53	0.25	0					Immediately below vp; quickly lost behind slope.	0					135
														3650	**225**			**0**	**41087**	**10050**	**327**		**811**

590 Male time AR
0.16 Male time AR

158.66 Total speeds of birds in WF buffer
13.22 Average speed of birds in WF buffer

VP	Observer	Date	Session	Original Flight no.	Fight Ref No.	Species	No. birds	Age/ sex	Height at detection	Time detected	Total duration in flight	Flight duration in buffer	<20m in buffer	20-150m in buffer	150m-200m in buffer	>200m in buffer	Comment	Check	NOTE	Flight length at risk in flight buffer area (m)	Flight length at risk in 6-turbine wind farm area	Apparent flight speed	Flight time in 6T buffer
OVP3	SJW	10-Sep-18	late	1	51	HH	1	brown	10	18:26	2.5	2.5	150				brown bird hunting bird	0		0	0		0
OVP1	SJW	11-Sep-18	early	1	52	HH	1	brown	7	06:33	2	2	120				took off from ground lost over shoulder of hill	0		0	0		0
OVP1	SJW	11-Sep-18	early	2	53	HH	1	ad ♂	10	08:45	0.75	0.75	45				lost heading down towards burn did not reappear	0		0	0		0
OVP3	SJW	25-Sep-18	pm	1	54	HH	1	brown	5	12:47	4.75	4.75	285				hunting bird	0		0	0		0
OVP3	SJW	25-Sep-18	pm	2	55	HH	1	juv	10	13:14	1.75	1.5	90				hunting juv bird	0		0	0		0
OVP3	SJW	25-Sep-18	pm	3	56	HH	1	ad ♂	10	14:07	3	3	180				Male hunting	0		0	0		0
OVP1	SJW	26-Sep-18	am	1	57	HH	1	ad ♂	10	09:11	2.25	2.25	135					0		0	0		0
OVP1	SJW	26-Sep-18	am	2	58	HH	1	brown	5	10:24	2.5	2.5	150					0		0	0		0
OVP3	SJW	15-Oct-18	late	1	59	HH	1	brown	5	16:53	3	3	180				brown bird lost over shoulder of slope of Little Wee Fea heading West	0		0	0		0
OVP1	SJW	16-Oct-18	early	1	60	HH	1	ad ♂	5	09:04	1.5	1.5	90				hunting male lost over sky line Kit Loch	0		0	0		0
OVP1	SJW	16-Oct-18	early	2	61	HH	1	brown	5	09:58	1.25	1.25	75				brown bird lost to view Ne Little Wee Fea	0		0	0		0
OVP3	SJW	25-Oct-18	early	1	62	HH	1	brown	5	17:45	3	3	180				low down in Burn of Ore lost to view over peat banks	0		0	0		0
OVP3	SJW	25-Oct-18	early	2	63	HH	1	brown	3	08:16	2.25	2.25	135				slope of little wee fea to buildings at vp then across the rd	0		0	0		0
OVP3	SJW	25-Oct-18	early	3	64	HH	1	ad ♂	2	08:30	1.75	1.75	105				low flight lost to view out side site at Upper Seatter	0		0	0		0
OVP3	SJW	25-Oct-18	early	4	65	HH	2	1st yr ♂ + ad ♂	5 & 2	08:37	1.5	1.5	90				ad male flying above brown bird which on size looked like a 1st yr male flew like this for a short distance then side by side then following one another	0		0	0		0
OVP3	SJW	25-Oct-18	early	5	66	HH	1	brown	4	08:58	3	3	180				to east of dam hunting then landed on fence post	0		0	0		0
OVP3	SJW	25-Oct-18	early	6	67	HH	1	brown	5	09:02	4.25	4.25	255				hunting bird different bird to flight line 5 as flight line 5 bird still on fence post as I watched this bird, sw along fence line lost to view over sky line	0		0	0		0
OVP3	SJW	08-Nov-18	pm	1	68	HH	2	ad ♂ ♀	10	13:18	4.5	4.5	270				2 birds together circling then headed west lost to view over skyline female following male both together for whole flight period	0		0	0		0
OVP3	SJW	08-Nov-18	pm	2	69	HH	1	brown	5	13:29	5.75	5.75	345				bird hunting up burn of ore	0		0	0		0
OVP3	SJW	08-Nov-18	pm	3	70	HH	1	brown	10	14:36	0.25	0.25	15				low lost to view into dead ground	0		0	0		0
OVP3	SJW	08-Nov-18	pm	4	71	HH	1	ad ♂	10	16:02	6	6	360				from wee slope across burn of ore lost into dead ground	0		0	0		0
OVP1	SJW	20-Nov-18	am	1	72	HH	1	ad ♂	5	10:42	4.25	4.25	255				hunting male gained height over slope of Little wee fea always beow 15m	0		0	0		0
OVP3	SJW	21-Nov-18	am	1	73	HH	1	ad ♂	2	08:14	0.25	0.25	15				landed	0		0	0		0
OVP3	SJW	21-Nov-18	am	2	74	HH	1	brown	0	08:14	0.25	0.25	15				ad male flight line 1 flushed this bird off ground out of a patch of juncus flew short distance and landed	0	Hen harrier roost with at least 2 brown birds	0	0		0
OVP3	SJW	21-Nov-18	am	3	75	HH	2	ad ♂ ♀	2	08:16	2.25	2.25	135				ad male bird from flight line 1 a female a short distance to south from him different bird from flight line 2, I followed the male	0		0	0		0
OVP3	SJW	21-Nov-18	am	4	76	HH	1	ad ♂	10	09:27	3	3	180				lost to view heading towards Upper Seatter	0		0	0		0
OVP3	SJW	21-Nov-18	am	5	77	HH	1	ad ♀	4	09:56	0.75	0.75	45				bright yellow eye could be seen	0		0	0		0
OVP3	SJW	21-Nov-18	am	6	78	HH	1	brown	5	10:40	5	5	300				lost to view over wee fea skyline heading west	0		0	0		0
OVP1	SJW	04-Dec-18	pm	1	79	HH	1	brown	5	13:02	4.5	4.5	270				hunting, always below 10m	0		0	0		0
OVP1	SJW	04-Dec-18	pm	2	80	HH	1	brown	10	13:40	5.25	5.25	315				gained height as approaching summit of Binga fea but still <15, lost to view before leaving site	0		0	0		0
OVP1	SJW	04-Dec-18	pm	3	81	HH	1	ad ♂	5	14:16	1.25	1.25	75				steady level flight lost over col west of kit loch	0		0	0		0
OVP3	SJW	05-Dec-18	pm	1	82	HH	1	brown	5	14:41	0.25	0.25	15				landed on fence post, didn't see take off but was gone by 15:00, last seen on post at 14:50	0		0	0		0
OVP3	SJW	05-Dec-18	pm	2	83	HH	1	brown	2	15:24	0.5	0.5	30				landed on fence post	0		0	0		0
OVP3	SJW	05-Dec-18	pm	3	84	HH	1	ad ♂	10	15:26	2.5	2.5	150				landed on fence post	0		0	0		0
OVP3	SJW	05-Dec-18	pm	4	85	HH	1	brown	5	15:32	0.25	0.25	15				landed on fence post , now 2 brown birds and one ad male on fence posts	0		0	0		0
OVP3	SJW	05-Dec-18	pm	5	86	HH	1	brown	1	15:48	2	2	120				same bird as flight line 2, took off from fence post into roost at 15:50	0	Hen harrier roost with one male bird and 2 brown birds	0	0		0
OVP3	SJW	05-Dec-18	pm	6	87	HH	2	ad ♂ + brown	2	15:51	4	4	240				presumed same birds as flight lines 3 & 4 as no birds on post, both into roost at 15:55	0		0	0		0
OVP1	SJW	17-Dec-18	am	1	88	HH	1	brown	5	10:32	3	3	180				hunting bird	0		0	0		0
OVP1	SJW	17-Dec-18	am	2	89	HH	1	brown	50	10:37	5	5		300			always high between 20 - 100m	0		0	0		0
OVP1	SJW	17-Dec-18	am	4	90	HH	1	brown	5	11:01	0.75	0.75	45				low and landed	0		0	0		0
OVP3	SJW	21-Dec-18	am	1	91	HH	1	brown	5	08:58	3	3	180				lost to view heading North behind communications building	0		0	0		0
OVP3	SJW	21-Dec-18	am	2	92	HH	1	brown	10	10:51	0.5	0.5	30				landed on fence post, last seen on fence post at 11:15	0		0	0		0
OVP3	SJW	21-Dec-18	am	3	93	HH	1	brown	5	11:19	3.25	3.25	195				lost to view over sky line, may have been bird from fence post flight line 2 as it was gone after I checked after losing this bird,	0		0	0		0
OVP3	SJW	09-Jan-19	pm	2	94	HH	1	brown	10	15:38	0.75	0.75	45				landed on fence post	0		0	0		0
OVP3	SJW	09-Jan-19	pm	3	95	HH	1	brown	5	15:46	1	1	60				lost to view in burn heading west	0		0	0		0
OVP3	SJW	09-Jan-19	pm	4	96	HH	1	brown	5	15:54	0.25	0.25	15				landed on ground bird from fence post flight line 2 not there, possibly same bird	0		0	0		0
OVP3	SJW	09-Jan-19	pm	5	97	HH	1	brown	10	15:59	0.5	0.5	30				into roost in juncus\rushes	0	Hen harrier roost with at least 1 brown bird	0	0		0
OVP1	SJW	11-Jan-19	pm	1	98	HH	1	brown	5	14:05	3.25	3.25	195					0		0	0		0
OVP1	SJW	11-Jan-19	pm	2	99	HH	1	brown	10	14:53	1.75	1.5	90					0		0	0		0
OVP3	SJW	23-Jan-19	am	1	100	HH	1	brown	5	10:31	3	3	180				hunting flight, lost Sw over slope of Binga Fea	0		0	0		0
OVP1	SJW	07-Feb-19	pm	1	101	HH	1	ad ♂	5	14:18	2.5	2.25	135					0		0	0		0
OVP1	SJW	14-Feb-19	am	1	102	HH	1	brown	10	10:22	1.5	1.5	90					0		0	0		0
OVP1	SJW	14-Feb-19	am	2	103	HH	1	ad ♂	10	11:56	3.25	3.25	195				hunting bird	0		0	0		0
OVP3	SJW	15-Feb-19	am	1	104	HH	2	ad ♂ + ♀	10	09:32	1.5	1.5	90				both birds together male above female but both below 15m , bit of interaction both landed	0		0	0		0
OVP3	SJW	15-Feb-19	am	2	105	HH	1	ad ♂	5	09:39	0.25	0.25	15				picked up in flight landed. female from flight 1 still on ground	0		0	0		0
OVP3	SJW	15-Feb-19	am	3	106	HH	1	brown	10	09:41	3	3	180				bird picked up in flight, different bird to female flight one as she is still on ground	0		0	0		0
OVP3	SJW	15-Feb-19	am	4	107	HH	1	ad ♂	5	09:46	2.25	2.25	135				hunting bird presumed bird involved in flights 1 and 2 as male gone from where he landed in flight 2	0		0	0		0
OVP3	SJW	15-Feb-19	am	5	108	HH	1	ad ♂	10	10:38	6.5	6.5	390				hunting bird lost to view in dead ground heading east	0		0	0		0
OVP3	SJW	14-Mar-19	pm	1	109	HH	1	♀	5	13:59	6.25	6.25	375				lost into dead ground not seen to reappear	0		0	0		0
OVP3	SJW	14-Mar-19	pm	2	110	HH	1	♀	10	15:48	2.5	2.5	150				lost over skyline	0		0	0		0
OVP1	SJW	18-Mar-19	mid	2	111	HH	1	♀	50	12:01	3.5	3.5		210			Picked up high 50m. At one point got to about 75m circled a couple of times, always high	0		0	0		0
OVP1	SJW	28-Mar-19	pm	2	112	HH	1	♀	10	16:18	1.25	1.25	75				over skyline level flight	0		0	0		0
OVP1	SJW	28-Mar-19	pm	3	113	HH	1	ad ♂	5	16:51	2	2	120				over skyline hunting	0		0	0		0
OVP3	SJW	29-Mar-19	am	1	114	HH	1	ad ♂	5	06:29	5.5	5.5	330				lost heading west up burn of ore	0		0	0		0
OVP3	SJW	29-Mar-19	am	2	115	HH	1	♀	10	06:39	2.25	2.25	135					0		0	0		0
OVP3	SJW	29-Mar-19	am	6	116	HH	1	ad ♂	10	07:11	0.75	0.75	45					0		0	0		0
OVP3	SJW	29-Mar-19	am	7	117	HH	1	♀	5	08:29	5	5	300					0		0	0		0
												9615	**510**	**0**				**0**		**0**	**0**		

VP	Observer	Date	Session	Original Flight no	Fight Ref No.	Species	No. birds	Age/ sex	Height at detection	Time detected	Total duration in flight	Flight duration in buffer	<15m in buffer	15 - 50m in buffer	50 - 100m in buffer	100-150m in buffer	150 - 200m in buffer	>200m in buffer	Comment	Check	Flight length at risk in flight buffer area (m)	Flight length at risk in 6-turbine wind farm area	Effective flight speed	Time at risk within 6T buffer	Monthly time in 6T buffer
VP1	SJW	16-Apr-19	a.m.	1	1	HH	1	f	50	11:31	2.5	2.5	15	135					circling then skydancing and landed	0	1,470	0	10.89	0	
VP1	SJW	16-Apr-19	a.m.	2	2	HH	1	ad m	20	12:12	3	3	180						lost over skyline	0	0	0	0.00	0	
VP1	SJW	16-Apr-19	a.m.	3	3	HH	1	f	50	13:04	1.5	1.5	15	75					lost into burn	0	213	0	2.84	0	
VP3	SJW	16-Apr-19	p.m.	1	4	HH	1	ad m	10	15:20	2	2	120						landed	0	0	0	0.00	0	
VP3	SJW	16-Apr-19	p.m.	2	5	HH	1	ad m	0	15:23	1	1	60						same bird as flight line1, landed last seen on ground at 15:29	0	0	0	0.00	0	
VP3	SJW	16-Apr-19	p.m.	3	6	HH	1	f	30	15:36	3.25	3.25		195					circling lost over skyline	0	1757	1103	9.01	122	
VP3	SJW	16-Apr-19	p.m.	5	7	HH	1	ad m	10	16:56	1.5	1.5	90						landed	0	0	0	0.00	0	
VP3	SJW	16-Apr-19	p.m.	6	8	HH	1	ad m	0	16:58	3	3	180						same bird as flight line 5, took off another ad ♂ seen when following this bird it went west up burn, this bird landed. Last seen onground at 16:10	0	0	0	0.00	0	
VP3	SJW	16-Apr-19	p.m.	7	9	HH	1	ad m	70	17:12	2.5	2.5	15	120	15				high circling high then skydanced lost when dropped down low flight into burn	0	1358	794	10.06	79	
VP1	AU	29-Apr-19	a.m.	1	10	HH	1	f	15-50	11:41	5	4.75		135	150				circling & hanging slowly on breeze - shallow glide S	0	2,574	1,277	9.03	141	
VP1	AU	29-Apr-19	a.m.	2	11	HH	1	f	15-50	12:59	1	1		60					Back in from S; muted skydancing (7 loops) all at 15-50m; then levelling out at bottom of a dip and shallow glide into burn	0	1,376	0	22.93	0	
VP1	AU	29-Apr-19	a.m.	3	12	HH	1	f	15-50	13:20	1	1		60					circling with no. 4 at first for c 1 minute, then lost, presumably low or down	0	0	0	0.00		
VP1	AU	29-Apr-19	a.m.	4	13	HH	1	ad m	15-50	13:20	11	11	465	195					with no. 3 at first, circling across site (1 min.) then lower (0.5 min) before circling up again at-risk (0.75 min) then glide down to site and pottering abut low where female disappeared (2.5mins); circled up again before glide down (1.5 mins at-risk) and low and slow down slope towards upper burn site (4.75 mins low)	0	42	0	0.70	0	
VP1	AU	29-Apr-19	a.m.	5	14	HH	1	f	15-50	13:36	5	4.5	30	105	135				found circling (0.5 mins + say 0.5 mins prior unseen) then low towards site (0.5 min) and circling up strongly again (0.75 mins at 15-50 and 2.25 at 50-100m) with slow glide S into wind before out of buffer	0	1,816	0	9.31	0	
VP1	AU	29-Apr-19	late	3	15	HH	1	rt	15-50	17:47	3.5	1.25		30	45				rising on to >100m beyond zone and glide away	0	1,753	0	7.30	0	
VP1	AU	29-Apr-19	late	8	16	HH	1	ad m	<5	19:22	0.5	0.5	30						skimming away around Binga Fea slope	0	0	0	0.00	0	
VP3	SJW	29-Apr-19	a.m.	1	17	HH	1	f	10	11:19	1.5	1.5	90						landed not seen to take off	0	0	0	0.00	0	
VP3	SJW	29-Apr-19	a.m.	2	18	HH	1	ad m	40	11:24	3.25	3.25	30	165					west up burn, lost into burn at bend	0	907	0	5.50	0	
VP3	SJW	29-Apr-19	a.m.	3	19	HH	1	f	50	12:16	4	4	30	150	60				circling high, then dropped height and landed	0	1192	0	5.68	0	
VP3	SJW	29-Apr-19	a.m.	4	20	HH	1	ad m	10	12:52	3.25	3.25	195						level flight lost on shoulder of Binga fea	0	0	0	0.00	0	
VP3	SJW	29-Apr-19	a.m.	5	21	HH	1	ad m	10	13:00	3.5	3.5	210						lost into burn	0	0	0	0	0	
VP3	SJW	29-Apr-19	late	1	22	HH	1	ad m	5	18:40	3	3	180							0	1,444	0	0.00	0	
VP3	SJW	29-Apr-19	late	3	23	HH	1	ad m	10	19:18	5.75	5.75	345						lost heading west up burn	0					343
VP3	AU	08-May-19	p.m.	4	24	HH	1	ad m	50	16:23	2	0.5		30					Found circling, soon gliding away out of buffer and low to slope where met female no.5 with probable food-pass; both back (low?) up to skyline where he disappeared out of view	0	232	0	7.73	0	
VP3	AU	08-May-19	p.m.	5	25	HH	1	f	<15	16:24	4.5	0							met male no. 4 for probable food-pass then sat on skyline for 5 mins before dropping into site where male had previously also briefly dropped	0	0	0	0.00	0	
VP3	AU	08-May-19	p.m.	6	26	HH	1	f	50-100	17:03	3.25	3	15	105	60				found circling at first, then shallow glide across valley where briefly low before circling up again where I lost her (SJW at VP1 was watching a WE and EA together at this point, perhaps what had caused HH to fly up)	0	1739	1088	10.54	103	
VP3	AU	08-May-19	p.m.	7	27	HH	1	ad m	ground	17:18	1	0							flew up after a minute as female no. 8 approached; brief stop on peat bank then on southwards (no. 8 was followed)	0	0	0	0.00	0	
VP3	AU	08-May-19	p.m.	8	28	HH	1	f	<5	17:19	4.25	0.5	30						Approached and followed male no. 7; stayed <15m throughout with various brief perches and down to site at end with nesting material	0	0	0	0.00	0	
VP1	SJW	08-May-19	p.m.	1	29	HH	1	f	15	15:14	6.5	6.5	90	285	15				level low flight then gained height and skydancing then landed	0	1,624	0	5.41	0	
VP1	SJW	08-May-19	p.m.	2	30	HH	1	ad m	10	15:22	0.5	0.5	30						♂ straight to ♀ then copulation; ♂ then perched a few metres away	0					
VP1	SJW	08-May-19	p.m.	7	31	HH	1	f	40	17:08	5	5			300				lost into burn heading east	0	807	0	2.69	0	
VP1	SJW	08-May-19	p.m.	8	32	HH	1	f	50	17:12	2	2	15	105					50m when first seen then gained height dropped height when heading into burn; field time appears v short (apparent flight speed much too high) so overall time doubled to 2 mins and extra minute all added on at risk height	0	1,834	563	17.47	32	
VP1	AU	09-May-19	early	3	33	HH	1	ad m	150-200 asl	05:29	1	1		60					flying level away to N	0	813	0	13.55	0	
VP1	AU	09-May-19	early	4	34	HH	1	f	100-150 asl	05:29	1	0.5		15	15				following male no. 3 but lower down and very soon lost against slope as I followed him - v roughly estimated at 30 seconds at risk	0	327	0	10.90	0	
VP3	SJW	09-May-19	early	3	35	HH	1	ad m	10	05:48	1	1			60				heading west up burn onsouth side lost at bend	0	385	0	6.42	0	
VP3	SJW	09-May-19	early	8	36	HH	1	ad m	5	06:48	1.5	1.5	90						landed	0	0	0	0.00	0	
VP3	SJW	09-May-19	early	10	37	HH	1	ad m	1	07:25	1.5	1.5	90						copulated with ♀ then straight off west up burn	0	0	0	0.00	0	
VP3	SJW	09-May-19	early	11	38	HH	1	f	0	07:27	0.25	0.25	15						into nest site	0	0	0	0.00	0	
VP3	SJW	09-May-19	early	12	39	HH	1	ad m	5	07:43	3	3	180						low flight lost heading north over wee fea	0	0	0	0.00	0	
VP3	SJW	09-May-19	early	13	40	HH	1	ad m	3	07:54	<0.25	0.25	15						landed still in open at 08:15 when I left	0	0	0	0.00	0	
VP3	SJW	09-May-19	early	9	41	HH	1	f	0	17:24	<0.25	0.25	15						went to ♂ landed	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	1	42	HH	1	f	c.50	10:12	8	1.75		30	75				found rising up just beyond buffer to 50-100m, then glide along slope & lower out of buffer again, before rising quickly to >150m and away to W	0	1,188	0	11.31	0	
VP1	AU	27-May-19	a.m.	2	43	HH	1	ad m	<5	10:30	1	1	60						together with no. 3 at first, then low away to perch for about 20 minutes	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	3	44	HH	1	f	<5	10:30	0.25	0.25	15						low with no. 2 at first, then down into heather	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	4	45	HH	1	ad m	<5	10:52	3.25	3.25	195						no. 2 away low; suddenly accelerating to chase male no. 5; perched briefly, then continued low and out of view	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	5	46	HH	1	ad m	<5	10:54	2	2	120						chased off by no. 4 - both out of sight along lower burn	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	6	47	HH	1	f	20-50	11:01	1.5	0.75		45					Calling as it passed VP; joined male no. 7 low to E	0	371	0	8.24	0	
VP1	AU	27-May-19	a.m.	7	48	HH	1	ad m	<5	11:02	0.5	0							low at skyline and soon out of view beyond with no. 6	0	0	0	0.00	0	
VP1	AU	27-May-19	a.m.	8	49	HH	1	ad m	c.50	11:15	1	0.5		15	15				Found rising at c.50m then glide away to S; time in buffer allows for some unseen at-risk flight before detection	0	863	0	28.77	0	
VP1	AU	27-May-19	a.m.	13	50	HH	1	ad m	100-150 asl	12:35	17	17	990	15	15				found in level glide across, then down steeply and low foraging until finally out of sight at 12:52	0	845	0	28.17	0	
VP3	AU	27-May-19	late	6	51	HH	1	ad m	<5	20:09	2.25	1.5	90						skimming ground then lifting low over the tops of the trees	0	0	0	0.00	0	
VP3	AU	27-May-19	late	9	52	HH	1	f	20	20:35	1.25	0							with full crop; soon lower and alighting nr rushy strip	0	0	0	0.00	0	
VP3	AU	27-May-19	late	11	53	HH	1	ad m	<5	21:22	<0.25	0.25	15						alighting into rushes	0	0	0	0.00	0	
VP3	AU	27-May-19	late	12	54	HH	1	ad m	<5	21:30	1	0							probably no. 11 again, skimming low and soon out of view	0	0	0	0.00	0	135
VP3	SJW	27-May-19	a.m.	3	55	HH	1	f	100	10:45	6	1.5			90				circling then landed out infull view, still on ground at 10:58	0	800	0	8.89	0	
VP3	SJW	27-May-19	a.m.	4	56	HH	1	ad m	40	11:02	4.5	1.75		105					saw another ad♂ when following this bird heading south towards Heldale	0	667	0	6.35	0	
VP1	SJW	27-May-19	late	3	57	HH	2	adm/f	10	19:17	0.25	0.25	15						aerial food pass, ♀ landed in open	0	0	0	0.00	0	
VP1	SJW	27-May-19	late	4	58	HH	1	ad m	5	19:19	0.75	0.75	45						landed	0	0	0	0.00	0	
VP1	SJW	27-May-19	late	5	59	HH	1	ad m	5	19:24	1.25	1.25	75							0	0	0	0.00	0	
VP1	SJW	27-May-19	late	9	60	HH	1	ad m	10	20:14	1.25	1.25	75							0	0	0	0.00	0	
VP3	AU	10-Jun-19	late	4	61	HH	1	ad m	15-50	20:30	4.75	0							tussling with SE no. 3 at 15-50m & up to 50-100m for first 2-3 mins, then each separately down to alight; neither seen going	0	0	0	0.00	0	
VP3	AU	10-Jun-19	late	6	62	HH	1	ad m	15-50	20:54	6	0.5	30						to 150m below SE no. 5 then glide down but still hassling it on ground	0	0	0	0.00	0	
VP1	SJW	10-Jun-19	late	4	63	HH	1	f	20	20:12	1.75	1.75	105							0	0	0	0.00	0	
VP3	AU	12-Jun-19	pm/late	2	64	HH	1	ad m	<5	18:30	4	0							stayed low foraging, not exceeding 10m	0	0	0	0.00	0	
VP1	SJW	12-Jun-19	p.m.	4	65	HH	1	ad m	5	18:00	5.25	5.25	315							0	0	0	0.00	0	
VP1	SJW	12-Jun-19	p.m.	5	66	HH	1	ad m	30	18:18	1	1	45	15						0	71	0	4.73	0	
VP1	AU	13-Jun-19	a.m.	4	67	HH	1	ad m	15-50	08:06	2.75	2.75			165				hanging on the wind at first; rising out across the burn then circling up and lost when gliding down again	0	3,052	0	18.50	0	
VP3	SJW	13-Jun-19	a.m.	2	68	HH	1	f	5	08:05	4.25	4.25	255							0	0	0	0.00	0	
VP3	SJW	13-Jun-19	a.m.	3	69	HH	1	ad m	20	08:11	7	7	420							0	0	0	0.00		
VP3	AU	28-Jun-19	p.m.	1	70	HH	1	ad m	15-50	15:42	1	0.25		15					Out from slope then droppoing down steeply	0	182	0	12.13	0	
VP3	AU	28-Jun-19	p.m.	3	71	HH	1	f	15-50	17:02	10.75	10.75	375	90	135	45			circling up off slope then down and low foraging before off to meet no. 4	0	2866	2764	10.61	260	
VP3	AU	28-Jun-19	p.m.	4	72	HH	1	ad m	<15	17:13	4.25	4.25	15	75	75	90			low at first - possible food pass then circling up and glide down into dead ground on hillside	0	1034	152	4.31	35	
VP3	AU	28-Jun-19	p.m.	5	73	HH	1	f	<15	17:14	3	3	30	45	105				No. 3 again, following male upwards for a while; not found when male out of sight - presumed back down lower	0	665	0	4.43	0	
VP3	AU	28-Jun-19	p.m.	6	74	HH	1	f	50-100	17:33	8.25	8.25	225	180	90				up and down lower, then up again and away over N skyline	0	2502	1302	9.27	141	
VP3	AU	28-Jun-19	p.m.	7	75	HH	1	f	c.10	17:47	6.25	6.25	105	60	120	90			judged to have risen to >100m beyond W Wee Fea skyline, then glide back down and into site	0	2098	2020	7.77	260	
VP3	AU	28-Jun-19	p.m.	9	76	HH	1	f	100-150	18:03	11.5	6.5	105	15	120	150			Did not gain much more height; stayed >15m whilst beyond buffer and back in at 100-150m	0	3330	734	11.68	63	
VP1	SJW	28-Jun-19	p.m.	2	77	HH	1	f	100	17:41	4.25	4.25				210	45		very high flight circling	0	2,135	0	10.17	0	
VP3	SJW	29-Jun-19	early	2	78	HH	1	ad m	10	04:07	2.5	2.5	150						slow flight over willow bushes landed on fence post	0	0	0	0.00	0	
VP3	SJW	29-Jun-19	early	3	79	HH	1	ad m	2	04:18	1.5	1.5	90						presumed same bird as flight line 2 as bird gone from fence post	0	0	0	0.00	0	
VP3	SJW	29-Jun-19	early	7	80	HH	1	f	2	06:34	4.25	4.25	255						lost to view top edge of plantation	0	0	0	0.00	0	759
VP3	AU	02-Jul-19	a.m.	2	81	HH	1	f	<5	10:16	3.75	3.5	210						low foraging through gap in plantation	0	0	0	0.00	0	
VP3	AU	02-Jul-19	a.m.	3	82	HH	1	f	<10	10:47	4.5	0							mostly low, but up to 15-20m for approx 45 secs	0	0	0	0.00	0	
VP1	SJW	02-Jul-19	a.m.	4	83	HH	1		10	10:22	1.5	1.5	90							0	0	0	0.00	0	
VP1	SJW	02-Jul-19	a.m.	7	84	HH	1		30	11:10	4.25	4.25	240	15						0	155	0	10.33	0	
VP3	SJW	02-Jul-19	late	2	85	HH	1	f	10	19:17	3.25	3.25	195						landed on ground	0	0	0	0.00	0	
VP1	AU	16-Jul-19	p.m.	2	87	HH	1	f	50-100	13:44	2.25	2.25		60	75				Found breaking the skyline at c.50m	0	2,818	2,379	20.87	114	
VP1	AU	16-Jul-19	p.m.	3	88	HH	1	f	15-50	13:50	7	6.25		150	165	60			At risk height throughout observation - out of sight beyond buffer to E of Binga Fea	0	4,423	1,658	11.79	141	
VP1	AU	16-Jul-19	p.m.	4	89	HH	1	f	15-50	14:08	1	1	30	30					Lost low against slope	0	493	0	16.43	0	
VP1	AU	16-Jul-19	p.m.	5	90	HH	1	ad m	<10	14:13	6.5	5.25	300	15					only greater than 15m as it crossed burn	0	283	0	18.87	0	
VP3	SJW	16-Jul-19	p.m.	1	91	HH	1	ad m	20	13:25	4.25	4.25		255					at risk height all the way across	0	1124	752	4.41	171	
VP3	SJW	16-Jul-19	p.m.	2	92	HH	1	f	100	13:52	10.5	10.5				630			circling high lost over wee fea	0	4616	3162	7.33	432	
VP3	SJW	16-Jul-19	p.m.	3	93	HH	1	ad m	10	14:16	0.5	0.5	30							0	0	0	0.00	0	
VP3	SJW	16-Jul-19	p.m.	5	94	HH	1	ad m	10	15:12	4.5	4.5	270							0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	2	95	HH	1	juv	c.10	06:35	0.25	0							very soon into dead ground	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	3	96	HH	1	ad m	<5	06:39	5.5	3.5	210						stayed low foraging	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	4	97	HH	1	1 of 3 juv	<10	06:45	2.5	2.5	150						all together for a time, then splitting up - all stayed low	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	4	98	HH	1	1 of 3 juv	<10	06:45	2	2	120						all together for a time, then splitting up - all stayed low	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	4	99	HH	1	1 of 3 juv	<10	06:45	7.5	7.5	450						all together for a time, then splitting up - all stayed low	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	5	100	HH	1	ad m	5-10	06:57	0.5	0.25	15						out of view behind plantation and not picked up again	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	6	101	HH	1	ad m	<5	07:40	<0.25	0							low foraging - soon out of sight	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	7	102	HH	1	juv	c.10	07:46	0.25	0.25	15						out of sight beyond level area	0	0	0	0.00	0	
VP3	AU	23-Jul-19	early	10	103	HH	1	ad m	15-50	08:11	1	0							in with prey - food pass to juvenile and both down to the ground	0	0	0	0.00	0	857
VP1	AU	05-Aug-19	pm/late	1	104	HH	1	rt	10-15	17:25	4.5	0							soon to 15-50m and onwards at that height, going out of sight beyond ridge	0	0	0	0.00	0	
VP3	AU	06-Aug-19	p.m.	1	105	HH	1		15	13:05	4.5	0							circling up to c.200m and lost in a bit of low hanging cloud	0	0	0	0.00	0	
VP3	SJW	20-Aug-19	late	3	106	HH	1	f	5	19:01	6	6	360						hunting bird	0	0	0	0.00	0	
VP3	SJW	20-Aug-19	late	4	107	HH	1	ad m	10	19:24	4.5	4.5	270							0	0	0	0.00	0	
VP3	SJW	20-Aug-19	late	6	108	HH	1	ad m	5	20:02	0.75	0.75	45						lost over skyline Little Wee Fea	0	0	0	0.00	0	
VP3	SJW	21-Aug-19	a.m.	2	109	HH	1	ad m	10	10:40	1	1	60						landed on fence post	0	0	0	0.00	0	
VP3	SJW	21-Aug-19	a.m.	5	110	HH	1	f	50	12:32	5.75	5.75			90	255			circling gaining height, drifted off NW	0	2736	1830	7.93	231	
VP1	AU	28-Aug-19	pm/late	3	111	HH	1	juv	15-50	18:09	1	1		60					lost lower against the slope	0	853	221	14.22	16	
VP1	AU	28-Aug-19	pm/late	4	112	HH	1	juv	<15	18:21	3	2.5	120	30					alighting and not seen departing	0	334	0	11.13	0	
VP3	SJW	28-Aug-19	pm/late	1	113	HH	1	f	15	16:12	8.75	8.75	525						hunting, but always 10-15m	0	0	0	0.00	0	
VP3	SJW	28-Aug-19	pm/late	2	114	HH	1	1st yr	5	16:29	3.25	3.25	195						hunting	0	0	0	0.00	0	
VP3	SJW	28-Aug-19	pm/late	3	115	HH	1	f	10	16:36	5.25	5.25	315						hunting bird 10-15m	0	0	0	0.00	0	
VP3	SJW	28-Aug-19	pm/late	6	116	HH	1	f	30	18:16	4.5	4.5		270					circling gained height over burn up to 40m, then dropped height to about 20m off south circling	0	1099	23	4.07	6	
VP3	SJW	28-Aug-19	pm/late	7	117	HH	1	ad m	5	18:31	3	3	180						never above 10m	0	0	0	0.00	0	
VP3	AU	29-Aug-19	early	4	118	HH	1	ad f	<5	08:10	4	4	240						stayed low and beyond skyline	0	0	0	0.00	0	
VP1	SJW	29-Aug-19	early	2	119	HH	1	f	2	07:31	1.75	1.75	105						hunting	0	0	0	0.00	0	252
														3615	2190	1530	45	7380							
														3615	**2190**	**1530**		**7335**	Time at risk	**0**	**65266**	**21822**	**0**	**2346**		**2346**
														1080	**345**	**90**		1515	male times at risk							
																		0.21	male proportion at risk				164.04	Total speeds of birds in WF buffer		
																							9.65	Average speed of birds in WF buffer		
														2445	**1845**	**1440**		5730	female times at risk							
																		0.78	female proportion at risk							
														90	0	0		**90**	juveniles at risk							
																		0.01	juveniles proportion at risk							

VP	Observer	Date	Session	Original Flight no.	Flight Ref No.	Species	No. birds	Age/ sex	Height at detection	Time detected	Total duration in flight (mins)	Flight duration in buffer	<15m in buffer	15 - 50m in buffer	50 - 100m in buffer	100-150m in buffer	150 - 200m in buffer	>200m in buffer	Comment	Check	Flight length at risk in flight buffer area (m)	Flight length at risk in 6-turbine wind farm area		Apparent flight speed	Flight time in 6T buffer		Monthly time in 6T buffer
VP3	SJW	05-Sep-19	early	1	120	HH	1	f	5	07:46	1	1	60						lost over skyline	0	0	0		0.00	0		
VP1	SJW	20-Sep-19	a.m.	1	121	HH	1	ad m	50	10:02	6.75	6.25	120	255					picked up at 40m circling down to <15m along slope	0	4,535	178		17.78	10		
VP1	SJW	20-Sep-19	a.m.	2	122	HH	1	juv	5	10:20	0.75	0.75	45							0	0	0		0.00	0		
VP3	SJW	20-Sep-19	p.m.	2	123	HH	1	f	5	15:26	2.25	2.25	135							0	0	0		0.00	0		10
VP3	SJW	08-Oct-19	a.m.	1a	124	HH	1	f	50	09:24	9.5	9.5		175	395				Sparring in air then both continued North hanging in wind with female dropping down and mobbing the 1st yr male; both birds then mobbing one another. Highest flight was female at up to 75m	0	1,819	1004		3.19	315		
VP3	SJW	08-Oct-19	a.m.	1b	125	HH	1	1st yr m	50	09:24	9.5	9.5		175	395				size difference indicated 1st yr male.	0	1,819	1004		3.19	315		
VP3	SJW	08-Oct-19	a.m.	2	126	HH	1	rt	10	10:08	4.25	4.25	255						hunting up burn and over reclaim lost over skyline	0	0	0		0.00	0		
VP3	SJW	08-Oct-19	a.m.	3	127	HH	1	ad m	5	10:56	1	1	60							0	0	0		0.00	0		
VP1	SJW	08-Oct-19	p.m.	1	128	HH	1	rt	5	14:25	3	3	180							0	0	0		0.00	0		
VP1	SJW	08-Oct-19	p.m.	3	129	HH	1	ad m	10	15:37	3.25	3.25	195						landed near willow bushes out of sight, not seen to reappear	0	0	0		0.00	0		
VP1	SJW	08-Oct-19	p.m.	4	130	HH	1	rt	10	15:43	0.5	0.5	30						lost in dead ground at Kit Loch Col	0	0	0		0.00	0		
VP3	SJW	24-Oct-19	p.m.	1	131	HH	1	ad m	5	16:41	0.75	0.75	45						lost into dead ground at slope at burn	0	0	0		0.00	0		629
VP1	SJW	01-Nov-19	a.m.	1	132	HH	1	rt	3	10:32	2.25	2.25	135						down into burn lost to view	0	0	0		0.00	0		
VP3	SJW	01-Nov-19	p.m.	1	133	HH	1	rt	5	15:31	3	3	180						over Binga fea out of sight	0	0	0		0.00	0		
VP3	SJW	01-Nov-19	p.m.	2	134	HH	1	ad m	2	15:35	1.5	1.5	90						landed on fence post	0	0	0		0.00	0		
VP3	SJW	01-Nov-19	p.m.	3	135	HH	1	ad m	3	15:41	0.75	0.75	45						presumed bird no. 2 moving on	0	0	0		0.00	0		
VP3	AU	29-Nov-19	p.m.	1	136	HH	1	rt	10-15	13:47	2	2	120						across burn at 10-15m, then lower to ground and alighting on fence post; sat there until the end of the watch, apart from a brief spin round when a Raven landed nearby. Continued to watch it after the watch and it finally flew off at 15:51 (after 2 hours and 2 minutes) but was lost low against the ground almost immediately in the dusk.	0	0	0		0.00	0		
VP1	SJW	29-Nov-19	p.m.	2	137	HH	1	rt	2	13:07	2.75	2.75	165							0	0	0		0.00	0		
VP1	SJW	29-Nov-19	p.m.	3a	138	HH	1	rt	20	13:30	1.25	1.25		75					both birds broke skyline together one bird about 20m other 5m, one above the other; both continued like this with the higher bird gaining height to about 30m and the lower bird was always below 15m, roughly 5-10m. This entry is for the upper bird, which was in view longer.	0	889	0		11.85	0		
VP1	SJW	29-Nov-19	p.m.	3b	139	HH	1	rt	5	13:30	1	1	60						This entry is for the lower bird along flight path no. 3 (see 3a above)	0	0	0		0.00	0		0
VP1	SJW	03-Dec-19	a.m.	1	140	HH	1	rt	5	11:28	2.25	2.25	135						above reclaim on Wee Fea, then over skyline	0	0	0		0.00	0		
VP3	SJW	04-Dec-19	a.m.	1	141	HH	1	rt	2	08:26	0.5	0.25	15						landed on fence post had a crap and a preen, didn't see where it rose from but by behaviour suggested it had just come out of roost nearby. Still on fence post at 08:35, gone at 08:40	0	0	0		0.00	0		
VP1	SJW	19-Dec-19	p.m.	2	142	HH	1	rt	2	13:50	6.25	6.25	375						hunting	0	0	0		0.00	0		
VP3	SJW	20-Dec-19	p.m.	1	143	HH	1	rt	50	12:53	2.5	2.5			150				high west of Longigill, kept high until out of sight round Binga Fea	0	911	459		6.07	76		
VP3	SJW	20-Dec-19	p.m.	2	144	HH	1	rt	25	14:19	3.25	3.25	135	60					high on slope of Little Wee Fea, dropping in height when crossing valley; landed on post, last seen on post 14:40, gone at 14:43	0	1,155	361		19.25	19		94
VP3	SJW	09-Jan-20	a.m.	1	145	HH	1	rt	10	09:27	3.25	0							gained height when beyond fence to about 20 -25 m	0	0	0		0.00	0		
VP3	SJW	09-Jan-20	a.m.	2	146	HH	1	rt	5	10:01	7.25	7.25	435						hunting bird	0	0	0		0.00	0		
VP1	SJW	09-Jan-20	p.m.	1	147	HH	1	rt	5	15:43	6	6	360						landed briefly on ground for 7 sec	0	0	0		0.00	0		
VP1	SJW	22-Jan-20	a.m.	1	148	HH	2	rt	5	08:15	0.75	0.75	45							0	0	0		0.00	0		
VP3	SJW	22-Jan-20	p.m.	1	149	HH	1	rt	3	14:56	5.5	5.5	330						chased a pipit unsuccessfully then away to W over Binga Fea skyline; in view for over 5 minutes	0	0	0		0.00	0		
VP3	SJW	22-Jan-20	p.m.	2	150	HH	1	rt	5	15:03	0.75	0.75	45						probably a different bird from no. 1 due to short time between them; away to N over Wee Fea skyline	0	0	0		0.00	0		0
VP3	SJW	13-Feb-20	a.m.	1	151	HH	1	rt	1	08:05	2	2	120						one bird off fence post off east lost into dead ground; 2nd bird not seen going - some time after 08:20	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	2	152	HH	1	rt	1	09:31	0.5	0.5	30						landed on fence post	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	3	153	HH	1	f	5	09:40	0.25	0.25	15						landed on fence post; different from no. 2, which was still there	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	4	154	HH	1	rt	2	09:43	0.25	0.25	15						presumed no. 2; landed on another fence post	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	5	155	HH	1	rt	15	09:45	3.25	3.25	195						over skyline landed onfence post, three birds now on fence posts	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	6	156	HH	1	rt	5	09:48	3.25	3.25	195						probably no. 3 - moving off east and lost into dead ground	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	7	157	HH	1	rt	5	09:59	2.25	2.25	135						probably no. 5 - moving off south over skyline	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	8	158	HH	1	rt	1	10:05	3.75	3.75	225						No. 4 taking off from fence post and out of sight into dead ground up slope to N	0	0	0		0.00	0		
VP3	SJW	13-Feb-20	a.m.	9	159	HH	1	rt	1	10:43	4	4	240						hunting bird	0	0	0		0.00	0		
VP1	SJW	19-Feb-20	a.m.	1	160	HH	1	f	5	08:40	5.25	5.25	315						hunting bird	0	0	0		0.00	0		
VP1	SJW	19-Feb-20	a.m.	2	161	HH	2	rt	2	10:02	1	1	60							0	0	0		0.00	0		0
VP1	AU	04-Mar-20	a.m.	5	162	HH	1	rt	10-15	10:51	4.5	4	240						stayed at <15m; slow hanging on wind	0	0	0		0.00	0		
VP3	SJW	04-Mar-20	a.m.	1	163	HH	1	rt	<5	09:35	7.25	7.25	435							0	0	0		0.00	0		
VP3	SJW	20-Mar-20	a.m.	1	164	HH	1	ad m	50	09:51	7.5	7.5		345	105				Circling burn of ore gained height to about 75m then dropped to 30m when heading Nw over Longigill	0	2447	789		5.44	145		
VP3	SJW	20-Mar-20	a.m.	2	165	HH	1	f	40	11:49	5	2.5	45	105					f circling, joined by ad male no. 3 with a bit of interaction; f landed on fence post	0	1,352	0		12.88	0		
VP3	SJW	20-Mar-20	a.m.	3	166	HH	1	ad m	40	11:49	8.25	2.5		105	45				Interacting with f no. 2 and circling above her when she landed; m then gained height away over towards Binga Fea	0	1,434	0		9.56	0		
VP3	SJW	20-Mar-20	a.m.	4	167	HH	1	f	75	11:58	5.25	5.25			315				circling high drifted off West	0	2251	1222		7.15	171		
VP1	SJW	20-Mar-20	p.m.	1	168	HH	1	f	100	13:51	7.25	7.25		30	405				circling high, dropped height to 40-50m over Kit loch/wee fea sky line	0	3,683	0		8.47	0		
VP1	SJW	20-Mar-20	p.m.	2	169	HH	**2**	ad m+f	75	14:08	5.75	5.75		135	210				ad m & f circling about 75-100 m; dropped height, then lost to view into burn	0	3,500	0	**2 birds**	10.14	0		316
														1460	**2020**	**0**				**0**	**25795**	**5017**		**115.00**	**1050**		
																								9.58	average flight speed		

Annex 3

VP	Observer	Date	Session	5-min ended	Sp.	Zone A	Zone B
VP1	NH	18-Apr-18	early	08:05	busy	0	0
VP1	NH	28/04/2018	am	10:05	NX	1	0
VP1	NH	28/04/2018	am	10:20	NX	2	0
VP1	NH	28/04/2018	am	10:30	NX	1	0
VP1	NH	28/04/2018	am	10:35	NX	0	4
VP1	NH	28/04/2018	am	10:40	NX	1	0
VP1	NH	28/04/2018	am	11:10	NX	2	0
VP1	NH	28/04/2018	am	11:15	NX	1	1
VP1	NH	28/04/2018	am	12:25	NX	3	0
VP1	NH	28/04/2018	am	12:30	NX	1	0
						12	5
			Number 'busy':			**1**	**1**
VP1	AU	01-May	early	06:25	NX	1	
VP1	AU	01-May	early	06:40	NX	1	
VP1	AU	01-May	early	08:35	NX	2	
VP1	AU	01-May	early	06:10	busy		
VP1	AU	01-May	early	06:50	busy		
VP1	AU	01-May	early	06:55	busy		
VP1	AU	01-May	early	07:00	busy		
VP1	AU	01-May	early	07:05	busy		
VP1	AU	01-May	early	07:10	busy		
VP1	AU	01-May	early	07:15	busy		
VP1	AU	01-May	early	07:20	busy		
VP1	AU	01-May	early	07:25	busy		
VP1	AU	01-May	early	07:30	busy		
VP1	AU	01-May	early	07:45	busy		
VP1	AU	01-May	early	07:50	busy		
VP1	AU	01-May	early	08:05	busy		
VP1	AU	01-May	early	08:10	busy		
VP1	AU	01-May	early	08:15	busy		
VP1	AU	01-May	early	08:20	busy		
VP1	AU	01-May	early	08:25	busy		
VP1	AU	01-May	early	08:55	busy		
VP1	NH	17/05/2018	am	10:55	NX	1	0
VP1	NH	17/05/2018	am	11:00	NX	1	0
VP1	NH	17/05/2018	am	11:05	NX	1	0
VP1	NH	17/05/2018	am	11:10	NX	2	0
VP1	NH	17/05/2018	am	11:20	NX	0	1
VP1	NH	17/05/2018	am	11:25	NX	1	2
VP1	NH	17/05/2018	am	11:30	NX	0	1
VP1	NH	17/05/2018	am	11:40	NX	0	2
VP1	NH	17/05/2018	am	11:45	NX	1	0
VP1	NH	17/05/2018	am	11:55	NX	1	2
VP1	NH	17/05/2018	am	12:00	NX	1	0
VP1	NH	17/05/2018	am	12:10	NX	2	1
VP1	NH	17/05/2018	am	12:15	NX	2	0
VP1	NH	17/05/2018	am	12:20	NX	2	0
VP1	NH	17/05/2018	am	12:25	NX	1	0
VP1	NH	17/05/2018	am	12:35	NX	2	0
VP1	NH	17/05/2018	am	12:40	NX	1	1
VP1	NH	17/05/2018	am	12:45	NX	1	3
VP1	NH	17/05/2018	am	12:55	NX	1	0
VP1	NH	17/05/2018	am	13:00	NX	0	1
VP1	NH	17/05/2018	am	13:05	NX	0	2
VP1	NH	17/05/2018	am	13:20	NX	0	1
VP1	NH	17/05/2018	am	12:30	too busy		
						25	17
			Number 'busy':			**19**	**19**
VP1	NH	07-Jun-18	early	06:20	NX	3	3
VP1	NH	07-Jun-18	early	06:40	NX	2	2
VP1	NH	07-Jun-18	early	06:55	NX	1	0
VP1	NH	07-Jun-18	early	07:05	NX	1	0
VP1	NH	07-Jun-18	early	07:20	NX	1	0
VP1	NH	07-Jun-18	early	07:35	NX	3	0
VP1	NH	07-Jun-18	early	07:40	NX	2	2
VP1	NH	07-Jun-18	early	07:50	NX	2	0
VP1	NH	07-Jun-18	early	07:55	NX	5	0
VP1	NH	07-Jun-18	early	08:00	NX	1	0
VP1	NH	07-Jun-18	early	08:05	NX	4	2
VP1	NH	07-Jun-18	early	08:10	NX	0	4
VP1	NH	07-Jun-18	early	08:15	NX	2	0
VP1	NH	07-Jun-18	early	08:20	NX	4	3
VP1	NH	07-Jun-18	early	08:25	NX	5	0
VP1	NH	07-Jun-18	early	08:30	NX	2	1
VP1	NH	07-Jun-18	early	08:35	NX	2	0
VP1	NH	07-Jun-18	early	08:40	NX	0	1
VP1	NH	07-Jun-18	early	08:45	NX	2	0
VP1	NH	07-Jun-18	early	08:55	NX	2	1
VP1	NH	07-Jun-18	early	09:00	NX	2	0
VP1	NH	07-Jun-18	early	09:05	NX	1	0
VP1	NH	07-Jun-18	early	06:15	busy		
VP1	NH	07-Jun-18	early	06:25	busy		
VP1	NH	07-Jun-18	early	06:30	busy		
VP1	NH	07-Jun-18	early	06:35	busy		
VP1	NH	07-Jun-18	early	07:10	busy		
VP1	NH	07-Jun-18	early	07:15	busy		
VP1	NH	24-Jun-18	pm	14:45	NX	2	1
VP1	NH	24-Jun-18	pm	14:50	NX	1	1
VP1	NH	24-Jun-18	pm	14:55	NX	1	2
VP1	NH	24-Jun-18	pm	15:00	NX	3	0
VP1	NH	24-Jun-18	pm	15:05	NX	4	2
VP1	NH	24-Jun-18	pm	15:10	NX	6	6

No. 5-mins	Net snaps
72	71

Birds per snapshot - 20-150m		
	Zone A	Zone B
	12	5
	0.17	0.07
Birds/sqkm	0.085	0.036
Zone area	1.98	1.97

No. 5-mins	Net snaps
72	53

Birds per snapshot - 20-150m		
	Zone A	Zone B
	25	17
	0.47	0.32
Birds/sqkm	0.238	0.163
Zone area	1.98	1.97

VP1	NH	24-Jun-18	pm	15:20	NX	2	2
VP1	NH	24-Jun-18	pm	15:25	NX	1	3
VP1	NH	24-Jun-18	pm	15:30	NX	1	1
VP1	NH	24-Jun-18	pm	15:35	NX	0	1
VP1	NH	24-Jun-18	pm	15:40	NX	1	3
VP1	NH	24-Jun-18	pm	15:45	NX	2	1
VP1	NH	24-Jun-18	pm	15:50	NX	1	5
VP1	NH	24-Jun-18	pm	15:55	NX	0	1
VP1	NH	24-Jun-18	pm	16:00	NX	2	0
VP1	NH	24-Jun-18	pm	16:05	NX	1	1
VP1	NH	24-Jun-18	pm	16:10	NX	1	3
VP1	NH	24-Jun-18	pm	16:15	NX	0	4
VP1	NH	24-Jun-18	pm	16:20	NX	1	3
VP1	NH	24-Jun-18	pm	16:25	NX	2	3
VP1	NH	24-Jun-18	pm	16:30	NX	4	0
VP1	NH	24-Jun-18	pm	16:35	NX	1	4
VP1	NH	24-Jun-18	pm	16:40	NX	1	4
VP1	NH	24-Jun-18	pm	16:45	NX	1	6
VP1	NH	24-Jun-18	pm	16:50	NX	1	4
VP1	NH	24-Jun-18	pm	16:55	NX	0	1
VP1	NH	24-Jun-18	pm	17:00	NX	1	3
VP1	NH	24-Jun-18	pm	17:10	NX	1	3
VP1	NH	24-Jun-18	pm	17:15	NX	1	2
VP1	NH	24-Jun-18	pm	17:20	NX	1	0
VP1	NH	24-Jun-18	pm	17:25	NX	2	1
VP1	NH	24-Jun-18	pm	17:30	NX	4	2
VP1	NH	24-Jun-18	pm	17:35	NX	0	2
VP1	NH	24-Jun-18	pm	17:40	NX	1	0
VP1	NH	24-Jun-18	pm	15:15	busy		
						98	94
			Number 'busy':			**7**	**7**
VP1	SJW	02-Jul-18	am	11:40	NX	2	
VP1	SJW	02-Jul-18	am	12:00	NX		2
VP1	SJW	02-Jul-18	am	12:15	NX	3	1
VP1	SJW	02-Jul-18	am	12:30	NX	7	2
VP1	SJW	02-Jul-18	am	12:45	NX	1	3
VP1	SJW	02-Jul-18	am	12:55	NX	1	1
VP1	SJW	02-Jul-18	am	13:15	NX		
VP1	SJW	02-Jul-18	am	13:25	NX	2	2
VP1	SJW	02-Jul-18	am	13:40	NX	3	
VP1	SJW	02-Jul-18	am	13:50	NX	4	2
VP1	SJW	02-Jul-18	am	14:00	NX	3	8
VP1	SJW	02-Jul-18	am	14:10	NX	2	1
VP1	SJW	02-Jul-18	am	14:25	NX	4	2
VP1	SJW	02-Jul-18	am	12:05	busy		
VP1	SJW	02-Jul-18	am	12:10	busy		
VP1	SJW	02-Jul-18	am	12:20	busy		
VP1	SJW	02-Jul-18	am	13:45	busy		
VP1	SJW	02-Jul-18	am	13:55	busy		
VP1	SJW	04-Jul-18	late	19:40	NX	2	1
VP1	SJW	04-Jul-18	late	19:50	NX	1	1
VP1	SJW	04-Jul-18	late	20:00	NX	1	
VP1	SJW	04-Jul-18	late	20:35	NX	2	5
VP1	SJW	04-Jul-18	late	20:55	NX	1	2
VP1	SJW	04-Jul-18	late	21:20	NX	4	
VP1	SJW	04-Jul-18	late	21:25	NX		1
VP1	SJW	04-Jul-18	late	21:35	NX	2	1
VP1	SJW	04-Jul-18	late	21:45	NX	1	
VP1	SJW	04-Jul-18	late	22:00	NX		3
VP1	SJW	04-Jul-18	late	22:15	NX	1	
VP1	SJW	04-Jul-18	late	22:20	NX	1	1
VP1	SJW	04-Jul-18	late	20:05	busy		
VP1	SJW	04-Jul-18	late	20:10	busy		
VP1	SJW	04-Jul-18	late	20:15	busy		
VP1	SJW	04-Jul-18	late	21:00	busy		
VP1	SJW	04-Jul-18	late	21:55	busy		
VP1	SJW	18-Jul-18	pm	12:10	NX	2	1
VP1	SJW	18-Jul-18	pm	12:20	NX	1	
VP1	SJW	18-Jul-18	pm	12:50	NX	2	
VP1	SJW	18-Jul-18	pm	13:30	NX		2
VP1	SJW	18-Jul-18	pm	13:40	NX	4	
VP1	SJW	18-Jul-18	pm	13:45	NX		2
VP1	SJW	18-Jul-18	pm	13:50	NX	5	
VP1	SJW	18-Jul-18	pm	13:55	NX	2	2
VP1	SJW	18-Jul-18	pm	14:00	NX	3	1
VP1	SJW	18-Jul-18	pm	14:15	NX	2	1
VP1	SJW	18-Jul-18	pm	14:25	NX	1	2
VP1	SJW	18-Jul-18	pm	14:30	NX	2	
VP1	SJW	18-Jul-18	pm	14:40	NX	1	
VP1	SJW	18-Jul-18	pm	14:45	NX	1	
VP1	SJW	18-Jul-18	pm	14:50	NX	3	1
VP1	SJW	18-Jul-18	pm	15:00	NX	2	
						79	51
			Number 'busy':			**10**	**10**
VP1	AU	06-Aug	a.m.	10:55	NX		1
VP1	AU	06-Aug	a.m.	11:00	NX		2
VP1	AU	06-Aug	a.m.	11:05	NX	1	1
VP1	AU	06-Aug	a.m.	11:15	NX	1	
VP1	AU	06-Aug	a.m.	11:25	NX	1	1
VP1	AU	06-Aug	a.m.	11:30	NX		2
VP1	AU	06-Aug	a.m.	11:35	NX	1	1
VP1	AU	06-Aug	a.m.	11:40	NX	3	3
VP1	AU	06-Aug	a.m.	11:45	NX	4	1
VP1	AU	06-Aug	a.m.	11:50	NX	1	
VP1	AU	06-Aug	a.m.	12:00	NX	2	

No. 5-mins	Net snaps
72	65

Birds per snapshot - 20-150m		
	Zone A	Zone B
	98	94
	1.51	1.45
Birds/sqkm	0.761	0.734
Zone area	1.98	1.97

No. 5-mins	Net snaps
108	98

Birds per snapshot - 20-150m		
	Zone A	Zone B
	79	51
	0.81	0.52
Birds/sqkm	0.407	0.264
Zone area	1.98	1.97

VP1	AU	06-Aug	a.m.	12:05	NX	1	2
VP1	AU	06-Aug	a.m.	12:15	NX		1
VP1	AU	06-Aug	a.m.	12:20	NX	1	2
VP1	AU	06-Aug	a.m.	12:25	NX		2
VP1	AU	06-Aug	a.m.	12:30	NX	2	1
VP1	AU	06-Aug	a.m.	12:35	NX		1
VP1	AU	06-Aug	a.m.	12:40	NX		3
VP1	AU	06-Aug	a.m.	12:45	NX	1	3
VP1	AU	06-Aug	a.m.	12:50	NX	3	1
VP1	AU	06-Aug	a.m.	12:55	NX	1	2
VP1	AU	06-Aug	a.m.	13:00	NX		1
VP1	AU	06-Aug	a.m.	13:05	NX		1
VP1	AU	06-Aug	a.m.	13:20	NX	2	3
VP1	AU	06-Aug	a.m.	13:25	NX		1
VP1	AU	06-Aug	a.m.	13:35	NX	2	2
VP1	AU	06-Aug	a.m.	13:40	NX	1	
VP1	AU	06-Aug	a.m.	13:45	NX	2	4
VP1	AU	06-Aug	a.m.	13:50	NX	1	3
VP1	AU	06-Aug	a.m.	11:55	busy		
VP1	AU	08-Aug	late	18:20	NX		1
VP1	AU	08-Aug	late	18:25	NX	1	
VP1	AU	08-Aug	late	18:30	NX	3	
VP1	AU	08-Aug	late	18:35	NX	1	3
VP1	AU	08-Aug	late	18:45	NX	4	
VP1	AU	08-Aug	late	18:50	NX	2	
VP1	AU	08-Aug	late	18:55	NX	2	
VP1	AU	08-Aug	late	19:00	NX	1	
VP1	AU	08-Aug	late	19:05	NX	5	3
VP1	AU	08-Aug	late	19:10	NX	6	1
VP1	AU	08-Aug	late	19:15	NX	4	1
VP1	AU	08-Aug	late	19:20	NX	1	
VP1	AU	08-Aug	late	19:25	NX	4	
VP1	AU	08-Aug	late	19:35	NX	1	
VP1	AU	08-Aug	late	19:40	NX	2	
VP1	AU	08-Aug	late	19:45	NX	2	
VP1	AU	08-Aug	late	19:50	NX		
VP1	AU	08-Aug	late	20:10	NX	8	2
VP1	AU	08-Aug	late	20:15	NX	1	1
VP1	AU	08-Aug	late	20:20	NX	4	
VP1	AU	08-Aug	late	20:25	NX	1	
VP1	AU	08-Aug	late	20:30	NX	1	
VP1	AU	08-Aug	late	20:35	NX	1	3
VP1	AU	08-Aug	late	20:50	NX	1	
VP1	AU	08-Aug	late	20:55	NX		1
VP1	AU	08-Aug	late	21:00	NX	1	
VP1	AU	08-Aug	late	21:05	NX	2	
VP1	AU	08-Aug	late	21:10	NX	3	1
VP1	AU	08-Aug	late	21:15	NX	1	1
VP1	AU	08-Aug	late	18:40	busy		
VP1	AU	08-Aug	late	20:45	busy		
VP1	SJW	20-Aug-18	pm	13:25	NX		2
VP1	SJW	20-Aug-18	pm	13:30	NX	2	1
VP1	SJW	20-Aug-18	pm	13:40	NX	1	3
VP1	SJW	20-Aug-18	pm	13:55	NX	4	1
VP1	SJW	20-Aug-18	pm	14:10	NX	1	2
VP1	SJW	20-Aug-18	pm	14:25	NX	2	4
VP1	SJW	20-Aug-18	pm	14:30	NX	1	
VP1	SJW	20-Aug-18	pm	14:35	NX	1	2
VP1	SJW	20-Aug-18	pm	14:55	NX	1	
VP1	SJW	20-Aug-18	pm	15:00	NX	5	1
VP1	SJW	20-Aug-18	pm	15:10	NX		2
VP1	SJW	20-Aug-18	pm	15:30	NX	2	1
VP1	SJW	20-Aug-18	pm	15:35	NX	4	
VP1	SJW	20-Aug-18	pm	15:45	NX	1	
VP1	SJW	20-Aug-18	pm	13:45	busy		
						119	82
				Number 'busy':		**3**	**3**
VP1	SJW	11-Sep-18	early	06:40	NX	1	
VP1	SJW	11-Sep-18	early	07:00	NX	1	
VP1	SJW	11-Sep-18	early	07:05	NX		3
VP1	SJW	11-Sep-18	early	07:10	NX		1
VP1	SJW	11-Sep-18	early	07:15	NX		
VP1	SJW	11-Sep-18	early	07:20	NX	2	2
VP1	SJW	11-Sep-18	early	07:30	NX	1	2
VP1	SJW	11-Sep-18	early	07:35	NX		5
VP1	SJW	11-Sep-18	early	07:50	NX	1	4
VP1	SJW	11-Sep-18	early	08:05	NX	1	2
VP1	SJW	11-Sep-18	early	08:10	NX	1	
VP1	SJW	11-Sep-18	early	08:30	NX		2
VP1	SJW	11-Sep-18	early	08:45	NX		3
VP1	SJW	11-Sep-18	early	08:50	NX	1	
VP1	SJW	11-Sep-18	early	09:05	NX	1	
VP1	SJW	11-Sep-18	early	09:15	NX		2
VP1	SJW	11-Sep-18	early	09:25	NX		1
VP1	SJW	11-Sep-18	early	09:30	NX		1
VP1	SJW	11-Sep-18	early	06:35	busy		
VP1	SJW	26-Sep-18	am	09:05	NX		1
VP1	SJW	26-Sep-18	am	10:25	busy		
						10	29
				Number 'busy':		**2**	**2**

No. 5-mins	Net snaps
108	105
72	70

Birds per snapshot - 20-150m

	Zone A	Zone B
	119	82
	1.13	0.78
Birds/sqkm	0.572	0.396
Zone area	1.98	1.97

Birds per snapshot - 20-150m

	Zone A	Zone B
	10	29
	0.14	0.41
Birds/sqkm	0.072	0.210
Zone area	1.98	1.97

VP	Observer	Date	Session	5-min ended	Sp.	Zone A	Zone B
VP3	SJW	18-Apr	pm	14:35	NX	1	6
VP3	SJW	18-Apr	pm	14:40	NX	2	2
VP3	SJW	18-Apr	pm	14:45	NX	1	2
VP3	SJW	18-Apr	pm	14:50	NX	3	6
VP3	SJW	18-Apr	pm	15:00	NX	4	4
VP3	SJW	18-Apr	pm	15:15	NX	1	1
VP3	SJW	18-Apr	pm	15:40	NX	1	
VP3	SJW	18-Apr	pm	15:50	NX	1	1
VP3	SJW	18-Apr	pm	16:00	NX	1	1
VP3	SJW	18-Apr	pm	16:20	NX	2	2
VP3	SJW	18-Apr	pm	16:35	NX	1	1
VP3	SJW	18-Apr	pm	17:10	NX	1	1
VP3	SJW	18-Apr	pm	17:15	NX		2
VP3	SJW	18-Apr	pm	17:25	NX	2	2
VP3	SJW	18-Apr	pm		NX	2	2
VP3	SJW	18-Apr	pm	15:25	busy		
VP3	SJW	18-Apr	pm	15:45	busy		
VP3	SJW	18-Apr	pm	16:05	busy		
VP3	SJW	18-Apr	pm	16:10	busy		
VP3	NH	25-Apr-18	am	10:25	NX	0	2
VP3	NH	25-Apr-18	am	10:30	NX	3	0
VP3	NH	25-Apr-18	am	10:55	NX	13	0
VP3	NH	25-Apr-18	am	11:15	NX	1	0
VP3	NH	25-Apr-18	am	11:35	NX	1	1
VP3	NH	25-Apr-18	am	11:40	NX	0	2
VP3	NH	25-Apr-18	am	11:45	NX	1	0
VP3	NH	25-Apr-18	am	11:55	NX	1	0
VP3	NH	25-Apr-18	am	12:10	NX	0	1
VP3	NH	25-Apr-18	am	12:15	NX	0	1
VP3	NH	25-Apr-18	am	10:35	busy		
VP3	NH	25-Apr-18	am	10:40	busy		
VP3	NH	25-Apr-18	am	11:50	busy		
						43	40
			Number 'busy':			**7**	**7**
VP3	SJW	10-May	late	18:30	NX		
VP3	SJW	10-May	late	18:40	NX		1
VP3	SJW	10-May	late	18:45	NX		
VP3	SJW	10-May	late	18:50	NX	1	
VP3	SJW	10-May	late	18:55	NX		1
VP3	SJW	10-May	late	19:05	NX		
VP3	SJW	10-May	late	19:15	NX	1	2
VP3	SJW	10-May	late	19:25	NX	2	2
VP3	SJW	10-May	late	19:35	NX		
VP3	SJW	10-May	late	19:40	NX	1	
VP3	SJW	10-May	late	19:50	NX		
VP3	SJW	10-May	late	20:00	NX	1	
VP3	SJW	10-May	late	20:05	NX		
VP3	SJW	10-May	late	20:20	NX		
VP3	SJW	10-May	late	20:30	NX	1	
VP3	SJW	10-May	late	20:40	NX		
VP3	SJW	10-May	late	20:50	NX		
VP3	SJW	10-May	late	20:55	NX		
VP3	SJW	10-May	late	21:00	NX		
VP3	SJW	10-May	late	21:15	NX		
VP3	SJW	10-May	late		NX		
VP3	SJW	19-May	early	05:35	NX		1
VP3	SJW	19-May	early	05:40	NX		
VP3	SJW	19-May	early	05:45	NX		
VP3	SJW	19-May	early	05:50	NX	1	1
VP3	SJW	19-May	early	05:55	NX	1	2
VP3	SJW	19-May	early	06:05	NX		1
VP3	SJW	19-May	early	06:10	NX		
VP3	SJW	19-May	early	06:15	NX	1	
VP3	SJW	19-May	early	06:35	NX	1	
VP3	SJW	19-May	early	06:45	NX	1	1
VP3	SJW	19-May	early	06:55	NX	1	1
VP3	SJW	19-May	early	07:00	NX		3
VP3	SJW	19-May	early	07:10	NX		1
VP3	SJW	19-May	early	07:15	NX	2	
VP3	SJW	19-May	early	07:20	NX		
VP3	SJW	19-May	early	07:25	NX		
VP3	SJW	19-May	early	07:30	NX		
VP3	SJW	19-May	early	05:25	busy		
VP3	SJW	19-May	early	05:30	busy		
						15	17
			Number 'busy':			**2**	**2**
VP3	SJW	04-Jun	late	19:30	NX	1	2
VP3	SJW	04-Jun	late	19:45	NX	3	1
VP3	SJW	04-Jun	late	19:50	NX	2	1
VP3	SJW	04-Jun	late	20:05	NX		
VP3	SJW	04-Jun	late	20:35	NX	2	
VP3	SJW	04-Jun	late		NX	1	1
VP3	SJW	04-Jun	late	19:55	busy		
VP3	SJW	04-Jun	late	20:00	busy		
VP3	SJW	04-Jun	late	20:20	busy		
VP3	NH	24-Jun-18	am	10:10	NX	1	0
VP3	NH	24-Jun-18	am	10:15	NX	1	0
VP3	NH	24-Jun-18	am	10:30	NX	1	0
VP3	NH	24-Jun-18	am	10:40	NX	1	0
VP3	NH	24-Jun-18	am	10:50	NX	1	0
VP3	NH	24-Jun-18	am	10:55	NX	1	0
VP3	NH	24-Jun-18	am	11:00	NX	1	0
VP3	NH	24-Jun-18	am	11:10	NX	1	0
VP3	NH	24-Jun-18	am	11:15	NX	4	0
VP3	NH	24-Jun-18	am	11:20	NX	3	0
VP3	NH	24-Jun-18	am	11:50	NX	2	0
VP3	NH	24-Jun-18	am	12:05	NX	0	1
VP3	NH	24-Jun-18	am	12:15	NX	1	0
VP3	NH	24-Jun-18	am	12:25	NX	1	0
VP3	NH	24-Jun-18	am	12:30	NX	2	0
VP3	NH	24-Jun-18	am	12:35	NX	3	0
VP3	NH	24-Jun-18	am	12:40	NX	0	1
VP3	NH	24-Jun-18	am	12:45	NX	1	0
VP3	NH	24-Jun-18	am	12:50	NX	2	0
VP3	NH	24-Jun-18	am	10:25	busy		
VP3	NH	24-Jun-18	am	12:20	busy		
						36	7

No. 5-mins	Net snaps
72	65

Birds per snapshot - 20-150m		
	Zone A	Zone B
	43	40
	0.66	0.62
Birds/sqkm	0.372	0.281
Zone area	1.78	2.19

No. 5-mins	Net snaps
72	70

Birds per snapshot - 20-150m		
	Zone A	Zone B
	15	17
	0.21	0.24
Birds/sqkm	0.120	0.111
Zone area	1.78	2.19

No. 5-mins	Net snaps

Birds per snapshot - 20-150m	
Zone A	Zone B
36	7

				Number 'busy':			**5**	**5**					
VP3	SJW	03-Jul-18	early	04:15	NX	3	1						
VP3	SJW	03-Jul-18	early	04:25	NX	2							
VP3	SJW	03-Jul-18	early	04:30	NX	1	1						
VP3	SJW	03-Jul-18	early	04:35	NX	2	1						
VP3	SJW	03-Jul-18	early	04:45	NX		2						
VP3	SJW	03-Jul-18	early	04:55	NX	2							
VP3	SJW	03-Jul-18	early	05:00	NX	3	1						
VP3	SJW	03-Jul-18	early	05:10	NX	2							
VP3	SJW	03-Jul-18	early	05:15	NX	1	1						
VP3	SJW	03-Jul-18	early	05:25	NX	4	2						
VP3	SJW	03-Jul-18	early	05:30	NX		1						
VP3	SJW	03-Jul-18	early	05:35	NX	1							
VP3	SJW	03-Jul-18	early	05:45	NX	1							
VP3	SJW	03-Jul-18	early	05:55	NX	2							
VP3	SJW	03-Jul-18	early	06:05	NX	3	1						
VP3	SJW	03-Jul-18	early	06:10	NX	1	2						
VP3	SJW	03-Jul-18	early	06:25	NX	4	1						
VP3	SJW	03-Jul-18	early	06:45	NX		1						
VP3	SJW	03-Jul-18	early	07:00	NX	1	3						
VP3	SJW	03-Jul-18	early	07:05	NX	2							
VP3	SJW	03-Jul-18	early	07:10	NX	2							
VP3	SJW	03-Jul-18	early	04:40	busy								
VP3	SJW	03-Jul-18	early	06:00	busy								
VP3	NH	19-Jul-18	am	10:30	NX	4	3						
VP3	NH	19-Jul-18	am	10:35	NX	1	0						
VP3	NH	19-Jul-18	am	10:40	NX	2	0						
VP3	NH	19-Jul-18	am	10:55	NX	1	0						
VP3	NH	19-Jul-18	am	11:00	NX	2	1						
VP3	NH	19-Jul-18	am	11:05	NX	3	1						
VP3	NH	19-Jul-18	am	11:20	NX	1	0						
VP3	NH	19-Jul-18	am	11:25	NX	1	2						
VP3	NH	19-Jul-18	am	11:30	NX	2	1						
VP3	NH	19-Jul-18	am	11:45	NX	1	0						
VP3	NH	19-Jul-18	am	11:50	NX	0	1						
VP3	NH	19-Jul-18	am	11:55	NX	2	0						
VP3	NH	19-Jul-18	am	12:00	NX	2	0						
VP3	NH	19-Jul-18	am	12:05	NX	5	2						
VP3	NH	19-Jul-18	am	12:15	NX	2	1						
VP3	NH	19-Jul-18	am	12:20	NX	1	0						
VP3	NH	19-Jul-18	am	12:25	NX	3	0						
VP3	NH	19-Jul-18	am	12:35	NX	1	1						
VP3	NH	19-Jul-18	am	12:40	NX	2	0						
VP3	NH	19-Jul-18	am	12:45	NX	4	0						
VP3	NH	19-Jul-18	am	12:50	NX	1	1						
VP3	NH	19-Jul-18	am	12:55	NX	3	0						
VP3	NH	19-Jul-18	am	13:00	NX	2	1						
VP3	NH	19-Jul-18	am	13:05	NX	2	0						
VP3	NH	19-Jul-18	am	13:10	NX	0	2						
VP3	NH	19-Jul-18	am	13:15	NX	1	0						
VP3	NH	19-Jul-18	am	10:45	busy								
VP3	NH	19-Jul-18	am	10:50	busy								
VP3	NH	19-Jul-18	am	11:10	busy								
VP3	NH	19-Jul-18	am	11:15	busy								
VP3	NH	19-Jul-18	am	11:35	busy								
VP3	NH	19-Jul-18	am	11:40	busy								
VP3	NH	19-Jul-18	am	12:10	busy								
VP3	NH	19-Jul-18	am	12:30	busy								
VP3	NH	20-Jul-18	pm	14:10	NX	2	0						
VP3	NH	20-Jul-18	pm	14:30	NX	1	3						
VP3	NH	20-Jul-18	pm	14:50	NX	6	0						
VP3	NH	20-Jul-18	pm	14:55	NX	2	1						
VP3	NH	20-Jul-18	pm	15:00	NX	3	1						
VP3	NH	20-Jul-18	pm	15:05	NX	0	1						
VP3	NH	20-Jul-18	pm	15:10	NX	4	0						
VP3	NH	20-Jul-18	pm	15:30	NX	5	0						
VP3	NH	20-Jul-18	pm	15:35	NX	1	0						
VP3	NH	20-Jul-18	pm	15:40	NX	2	0						
VP3	NH	20-Jul-18	pm	15:50	NX	3	1						
VP3	NH	20-Jul-18	pm	15:55	NX	6	0						
VP3	NH	20-Jul-18	pm	16:00	NX	1	1						
VP3	NH	20-Jul-18	pm	16:05	NX	1	2						
VP3	NH	20-Jul-18	pm	16:10	NX	1	0						
VP3	NH	20-Jul-18	pm	16:15	NX	1	0						
VP3	NH	20-Jul-18	pm	16:20	NX	1	0						
VP3	NH	20-Jul-18	pm	16:25	NX	2	0						
VP3	NH	20-Jul-18	pm	16:30	NX	1	3						
VP3	NH	20-Jul-18	pm	16:50	NX	0	2						
VP3	NH	20-Jul-18	pm	16:55	NX	0	1						
VP3	NH	20-Jul-18	pm	14:20	busy								
VP3	NH	20-Jul-18	pm	14:25	busy								
VP3	NH	20-Jul-18	pm	14:45	busy								
VP3	NH	20-Jul-18	pm	15:45	busy								
VP3	NH	20-Jul-18	pm	17:00	busy								
VP3	NH	20-Jul-18	pm	17:05	busy								
						129	51						
				Number 'busy':		**16**	**16**						
VP3	NH	07-Aug-18	early	05:50	NX	2	1						
VP3	NH	07-Aug-18	early	05:55	NX	1	0						
VP3	NH	07-Aug-18	early	06:00	NX	1	1						
VP3	NH	07-Aug-18	early	06:05	NX	2	1						
VP3	NH	07-Aug-18	early	06:10	NX	2	1						
VP3	NH	07-Aug-18	early	06:15	NX	1	0						
VP3	NH	07-Aug-18	early	06:20	NX	1	1						
VP3	NH	07-Aug-18	early	06:25	NX	4	1						
VP3	NH	07-Aug-18	early	06:30	NX	3	1						
VP3	NH	07-Aug-18	early	06:35	NX	10	1						
VP3	NH	07-Aug-18	early	06:40	NX	5	1						
VP3	NH	07-Aug-18	early	06:45	NX	3	4						
VP3	NH	07-Aug-18	early	06:50	NX	4	0						
VP3	NH	07-Aug-18	early	07:00	NX	2	0						

No. 5-mins	Net snaps			
72	67		0.54	0.10
		Birds/sqkm	0.302	0.048
		Zone area	1.78	2.19

No. 5-mins	Net snaps	**Birds per snapshot - 20-150m**		
			Zone A	Zone B
			129	51
108	92		1.40	0.55
		Birds/sqkm	0.788	0.253
		Zone area	1.78	2.19

VP3	NH	07-Aug-18	early	07:05	NX	2	2
VP3	NH	07-Aug-18	early	07:10	NX	2	3
VP3	NH	07-Aug-18	early	07:15	NX	2	3
VP3	NH	07-Aug-18	early	07:20	NX	2	1
VP3	NH	07-Aug-18	early	07:30	NX	3	1
VP3	NH	07-Aug-18	early	07:45	NX	3	0
VP3	NH	07-Aug-18	early	07:55	NX	1	1
VP3	NH	07-Aug-18	early	08:00	NX	3	1
VP3	NH	07-Aug-18	early	08:15	NX	2	0
VP3	NH	07-Aug-18	early	08:25	NX	6	2
VP3	NH	07-Aug-18	early	08:30	NX	1	1
VP3	NH	07-Aug-18	early	08:35	NX	3	0
VP3	NH	07-Aug-18	early	08:40	NX	5	1
VP3	NH	07-Aug-18	early	08:45	NX	4	0
VP3	NH	07-Aug-18	early	07:25	busy		
VP3	NH	07-Aug-18	early	07:35	busy		
VP3	NH	07-Aug-18	early	07:40	busy		
VP3	NH	07-Aug-18	early	08:20	busy		
VP3	NH	20-Aug-18	am	09:00	NX	1	0
VP3	NH	20-Aug-18	am	09:15	NX	1	1
VP3	NH	20-Aug-18	am	09:25	NX	1	0
VP3	NH	20-Aug-18	am	09:35	NX	3	0
VP3	NH	20-Aug-18	am	09:40	NX	1	0
VP3	NH	20-Aug-18	am	09:45	NX	2	0
VP3	NH	20-Aug-18	am	09:50	NX	1	0
VP3	NH	20-Aug-18	am	10:00	NX	0	0
VP3	NH	20-Aug-18	am	10:15	NX	2	0
VP3	NH	20-Aug-18	am	10:20	NX	0	1
VP3	NH	20-Aug-18	am	10:25	NX	1	0
VP3	NH	20-Aug-18	am	10:30	NX	2	1
VP3	NH	20-Aug-18	am	10:35	NX	1	0
VP3	NH	20-Aug-18	am	10:40	NX	2	0
VP3	NH	20-Aug-18	am	10:50	NX	3	2
VP3	NH	20-Aug-18	am	10:55	NX	2	0
VP3	NH	20-Aug-18	am	11:00	NX	0	1
VP3	NH	20-Aug-18	am	11:05	NX	1	0
VP3	NH	20-Aug-18	am	11:10	NX	0	1
VP3	NH	20-Aug-18	am	11:15	NX	3	0
VP3	NH	20-Aug-18	am	11:20	NX	2	0
VP3	NH	20-Aug-18	am	11:40	NX	0	1
VP3	NH	20-Aug-18	am	11:55	NX	0	1
VP3	NH	22-Aug-18	pm	13:05	NX	6	1
VP3	NH	22-Aug-18	pm	13:10	NX	5	1
VP3	NH	22-Aug-18	pm	13:15	NX	5	2
VP3	NH	22-Aug-18	pm	13:20	NX	5	0
VP3	NH	22-Aug-18	pm	13:25	NX	2	1
VP3	NH	22-Aug-18	pm	13:30	NX	2	0
VP3	NH	22-Aug-18	pm	13:35	NX	3	0
VP3	NH	22-Aug-18	pm	13:40	NX	1	1
VP3	NH	22-Aug-18	pm	13:45	NX	4	0
VP3	NH	22-Aug-18	pm	13:50	NX	6	1
VP3	NH	22-Aug-18	pm	13:55	NX	4	0
VP3	NH	22-Aug-18	pm	14:00	NX	1	0
VP3	NH	22-Aug-18	pm	14:05	NX	4	0
VP3	NH	22-Aug-18	pm	14:10	NX	2	1
VP3	NH	22-Aug-18	pm	14:15	NX	3	2
VP3	NH	22-Aug-18	pm	14:20	NX	2	0
VP3	NH	22-Aug-18	pm	14:25	NX	4	0
VP3	NH	22-Aug-18	pm	14:30	NX	6	5
VP3	NH	22-Aug-18	pm	14:35	NX	2	1
VP3	NH	22-Aug-18	pm	14:45	NX	1	3
VP3	NH	22-Aug-18	pm	14:50	NX	0	3
VP3	NH	22-Aug-18	pm	14:55	NX	0	1
VP3	NH	22-Aug-18	pm	15:00	NX	1	1
VP3	NH	22-Aug-18	pm	15:05	NX	1	1
VP3	NH	22-Aug-18	pm	15:10	NX	0	4
VP3	NH	22-Aug-18	pm	15:15	NX	3	1
VP3	NH	22-Aug-18	pm	15:20	NX	2	2
VP3	NH	22-Aug-18	pm	15:25	NX	4	1
VP3	NH	22-Aug-18	pm	15:30	NX	3	1
VP3	NH	22-Aug-18	pm	15:35	NX	2	2
VP3	NH	22-Aug-18	pm	15:40	NX	4	0
VP3	NH	22-Aug-18	pm	15:45	NX	2	2
VP3	NH	22-Aug-18	pm	15:50	NX	4	0
VP3	NH	22-Aug-18	pm	15:55	NX	1	1
VP3	NH	22-Aug-18	pm	16:00	NX	3	0
VP3	NH	22-Aug-18	pm	14:40	busy		
						207	77
				Number 'busy':		**5**	**5**
VP3	SJW	10-Sep-18	late	17:05	NX		1
VP3	SJW	10-Sep-18	late	17:30	NX	2	
VP3	SJW	10-Sep-18	late	17:40	NX		1
VP3	SJW	10-Sep-18	late	17:45	NX	1	
VP3	SJW	10-Sep-18	late	17:55	NX	2	
VP3	SJW	10-Sep-18	late	18:00	NX	1	
VP3	SJW	10-Sep-18	late	18:15	NX	1	
VP3	SJW	10-Sep-18	late	18:35	NX	1	
VP3	SJW	10-Sep-18	late	18:45	NX		1
VP3	SJW	10-Sep-18	late	19:00	NX	1	
VP3	SJW	10-Sep-18	late	19:15	NX		1
VP3	SJW	10-Sep-18	late	19:25	NX	1	
VP3	SJW	10-Sep-18	late	19:30	NX	1	
VP3	SJW	10-Sep-18	late	19:40	NX	1	
VP3	SJW	25-Sep-18	pm	12:45	NX	1	
VP3	SJW	25-Sep-18	pm	12:55	NX	1	
VP3	SJW	25-Sep-18	pm	13:05	NX	1	
VP3	SJW	25-Sep-18	pm	12:50	busy		
VP3	SJW	25-Sep-18	pm	13:15	busy		
VP3	SJW	25-Sep-18	pm	14:10	busy		
						15	4
				Number 'busy':		**3**	**3**

No. 5-mins	Net snaps	**Birds per snapshot - 20-150m**	Zone A	Zone B
			207	77
108	103		2.01	0.75
		Birds/sqkm	1.129	0.341
		Zone area	1.78	2.19

No. 5-mins	Net snaps	**Birds per snapshot - 20-150m**	Zone A	Zone B
			15	4
72	69		0.22	0.06
		Birds/sqkm	0.122	0.026
		Zone area	1.78	2.19

Great Skua - Bird Occupancy Calculations

VP1 - Zone A

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT		
Bird density	birds/km^2	0.085	0.238	0.761	0.407	0.572	0.072	*From 'snapshots & density VP1'*	
Flight speed	m/sec	14	14	14	14	14	14		
At-risk flight rate	m/sec/km^2	1.195	3.335	10.660	5.700	8.013	1.010		
Zone area	km^2	1.9800	1.9800	1.9800	1.9800	1.9800	1.9800		
Flight rate in zone	m/sec	2.366	6.604	21.108	11.286	15.867	2.000		
Hours available	hrs	432	522	549	547	480	387		
Monthly flight length at risk	m	3679910	12409811	41717243	22223829	27417600	2786400		
Rotor volume (1 turbine)	m^3	80779	80779	80779	80779	80779	80779		
Zone risk volume	m^3	267300000	267300000	267300000	267300000	267300000	267300000		
Flight length through rotors	m	1112	3750	12607	6716	8286	842		
No. passes through rotors		200	675	2267	1208	1490	151		
No. passes at 85% operational efficiency		170	573	1927	1027	1267	129		
No. striking rotors at Band Model 6.6%		11.22	37.84	127.20	67.77	83.60	8.50		
No. striking rotors at 99.5% avoidance		0.056	0.189	0.636	0.339	0.418	0.042	**1.681**	**1.781** (x 1.06 to allow for the extra 5m at 15-20m)

VP1 - Zone B

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT		
Bird density	birds/km^2	0.036	0.163	0.734	0.264	0.396	0.210	*From 'snapshots & density VP1'*	
Flight speed	m/sec	14	14	14	14	14	14		
At-risk flight rate	m/sec/km^2	0.500	2.279	10.277	3.698	5.550	2.944		
Zone area	km^2	1.97	1.97	1.97	1.97	1.97	1.97		
Flight rate in zone	m/sec	0.986	4.491	20.246	7.286	10.933	5.800		
Hours available	hrs	432	522	549	547	480	387		
Monthly flight length at risk	m	1533296	8438672	40014498	14347029	18892800	8080560		
Rotor volume (1 turbine)	m^3	80779	80779	80779	80779	80779	80779		
Zone risk volume	m^3	265950000	265950000	265950000	265950000	265950000	265950000		
Flight length through rotors	m	466	2563	12154	4358	5738	2454		
No. passes through rotors		84	461	2186	784	1032	441		
No. passes at 85% operational efficiency		71	392	1858	666	877	375		
No. striking rotors at Band Model 6.6%		4.70	25.86	122.63	43.97	57.90	24.76		
No. striking rotors at 99.5% avoidance		0.023	0.129	0.613	0.220	0.290	0.124	**1.399**	**1.483** (x 1.06 to allow for the extra 5m at 15-20m)

VP3 - Zone B

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT		
Bird density	birds/km^2	0.281	0.111	0.048	0.253	0.341	0.026	*From 'snapshots & density VP3'*	
Flight speed	m/sec	14	14	14	14	14	14		
At-risk flight rate	m/sec/km^2	3.934	1.553	0.668	3.544	4.779	0.371		
Zone area	km^2	2.19	2.19	2.19	2.19	2.19	2.19		
Flight rate in zone	m/sec	8.615	3.400	1.463	7.761	10.466	0.812		
Hours available	hrs	432	522	549	547	480	387		
Monthly flight length at risk	m	13398646	6389280	2890854	15282704	18085282	1130713		
Rotor volume (1 turbine)	m^3	80779	80779	80779	80779	80779	80779		
Zone risk volume	m^3	295650000	295650000	295650000	295650000	295650000	295650000		
Flight length through rotors	m	3661	1746	790	4176	4941	309		
No. passes through rotors		658	314	142	751	889	56		
No. passes at 85% operational efficiency		560	267	121	638	755	47		
No. striking rotors at Band Model 6.6%		36.94	17.61	7.97	42.13	49.86	3.12		
No. striking rotors at 99.5% avoidance		0.185	0.088	0.040	0.211	0.249	0.016	**0.788**	**0.835** (x 1.06 to allow for the extra 5m at 15-20m)

VP3 - Zone A - not included in the collision risk workings

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT		
Bird density	birds/km^2	0.372	0.120	0.302	0.788	1.129	0.122	*From 'snapshots & density VP3'*	
Flight speed	m/sec	14	14	14	14	14	14		
At-risk flight rate	m/sec/km^2	5.203	1.685	4.226	11.028	15.807	1.710		
Zone area	km^2	2.19	2.19	2.19	2.19	2.19	2.19		
Flight rate in zone	m/sec	11.395	3.691	9.255	24.152	34.617	3.745		
Hours available	hrs	432	522	549	547	480	387		
Monthly flight length at risk	m	17721215	6936148	18291726	47560220	59817603	5216843		
Rotor volume (1 turbine)	m^3	80779	80779	80779	80779	80779	80779		
Zone risk volume	m^3	295650000	295650000	295650000	295650000	295650000	295650000		
Flight length through rotors	m	4842	1895	4998	12995	16344	1425		
No. passes through rotors		871	341	899	2337	2940	256		
No. passes at 85% operational efficiency		740	290	764	1987	2499	218		
No. striking rotors at Band Model 7.4%		55	21	57	147	185	16		
No. striking rotors at 99.5% avoidance		0.274	0.107	0.283	0.735	0.924	0.081	**2.404**	**2.54815** (x 1.06 to allow for the extra 5m at 15-20m)

Watch details						Zone A			Zone B			Zone C			Zone D			Zone E			Zone F		
VP	Observer	Date	Session	5-min ended	Sp.	-50	-100	-150	-50	-100	-150	-50	-100	-150	-50	-100	-150	-50	-100	-150	-50	-100	-150
VP1	SJW	16-Apr	a.m.	11:25	NX		2																
VP1	SJW	16-Apr	a.m.	11:50	NX							1											
VP1	SJW	16-Apr	a.m.	12:05	NX										1								
VP1	SJW	16-Apr	a.m.	12:20	NX	1																	
VP1	SJW	16-Apr	a.m.	12:30	NX					2													
VP1	SJW	16-Apr	a.m.	12:40	NX		1																
VP1	SJW	16-Apr	a.m.	13:00	NX							1											
VP1	SJW	16-Apr	a.m.	13:20	NX	1																	
VP1	SJW	16-Apr	a.m.	13:40	NX							1											
VP1	AU	29-Apr	a.m.	11:25	NX										1								
VP1	AU	29-Apr	a.m.	11:35	NX										1								
VP1	AU	29-Apr	a.m.	11:50	NX										1								
VP1	AU	29-Apr	a.m.	12:00	NX								1										
VP1	AU	29-Apr	a.m.	12:15	NX							1											
VP1	AU	29-Apr	a.m.	12:35	NX					1													
VP1	AU	29-Apr	a.m.	12:55	NX								1										
VP1	AU	29-Apr	a.m.	13:30	NX		1																
VP1	AU	29-Apr	a.m.	13:45	NX							1											
VP1	AU	29-Apr	a.m.	13:50	NX								1										
VP1	AU	29-Apr	a.m.	13:55	NX			2															
VP1	AU	29-Apr	a.m.	14:05	NX		1						1	1	1								
VP1	AU	29-Apr	late	17:40	NX	1																	
VP1	AU	29-Apr	late	17:45	NX							1	1										
VP1	AU	29-Apr	late	20:10	NX										1								
VP1	AU	29-Apr	late	20:25	NX								1										
						3	5	2	0	3	0	6	6	1	6	0	0						
VP1	SJW	08-May	p.m.	14:30	NX								8		2								
VP1	SJW	08-May	p.m.	14:35	NX								5			1							
VP1	SJW	08-May	p.m.	14:50	NX	3										4							
VP1	SJW	08-May	p.m.	15:10	NX							2											
VP1	SJW	08-May	p.m.	15:30	NX		2			2						2							
VP1	SJW	08-May	p.m.	15:40	NX	2			1						1	1							
VP1	SJW	08-May	p.m.	15:45	NX											2							
VP1	SJW	08-May	p.m.	16:00	NX							2											
VP1	SJW	08-May	p.m.	16:10	NX	1						2											
VP1	SJW	08-May	p.m.	16:15	NX	1							2										
VP1	SJW	08-May	p.m.	16:40	NX		2			2			1			1							
VP1	SJW	08-May	p.m.	17:00	NX							1	1										
VP1	SJW	08-May	p.m.	17:20	NX		2									2							
VP1	SJW	08-May	p.m.	17:25	NX											2							
VP1	AU	09-May	early	05:35	NX				1														
VP1	AU	09-May	early	06:15	NX					1													
VP1	AU	09-May	early	06:40	NX	1																	
VP1	AU	09-May	early	07:20	NX							1											
VP1	AU	09-May	early	07:45	NX		1						1										
VP1	AU	27-May	a.m.	09:45	NX												1						
VP1	AU	27-May	a.m.	09:50	NX	1																	
VP1	AU	27-May	a.m.	10:25	NX												1						
VP1	AU	27-May	a.m.	10:50	NX							1											
VP1	AU	27-May	a.m.	11:10	NX	1	1																
VP1	AU	27-May	a.m.	11:15	NX								1										
VP1	AU	27-May	a.m.	11:20	NX		1									2							
VP1	AU	27-May	a.m.	12:10	NX	1	1																
VP1	SJW	27-May	late	18:55	NX					2					1								
VP1	SJW	27-May	late	19:15	NX							1				1							
VP1	SJW	27-May	late	19:30	NX	1																	
VP1	SJW	27-May	late	20:05	NX							1											
VP1	SJW	27-May	late	20:15	NX				1														
VP1	SJW	27-May	late	20:30	NX								1		1								
VP1	SJW	27-May	late	20:50	NX											1							
VP1	SJW	27-May	late	21:05	NX				1														
VP1	SJW	27-May	late	21:30	NX	1																	
						13	10	0	4	7	0	11	20	0	5	19	2						
VP1	SJW	10-Jun	late	19:05	NX	1			1							2							
VP1	SJW	10-Jun	late	19:10	NX		1		2				1										
VP1	SJW	10-Jun	late	19:25	NX							1											
VP1	SJW	10-Jun	late	19:30	NX					1						1							
VP1	SJW	10-Jun	late	19:50	NX							1				2							
VP1	SJW	10-Jun	late	20:05	NX											1							
VP1	SJW	10-Jun	late	20:10	NX	1																	
VP1	SJW	10-Jun	late	20:25	NX								1										
VP1	SJW	10-Jun	late	20:40	NX				1														
VP1	SJW	10-Jun	late	20:45	NX											1							
VP1	SJW	10-Jun	late	21:00	NX					2		1											
VP1	SJW	10-Jun	late	21:15	NX					1													
VP1	SJW	10-Jun	late	21:25	NX				2														
VP1	SJW	10-Jun	late	21:30	NX	1																	
VP1	SJW	10-Jun	late	21:40	NX										1								
VP1	SJW	10-Jun	late	21:50	NX		1																
VP1	SJW	12-Jun	p.m.	16:55	NX							1											
VP1	SJW	12-Jun	p.m.	17:10	NX										1								
VP1	SJW	12-Jun	p.m.	17:40	NX	1																	
VP1	SJW	12-Jun	p.m.	18:10	NX				1														
VP1	SJW	12-Jun	p.m.	18:30	NX					2					1								
VP1	SJW	12-Jun	p.m.	18:45	NX							1	1										
VP1	SJW	12-Jun	p.m.	18:50	NX					3					1								
VP1	SJW	12-Jun	p.m.	19:00	NX										2								
VP1	SJW	12-Jun	p.m.	19:05	NX				1														
VP1	SJW	12-Jun	p.m.	19:40	NX	1							3		1								
VP1	AU	13-Jun	a.m.	07:20	NX					5													
VP1	AU	13-Jun	a.m.	07:25	NX				3														
VP1	AU	13-Jun	a.m.	07:30	NX					1													
VP1	AU	13-Jun	a.m.	07:40	NX									1									
VP1	AU	13-Jun	a.m.	07:50	NX				1						4	1							
VP1	AU	13-Jun	a.m.	07:55	NX	1																	
VP1	AU	13-Jun	a.m.	08:05	NX		2			1													
VP1	AU	13-Jun	a.m.	08:15	NX				1														
VP1	AU	13-Jun	a.m.	08:25	NX				1														
VP1	AU	13-Jun	a.m.	09:35	NX				1														
VP1	AU	13-Jun	a.m.	09:40	NX				1														
VP1	AU	13-Jun	a.m.	09:45	NX	1			1														
VP1	AU	13-Jun	a.m.	10:05	NX	1	2			1													
VP1	AU	13-Jun	a.m.	10:10	NX	3																	
VP1	AU	13-Jun	a.m.	10:20	NX										1								
VP1	AU	13-Jun	a.m.	10:25	NX				1	1													
VP1	AU	13-Jun	a.m.	10:35	NX				1														
VP1	SJW	28-Jun	pm	15:15	NX					4			3										
VP1	SJW	28-Jun	pm	15:30	NX											2	1						
VP1	SJW	28-Jun	pm	15:45	NX				1	2						1	1						
VP1	SJW	28-Jun	pm	15:50	NX											1							
VP1	SJW	28-Jun	pm	15:55	NX	1																	
VP1	SJW	28-Jun	pm	16:00	NX											1							
VP1	SJW	28-Jun	pm	16:10	NX											2							
VP1	SJW	28-Jun	pm	16:25	NX											1							
VP1	SJW	28-Jun	pm	16:35	NX									1									
VP1	SJW	28-Jun	pm	16:45	NX		1																
VP1	SJW	28-Jun	pm	17:00	NX					2							1						
VP1	SJW	28-Jun	pm	17:05	NX												1						
VP1	SJW	28-Jun	pm	17:10	NX					1													
VP1	SJW	28-Jun	pm	17:20	NX					1													
VP1	SJW	28-Jun	pm	17:35	NX		1							2									
VP1	SJW	28-Jun	pm	17:50	NX		1				2					1							
VP1	SJW	28-Jun	pm	18:00	NX	1						1											
VP1	SJW	28-Jun	pm	18:05	NX				1					1		1							
VP1	AU	29-Jun	early	04:05	NX					1			1										
VP1	AU	29-Jun	early	04:25	NX								1										
VP1	AU	29-Jun	early	04:55	NX	2																	
VP1	AU	29-Jun	early	05:25	NX										1								
						15	9	0	21	29	2	6	11	5	13	18	4						

No. busy
10

Birds per snapshot 15-150 m					
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		10	3	13	6
108	98	0.102	0.031	0.133	0.061
	Birds/sqkm	0.200	0.040	0.114	0.071
	Zone area	0.5102	0.7707	1.1675	0.8647

No. busy
36

Birds per snapshot 15-150 m					
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		23	11	31	26
144	108	0.213	0.102	0.287	0.241
	Birds/sqkm	0.417	0.132	0.246	0.278
	Zone area	0.5102	0.7707	1.1675	0.8647

No. busy
40

Birds per snapshot 15-150 m					
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		24	52	22	35
180	140	0.171	0.371	0.157	0.250

VP1	SJW	02-Jul	am	09:55	NX											1													
VP1	SJW	02-Jul	am	10:10	NX	1																							
VP1	SJW	02-Jul	am	10:15	NX					2			2																
VP1	SJW	02-Jul	am	10:20	NX					2				1															
VP1	SJW	02-Jul	am	10:30	NX				1	2			1				3												
VP1	SJW	02-Jul	am	10:40	NX					1			2			1													
VP1	SJW	02-Jul	am	10:50	NX												2												
VP1	SJW	02-Jul	am	11:00	NX												1												
VP1	SJW	02-Jul	am	11:15	NX					1				1			1												
VP1	SJW	02-Jul	am	11:25	NX				1																				
VP1	SJW	02-Jul	am	11:40	NX				1				1				3												
VP1	SJW	02-Jul	am	11:55	NX					1																			
VP1	SJW	02-Jul	am	12:00	NX												1												
VP1	SJW	02-Jul	am	12:10	NX									3															
VP1	SJW	02-Jul	am	12:25	NX				1				1																
VP1	SJW	02-Jul	am	12:30	NX								2																
VP1	SJW	02-Jul	am	12:40	NX	1							1																
VP1	AU	02-Jul	late	18:50	NX				1																				
VP1	AU	02-Jul	late	19:10	NX								2	2															
VP1	AU	02-Jul	late	19:15	NX							1																	
VP1	AU	02-Jul	late	19:25	NX			1																					
VP1	AU	02-Jul	late	19:50	NX								1																
VP1	AU	02-Jul	late	20:00	NX				2				1			1													
VP1	AU	16-Jul	p.m.	13:20	NX			1																					
VP1	AU	16-Jul	p.m.	13:25	NX		1	1		1																			
VP1	AU	16-Jul	p.m.	13:30	NX								2	2															
VP1	AU	16-Jul	p.m.	13:35	NX		1		1																				
VP1	AU	16-Jul	p.m.	13:40	NX				1							2													
VP1	AU	16-Jul	p.m.	13:50	NX							2																	
VP1	AU	16-Jul	p.m.	14:00	NX		1		1	1			2			2	1	1											
VP1	AU	16-Jul	p.m.	14:05	NX	1																							
VP1	AU	16-Jul	p.m.	14:20	NX			1																					
VP1	AU	16-Jul	p.m.	14:30	NX												2												
VP1	AU	16-Jul	p.m.	14:35	NX	1		1		1	1						1												
VP1	AU	16-Jul	p.m.	14:40	NX		1			1																			
VP1	AU	16-Jul	p.m.	14:45	NX												2												
VP1	AU	16-Jul	p.m.	14:50	NX	2				2	1																		
VP1	AU	16-Jul	p.m.	14:55	NX					1																			
VP1	AU	16-Jul	p.m.	15:10	NX	1	1			1																			
VP1	AU	16-Jul	p.m.	15:15	NX				1																				
VP1	AU	16-Jul	p.m.	15:20	NX	1	1																						
VP1	AU	16-Jul	p.m.	15:30	NX	1																							
VP1	AU	16-Jul	p.m.	15:35	NX	1																							
VP1	AU	16-Jul	p.m.	16:00	NX		1																						
VP1	AU	16-Jul	p.m.	16:10	NX	1																							
VP1	AU	16-Jul	p.m.	16:15	NX	1				1																			
VP1	AU	16-Jul	pm/late	16:55	NX												2												
VP1	AU	16-Jul	pm/late	17:00	NX							1					1												
VP1	AU	16-Jul	pm/late	17:15	NX		1																						
VP1	AU	16-Jul	pm/late	17:25	NX	1										1													
VP1	AU	16-Jul	pm/late	17:40	NX	1	1		1								1												
VP1	AU	16-Jul	pm/late	17:45	NX					2	1					1													
VP1	AU	16-Jul	pm/late	17:50	NX	1	2	1								2													
VP1	AU	16-Jul	pm/late	17:55	NX				1	1																			
VP1	AU	16-Jul	pm/late	18:00	NX	1	1																						
VP1	AU	16-Jul	pm/late	18:15	NX											1													
VP1	AU	16-Jul	pm/late	18:20	NX											1													
VP1	AU	16-Jul	pm/late	18:25	NX									1															
VP1	AU	16-Jul	pm/late	18:30	NX				1	1				1		1													
VP1	AU	16-Jul	pm/late	18:35	NX					1			1																
VP1	AU	16-Jul	pm/late	18:40	NX				1																				
VP1	AU	16-Jul	pm/late	18:50	NX												1												
VP1	AU	16-Jul	pm/late	19:00	NX		1																						
VP1	AU	16-Jul	pm/late	19:10	NX		1																						
VP1	AU	16-Jul	pm/late	19:15	NX							1																	
VP1	AU	16-Jul	pm/late	19:30	NX												1												
VP1	AU	16-Jul	pm/late	19:35	NX				2																				
VP1	AU	16-Jul	pm/late	19:40	NX					1																			
VP1	AU	24-Jul	early	05:10	NX											1													
VP1	AU	24-Jul	early	05:20	NX							1																	
VP1	AU	24-Jul	early	05:45	NX		1																						
						16	15	6	17	24	3	6	19	11	14	24	1												
VP1	AU	05-Aug	p.m.	12:50	NX	1			1																				
VP1	AU	05-Aug	p.m.	12:55	NX	1			1																				
VP1	AU	05-Aug	p.m.	13:35	NX	1	1					1																	
VP1	AU	05-Aug	p.m.	13:45	NX							5																	
VP1	AU	05-Aug	p.m.	13:50	NX		1			1			4																
VP1	AU	05-Aug	p.m.	13:55	NX		1			1			2				1												
VP1	AU	05-Aug	p.m.	14:00	NX		2			2	1	2	1																
VP1	AU	05-Aug	p.m.	14:10	NX		3		2	1		1				1													
VP1	AU	05-Aug	p.m.	14:15	NX		2					1	2																
VP1	AU	05-Aug	p.m.	14:20	NX		2						2			2													
VP1	AU	05-Aug	p.m.	14:25	NX		1	2		2		1	2																
VP1	AU	05-Aug	p.m.	14:30	NX			1						4			2												
VP1	AU	05-Aug	p.m.	14:35	NX	1	2			1		1	1			1													
VP1	AU	05-Aug	p.m.	14:40	NX			1					1																
VP1	AU	05-Aug	p.m.	14:45	NX								1				1												
VP1	AU	05-Aug	p.m.	14:50	NX				2			1	1			1													
VP1	AU	05-Aug	p.m.	14:55	NX	1	1		1				2																
VP1	AU	05-Aug	p.m.	15:00	NX					2		1					1												
VP1	AU	05-Aug	p.m.	15:05	NX		1		2				1	1	2														
VP1	AU	05-Aug	p.m.	15:10	NX		2		1																				
VP1	AU	05-Aug	p.m.	15:15	NX		3	2		1		1	1																
VP1	AU	05-Aug	p.m.	15:20	NX				2																				
VP1	AU	05-Aug	p.m.	15:40	NX		1		2																				
VP1	AU	05-Aug	p.m.	15:45	NX	1	1																						
VP1	AU	05-Aug	p.m.	15:50	NX	1						2																	
VP1	AU	05-Aug	p.m.	15:55	NX		2					1	7	3															
VP1	AU	05-Aug	p.m.	16:30	NX								1																
VP1	AU	05-Aug	pm/late	17:10	NX	1	1			1																			
VP1	AU	05-Aug	pm/late	17:15	NX							1																	
VP1	AU	05-Aug	pm/late	17:35	NX				1				3	2															
VP1	AU	05-Aug	pm/late	17:40	NX	1	2	2				1	1	1															
VP1	AU	05-Aug	pm/late	17:45	NX								4																
VP1	AU	05-Aug	pm/late	17:50	NX					1	1																		
VP1	AU	05-Aug	pm/late	17:55	NX			2	1				1																
VP1	AU	05-Aug	pm/late	18:00	NX		3		1	2																			
VP1	AU	05-Aug	pm/late	18:05	NX	1	6	6	1	1		1																	
VP1	AU	05-Aug	pm/late	18:10	NX	2		2				1	2																
VP1	AU	05-Aug	pm/late	18:15	NX			2				1	1																
VP1	AU	05-Aug	pm/late	18:25	NX		1	1				1																	
VP1	AU	05-Aug	pm/late	18:40	NX	1			1		1	1																	
VP1	AU	05-Aug	pm/late	18:45	NX		1					1																	
VP1	AU	05-Aug	pm/late	18:50	NX		2																						
VP1	AU	20-Aug	late	17:15	NX	1				3					1														
VP1	AU	20-Aug	late	17:20	NX	2							1																
VP1	AU	20-Aug	late	17:25	NX					2																			
VP1	AU	20-Aug	late	17:30	NX	1																							
VP1	AU	20-Aug	late	17:50	NX					2	1																		
VP1	AU	20-Aug	late	17:55	NX																								
VP1	AU	20-Aug	late	18:00	NX					1					1														
VP1	AU	20-Aug	late	18:05	NX												1												
VP1	AU	20-Aug	late	18:15	NX	1						2																	
VP1	AU	20-Aug	late	18:20	NX	1																							
VP1	AU	20-Aug	late	18:35	NX										1														
VP1	AU	20-Aug	late	18:50	NX				2																				
VP1	AU	20-Aug	late	19:05	NX	2			1																				
VP1	AU	20-Aug	late	19:35	NX	1																							
VP1	AU	20-Aug	late	19:45	NX								1																
VP1	AU	20-Aug	late	20:05	NX							1	1																
VP1	AU	20-Aug	late	20:10	NX									1															
VP1	AU	21-Aug	a.m.	10:30	NX							2	1		1	1	2												

Birds/sqkm	0.336	0.482	0.135	0.289
Zone area	0.5102	0.7707	1.1675	0.8647

Birds per snapshot 15-150 m					
No. 5-mins Net snaps		Zone A	Zone B	Zone C	Zone D
		37	44	36	39
159	129	0.287	0.341	0.279	0.302
	Birds/sqkm	0.562	0.443	0.239	0.350
	Zone area	0.5102	0.7707	1.1675	0.8647

No. busy
30

VP1	AU	21-Aug	a.m.	10:35	NX					1	1					1										
VP1	AU	21-Aug	a.m.	10:40	NX	1																				
VP1	AU	21-Aug	a.m.	10:50	NX									2		1										
VP1	AU	21-Aug	a.m.	10:55	NX									1			1									
VP1	AU	21-Aug	a.m.	11:00	NX				1			1				2	1									
VP1	AU	21-Aug	a.m.	11:10	NX									1	2	1										
VP1	AU	21-Aug	a.m.	11:15	NX							2														
VP1	AU	21-Aug	a.m.	11:20	NX				2					1												
VP1	AU	21-Aug	a.m.	11:25	NX	1											1									
VP1	AU	21-Aug	a.m.	11:30	NX							2				2										
VP1	AU	21-Aug	a.m.	11:35	NX							1	1													
VP1	AU	21-Aug	a.m.	11:40	NX		1			1																
VP1	AU	21-Aug	a.m.	12:05	NX										1		2									
VP1	AU	21-Aug	a.m.	12:10	NX							2					1									
VP1	AU	21-Aug	a.m.	12:15	NX									1			2									
VP1	AU	21-Aug	a.m.	12:20	NX									1												
VP1	AU	21-Aug	a.m.	12:25	NX			1								1	2									
VP1	AU	21-Aug	a.m.	12:30	NX					1				2		2										
VP1	AU	21-Aug	a.m.	12:45	NX					1					1											
VP1	AU	21-Aug	a.m.	12:50	NX							1	1			1										
VP1	AU	21-Aug	a.m.	12:55	NX												1									
VP1	AU	21-Aug	a.m.	13:00	NX									1		1	1									
VP1	AU	21-Aug	a.m.	13:05	NX							2														
VP1	AU	21-Aug	a.m.	13:10	NX				3								1									
VP1	AU	21-Aug	a.m.	13:20	NX		1							1	1		1									
VP1	AU	21-Aug	a.m.	13:25	NX				1																	
VP1	AU	28-Aug	pm/late	16:25	NX											1										
VP1	AU	28-Aug	pm/late	16:30	NX							1														
VP1	AU	28-Aug	pm/late	16:45	NX				2							2										
VP1	AU	28-Aug	pm/late	17:00	NX	1																				
VP1	AU	28-Aug	pm/late	17:05	NX	1										2										
VP1	AU	28-Aug	pm/late	17:10	NX				2																	
VP1	AU	28-Aug	pm/late	17:15	NX											2										
VP1	AU	28-Aug	pm/late	17:20	NX				1	1																
VP1	AU	28-Aug	pm/late	17:40	NX	1																				
VP1	AU	28-Aug	pm/late	17:50	NX				1																	
VP1	AU	28-Aug	pm/late	18:05	NX									1												
VP1	AU	28-Aug	pm/late	18:20	NX	1																				
VP1	AU	28-Aug	pm/late	18:50	NX					2																
VP1	AU	28-Aug	pm/late	19:00	NX	1																				
VP1	SJW	29-Aug	early	06:55	NX					1																
VP1	SJW	29-Aug	early	07:05	NX												1	1								
VP1	SJW	29-Aug	early	07:20	NX									2												
VP1	SJW	29-Aug	early	07:30	NX									1												
VP1	SJW	29-Aug	early	07:50	NX							1														
VP1	SJW	29-Aug	early	08:25	NX									3												
VP1	SJW	29-Aug	early	08:55	NX				1	2						1										
VP1	SJW	29-Aug	early	09:00	NX					1		1					1									
VP1	SJW	29-Aug	early	09:15	NX	1											2									
VP1	SJW	29-Aug	early	09:20	NX									2												
VP1	SJW	29-Aug	early	09:40	NX												3									
						30	44	22	36	35	5	45	67	17	31	28	3									
VP1	SJW	04-Sep	p.m.	16:20	NX								1													
VP1	SJW	04-Sep	p.m.	16:40	NX										1											
VP1	SJW	04-Sep	p.m.	17:45	NX					1		1														
VP1	SJW	04-Sep	p.m.	18:35	NX									1												
VP1	SJW	04-Sep	p.m.	18:45	NX		1																			
VP1	SJW	20-Sep	a.m.	09:50	NX									1												
VP1	SJW	20-Sep	a.m.	10:15	NX									1												
VP1	SJW	20-Sep	a.m.	10:40	NX												1									
VP1	SJW	20-Sep	a.m.	11:35	NX												1									
VP1	SJW	20-Sep	a.m.	11:40	NX												1									
VP1	SJW	20-Sep	a.m.	11:55	NX				1																	
						0	1	0	1	1	0	1	2	2	1	0	3									
						77	84	30	79	99	10	75	125	36	70	89	13									

No. busy
35

Birds per snapshot 15-150 m

No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			96	76	129	62
201	166		0.578	0.458	0.777	0.373
		Birds/sqkm	1.134	0.594	0.666	0.432
		Zone area	0.5102	0.7707	1.1675	0.8647

No. busy
10

Birds per snapshot 15-150 m

No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			1	2	5	4
72	62		0.016	0.032	0.081	0.065
		Birds/sqkm	0.032	0.042	0.069	0.075
		Zone area	0.5102	0.7707	1.1675	0.8647

Watch details						Zone A			Zone B			Zone C			Zone D			Zone E			Zone F			
VP3	SJW	16-Apr	p.m.	15:30	NX											1			1					
VP3	SJW	16-Apr	p.m.	17:25	NX										2									
VP3	SJW	29-Apr	a.m.	11:10	NX										1	1								
VP3	SJW	29-Apr	a.m.	11:50	NX										1			1	4		1			
VP3	SJW	29-Apr	a.m.	12:05	NX	1									1			2	1		1			
VP3	SJW	29-Apr	a.m.	12:30	NX		1											2			1			
VP3	SJW	29-Apr	a.m.	12:55	NX				2				1					1						
VP3	SJW	29-Apr	a.m.	13:10	NX										1			1						
VP3	SJW	29-Apr	a.m.	13:30	NX				1							1								
VP3	SJW	29-Apr	a.m.	13:40	NX					1					1									
VP3	SJW	29-Apr	a.m.	13:50	NX						1					1								
VP3	SJW	29-Apr	a.m.	14:00	NX														1					
VP3	SJW	29-Apr	late	17:45	NX	1			1	1														
VP3	SJW	29-Apr	late	17:55	NX				1															
VP3	SJW	29-Apr	late	18:25	NX											2								
VP3	SJW	29-Apr	late	18:50	NX											2		1			1			
VP3	SJW	29-Apr	late	19:55	NX																			
VP3	SJW	29-Apr	late	20:25	NX	2	1	0	5	2	0	0	1	0	7	8	0	8	7	0	4	0	0	No. busy
																								12
VP3	AU	08-May	p.m.	14:30	NX					1														
VP3	AU	08-May	p.m.	14:35	NX																1			
VP3	AU	08-May	p.m.	14:40	NX															2				
VP3	AU	08-May	p.m.	14:45	NX																1			
VP3	AU	08-May	p.m.	14:55	NX											2								
VP3	AU	08-May	p.m.	15:05	NX											1	1		1					
VP3	AU	08-May	p.m.	15:10	NX																		1	
VP3	AU	08-May	p.m.	15:15	NX											2								
VP3	AU	08-May	p.m.	15:20	NX											2								
VP3	AU	08-May	p.m.	15:25	NX											2								
VP3	AU	08-May	p.m.	15:30	NX									1	2									
VP3	AU	08-May	p.m.	15:40	NX											1								
VP3	AU	08-May	p.m.	16:00	NX										1									
VP3	AU	08-May	p.m.	16:05	NX										1	1								
VP3	AU	08-May	p.m.	16:10	NX											2	2							
VP3	AU	08-May	p.m.	16:25	NX												1							
VP3	AU	08-May	p.m.	16:35	NX																1	1		
VP3	AU	08-May	p.m.	16:50	NX	1															1			
VP3	AU	08-May	p.m.	16:55	NX										2									
VP3	AU	08-May	p.m.	17:00	NX																			
VP3	AU	08-May	p.m.	17:15	NX															1				
VP3	AU	08-May	p.m.	17:25	NX																			
VP3	SJW	09-May	early	05:15	NX				1															
VP3	SJW	09-May	early	05:30	NX										1			1				1		
VP3	SJW	09-May	early	05:45	NX										1				1					
VP3	SJW	09-May	early	05:50	NX							1	1											
VP3	SJW	09-May	early	06:00	NX																	1		
VP3	SJW	09-May	early	06:10	NX										1									
VP3	SJW	09-May	early	06:20	NX	1									1	1								
VP3	SJW	09-May	early	06:40	NX	1																		
VP3	SJW	09-May	early	06:55	NX	1									1			2						
VP3	SJW	09-May	early	07:15	NX											1		1						
VP3	SJW	09-May	early	07:35	NX								1											
VP3	SJW	09-May	early	07:50	NX	1									1				1					
VP3	SJW	27-May	a.m.	09:40	NX	1										2								
VP3	SJW	27-May	a.m.	10:00	NX		1										4					1		
VP3	SJW	27-May	a.m.	10:10	NX	1										2						1		
VP3	SJW	27-May	a.m.	10:15	NX			3	1													1	2	
VP3	SJW	27-May	a.m.	10:30	NX		4					1			1	1			1		1			
VP3	SJW	27-May	a.m.	10:55	NX					2			2								1			
VP3	SJW	27-May	a.m.	11:00	NX	1	1					1							2					
VP3	SJW	27-May	a.m.	11:10	NX														2					
VP3	SJW	27-May	a.m.	11:20	NX										1									
VP3	SJW	27-May	a.m.	11:25	NX										1							1		
VP3	SJW	27-May	a.m.	11:55	NX	1										2					1			
VP3	SJW	27-May	a.m.	12:10	NX														1		1			
VP3	SJW	27-May	a.m.	12:15	NX											3		1						
VP3	SJW	27-May	a.m.	12:25	NX							1						1						
VP3	AU	27-May	late	19:35	NX								1								1			
VP3	AU	27-May	late	19:50	NX				1															
VP3	AU	27-May	late	19:55	NX											1								
VP3	AU	27-May	late	20:05	NX	1									1									
VP3	AU	27-May	late	20:25	NX									1										
VP3	AU	27-May	late	20:40	NX					1														
VP3	AU	27-May	late	20:50	NX										1			1						
VP3	AU	27-May	late	21:05	NX												1							
VP3	AU	27-May	late	21:25	NX														1					
VP3	AU	27-May	late	21:35	NX											1								
VP3	AU	27-May	late	21:40	NX													1						
						10	6	3	3	4	0	4	5	2	17	27	9	8	10	3	9	7	3	No. busy
																								27
VP3	AU	10-Jun	late	19:15	NX												1							
VP3	AU	10-Jun	late	19:20	NX										1							1		
VP3	AU	10-Jun	late	19:25	NX										1									
VP3	AU	10-Jun	late	19:35	NX													1						
VP3	AU	10-Jun	late	19:40	NX						1											1		
VP3	AU	10-Jun	late	19:50	NX														1					
VP3	AU	10-Jun	late	20:15	NX										1						1			
VP3	AU	10-Jun	late	20:20	NX			1								1	1							
VP3	AU	10-Jun	late	20:40	NX																1			
VP3	AU	10-Jun	late	21:15	NX	1																		
VP3	AU	10-Jun	late	21:20	NX										1									
VP3	AU	10-Jun	late	21:25	NX										2									
VP3	AU	10-Jun	late	21:35	NX	1																		
VP3	AU	10-Jun	late	21:50	NX							3												
VP3	AU	10-Jun	late	21:55	NX																	1		
VP3	AU	12-Jun	pm/late	18:00	NX																3			
VP3	AU	12-Jun	pm/late	18:10	NX										1									
VP3	AU	12-Jun	pm/late	18:15	NX										1									
VP3	AU	12-Jun	pm/late	18:30	NX																	1		
VP3	AU	12-Jun	pm/late	18:35	NX										1									
VP3	AU	12-Jun	pm/late	18:45	NX																1			
VP3	AU	12-Jun	pm/late	18:55	NX																1			
VP3	AU	12-Jun	pm/late	19:10	NX																	1		
VP3	AU	12-Jun	pm/late	19:20	NX		1																	
VP3	AU	12-Jun	pm/late	19:40	NX							1												
VP3	AU	12-Jun	pm/late	19:45	NX		1														4			
VP3	AU	12-Jun	pm/late	19:50	NX										1									
VP3	AU	12-Jun	pm/late	20:05	NX																1			
VP3	AU	12-Jun	pm/late	20:35	NX							1				2					2			
VP3	SJW	13-Jun	a.m.	07:05	NX				1				2			2								
VP3	SJW	13-Jun	a.m.	07:20	NX											2			1					
VP3	SJW	13-Jun	a.m.	07:25	NX										1									
VP3	SJW	13-Jun	a.m.	07:45	NX										1							2		
VP3	SJW	13-Jun	a.m.	07:50	NX				1															
VP3	SJW	13-Jun	a.m.	08:05	NX										3							1		
VP3	SJW	13-Jun	a.m.	08:25	NX										2	1					1			
VP3	SJW	13-Jun	a.m.	08:30	NX										1				1					
VP3	SJW	13-Jun	a.m.	08:50	NX																	1		
VP3	SJW	13-Jun	a.m.	09:10	NX											1						1		
VP3	SJW	13-Jun	a.m.	09:30	NX											1								
VP3	SJW	13-Jun	a.m.	09:45	NX										1				4					
VP3	SJW	13-Jun	a.m.	10:00	NX																	1		
VP3	AU	28-Jun	p.m.	15:20	NX					1			2											
VP3	AU	28-Jun	p.m.	15:25	NX		1		1			1	1								1			
VP3	AU	28-Jun	p.m.	15:30	NX																1			
VP3	AU	28-Jun	p.m.	15:35	NX												1							
VP3	AU	28-Jun	p.m.	15:40	NX					1					1							1		
VP3	AU	28-Jun	p.m.	15:45	NX											2								
VP3	AU	28-Jun	p.m.	15:50	NX														1					
VP3	AU	28-Jun	p.m.	15:55	NX					1														
VP3	AU	28-Jun	p.m.	16:00	NX			1							1				1		1			
VP3	AU	28-Jun	p.m.	16:05	NX										1	1			1					
VP3	AU	28-Jun	p.m.	16:10	NX										1						1			
VP3	AU	28-Jun	p.m.	16:15	NX				1						1	3			1					
VP3	AU	28-Jun	p.m.	16:20	NX								1		1				1					
VP3	AU	28-Jun	p.m.	16:25	NX											2			1	2				
VP3	AU	28-Jun	p.m.	16:30	NX							2				1								
VP3	AU	28-Jun	p.m.	16:35	NX	2					1										1			
VP3	AU	28-Jun	p.m.	16:40	NX								1			3			3			1		
VP3	AU	28-Jun	p.m.	16:45	NX					2											2			
VP3	AU	28-Jun	p.m.	16:50	NX				1		1										1	2		
VP3	AU	28-Jun	p.m.	16:55	NX																2	1		

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		3	7	1	15	15	4
108	96	0.031	0.073	0.010	0.156	0.156	0.042
	Birds/sqkm	0.138	0.234	0.029	0.170	0.221	0.064
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		19	7	11	53	21	19
144	117	0.162	0.060	0.094	0.453	0.179	0.162
	Birds/sqkm	0.573	0.192	0.261	0.493	0.253	0.250
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

VP3	AU	28-Jun	p.m.	17:00	NX											2	1					1	1			
VP3	AU	28-Jun	p.m.	17:30	NX										1								1			
VP3	AU	28-Jun	p.m.	17:45	NX								1													
VP3	SJW	29-Jun	early	04:05	NX				1																	
VP3	SJW	29-Jun	early	04:20	NX	1																				
VP3	SJW	29-Jun	early	04:35	NX										2								1			
VP3	SJW	29-Jun	early	04:50	NX					1																
VP3	SJW	29-Jun	early	04:55	NX											2										
VP3	SJW	29-Jun	early	05:10	NX										1											
VP3	SJW	29-Jun	early	05:30	NX	1																				
VP3	SJW	29-Jun	early	05:45	NX											2								1		
VP3	SJW	29-Jun	early	06:00	NX										1											
VP3	SJW	29-Jun	early	06:10	NX	1										2					1					
VP3	SJW	29-Jun	early	06:20	NX										1											
VP3	SJW	29-Jun	early	06:50	NX					1						1								1		
						7	3	2	6	7	3	8	8	0	31	31	4	1	17	2	27	20	0			
VP3	AU	02-Jul	a.m.	09:50	NX																1					
VP3	AU	02-Jul	a.m.	09:55	NX					2																
VP3	AU	02-Jul	a.m.	10:00	NX																1					
VP3	AU	02-Jul	a.m.	10:15	NX											1										
VP3	AU	02-Jul	a.m.	10:20	NX				3																	
VP3	AU	02-Jul	a.m.	10:55	NX															1						
VP3	AU	02-Jul	a.m.	11:00	NX		1																			
VP3	AU	02-Jul	a.m.	11:05	NX					1																
VP3	AU	02-Jul	a.m.	11:10	NX					1					1											
VP3	AU	02-Jul	a.m.	11:35	NX				1																	
VP3	AU	02-Jul	a.m.	11:40	NX													1	1				1			
VP3	AU	02-Jul	a.m.	11:45	NX				1										1							
VP3	AU	02-Jul	a.m.	11:50	NX	1																				
VP3	AU	02-Jul	a.m.	11:55	NX				1							2				1						
VP3	AU	02-Jul	a.m.	12:10	NX		2										1									
VP3	AU	02-Jul	a.m.	12:15	NX																					
VP3	AU	02-Jul	a.m.	12:20	NX											1			1				1			
VP3	AU	02-Jul	a.m.	12:25	NX													1								
VP3	AU	02-Jul	a.m.	12:30	NX										1											
VP3	SJW	02-Jul	late	18:50	NX											2										
VP3	SJW	02-Jul	late	19:15	NX							1														
VP3	SJW	02-Jul	late	19:45	NX																		1			
VP3	SJW	02-Jul	late	20:15	NX							1														
VP3	SJW	02-Jul	late	20:40	NX							1														
VP3	SJW	02-Jul	late	20:55	NX	1																				
VP3	SJW	16-Jul	p.m.	13:35	NX												1		1							
VP3	SJW	16-Jul	p.m.	13:40	NX										2	2										
VP3	SJW	16-Jul	p.m.	13:50	NX												1									
VP3	SJW	16-Jul	p.m.	14:10	NX										1					4						
VP3	SJW	16-Jul	p.m.	14:20	NX																1					
VP3	SJW	16-Jul	p.m.	14:30	NX					1						1										
VP3	SJW	16-Jul	p.m.	14:35	NX		1																			
VP3	SJW	16-Jul	p.m.	14:55	NX					1						2	2	1	4		1					
VP3	SJW	16-Jul	p.m.	15:05	NX											2			1							
VP3	SJW	16-Jul	p.m.	15:10	NX							1														
VP3	SJW	16-Jul	p.m.	15:30	NX										2											
VP3	SJW	16-Jul	pm/late	17:00	NX											1								1		
VP3	SJW	16-Jul	pm/late	17:05	NX					1					1	1										
VP3	SJW	16-Jul	pm/late	17:15	NX														1							
VP3	SJW	16-Jul	pm/late	17:40	NX								1													
VP3	SJW	16-Jul	pm/late	18:05	NX	1									1	3								1		
VP3	SJW	16-Jul	pm/late	18:25	NX										4	2										
VP3	SJW	16-Jul	pm/late	18:30	NX																			1		
VP3	SJW	16-Jul	pm/late	18:40	NX																			1		
VP3	SJW	16-Jul	pm/late	18:55	NX							1														
VP3	SJW	16-Jul	pm/late	19:15	NX										1											
VP3	SJW	16-Jul	pm/late	19:20	NX					1														2		
VP3	SJW	16-Jul	pm/late	19:35	NX										2	1										
VP3	AU	23-Jul	early	05:40	NX													1								
VP3	AU	23-Jul	early	05:45	NX																1					
VP3	AU	23-Jul	early	05:55	NX																			1		
VP3	AU	23-Jul	early	06:00	NX	2																				
VP3	AU	23-Jul	early	06:15	NX										1											
VP3	AU	23-Jul	early	06:20	NX	2									1											
VP3	AU	23-Jul	early	06:30	NX	1										1										
VP3	AU	23-Jul	early	06:35	NX										1											
VP3	AU	23-Jul	early	07:05	NX																4					
VP3	AU	23-Jul	early	07:10	NX		1						4		2											
VP3	AU	23-Jul	early	07:15	NX										1						1					
VP3	AU	23-Jul	early	07:20	NX										2			2			1					
VP3	AU	23-Jul	early	07:25	NX										1	1										
VP3	AU	23-Jul	early	07:30	NX				1	2					1											
VP3	AU	23-Jul	early	07:35	NX	1																				
VP3	AU	23-Jul	early	07:55	NX					1					2											
VP3	AU	23-Jul	early	08:10	NX										1	1										
VP3	AU	23-Jul	early	08:15	NX											1					1					
VP3	AU	23-Jul	early	08:20	NX										1											
VP3	AU	23-Jul	early	08:25	NX							1	1				2									
VP3	AU	23-Jul	early	08:30	NX										1											
						9	5	0	7	11	0	6	6	0	31	25	7	6	10	6	13	8	1			
VP3	AU	06-Aug	p.m.	12:40	NX									1	1		1						2			
VP3	AU	06-Aug	p.m.	12:45	NX										1								1			
VP3	AU	06-Aug	p.m.	12:50	NX										2	1			1		2					
VP3	AU	06-Aug	p.m.	12:55	NX			2								2			2							
VP3	AU	06-Aug	p.m.	13:00	NX			2	1							1					1					
VP3	AU	06-Aug	p.m.	13:05	NX										3	3	1									
VP3	AU	06-Aug	p.m.	13:15	NX		2										3				2					
VP3	AU	06-Aug	p.m.	13:20	NX		3								2											
VP3	AU	06-Aug	p.m.	13:25	NX						2					2					1					
VP3	AU	06-Aug	p.m.	13:30	NX		3										2		1		1					
VP3	AU	06-Aug	p.m.	13:35	NX	1	2									3	3									
VP3	AU	06-Aug	p.m.	13:40	NX		2																			
VP3	AU	06-Aug	p.m.	13:45	NX											2	3									
VP3	AU	06-Aug	p.m.	13:50	NX											3										
VP3	AU	06-Aug	p.m.	13:55	NX													1					2			
VP3	AU	06-Aug	p.m.	14:00	NX											1					1		2			
VP3	AU	06-Aug	p.m.	14:05	NX											1							2			
VP3	AU	06-Aug	p.m.	14:10	NX											2					1					
VP3	AU	06-Aug	p.m.	14:15	NX										1	1	1									
VP3	AU	06-Aug	p.m.	14:25	NX										2	6	1									
VP3	AU	06-Aug	p.m.	14:30	NX										2	4										
VP3	AU	06-Aug	p.m.	14:35	NX		1								3	1										
VP3	AU	06-Aug	p.m.	14:40	NX															1						
VP3	AU	06-Aug	p.m.	14:45	NX		1								2		2									
VP3	AU	06-Aug	p.m.	14:50	NX										1	3	2									
VP3	AU	06-Aug	p.m.	14:55	NX			1			1		1			2	1									
VP3	AU	06-Aug	p.m.	15:00	NX									2	3	3	3									
VP3	AU	06-Aug	p.m.	15:05	NX	1				1						2							1			
VP3	AU	06-Aug	p.m.	15:10	NX	2																				
VP3	AU	06-Aug	p.m.	15:25	NX							2														
VP3	AU	06-Aug	p.m.	15:30	NX										1											
VP3	AU	06-Aug	p.m.	15:55	NX			2								3										
VP3	AU	06-Aug	p.m.	16:00	NX		1						1			2										
VP3	AU	06-Aug	p.m.	16:05	NX							2			2				1							
VP3	SJW	20-Aug	late	17:25	NX							1														
VP3	SJW	20-Aug	late	17:30	NX																					2
VP3	SJW	20-Aug	late	18:00	NX											2			1							
VP3	SJW	20-Aug	late	18:15	NX														1							
VP3	SJW	20-Aug	late	18:35	NX																		1			
VP3	SJW	20-Aug	late	18:50	NX												1						1			
VP3	SJW	20-Aug	late	19:30	NX										1	2										
VP3	SJW	20-Aug	late	19:55	NX							1			1											
VP3	SJW	21-Aug	a.m.	10:35	NX							1														
VP3	SJW	21-Aug	a.m.	10:50	NX											2			1							
VP3	SJW	21-Aug	a.m.	11:00	NX							1							2							
VP3	SJW	21-Aug	a.m.	11:05	NX											2	1									
VP3	SJW	21-Aug	a.m.	11:20	NX											1			1		1					
VP3	SJW	21-Aug	a.m.	11:40	NX					1																
VP3	SJW	21-Aug	a.m.	12:00	NX														1							
VP3	SJW	21-Aug	a.m.	12:15	NX														1							
VP3	SJW	21-Aug	a.m.	12:30	NX								1													
VP3	SJW	21-Aug	a.m.	13:00	NX												1		1				1			
VP3	SJW	21-Aug	a.m.	13:05	NX																2					
VP3	SJW	28-Aug	pm/late	16:35	NX																		1			
VP3	SJW	28-Aug	pm/late	16:55	NX							1														
VP3	SJW	28-Aug	pm/late	17:00	NX											2										

No. busy: 23

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		12	16	16	66	20	47
180	157	0.076	0.102	0.102	0.420	0.127	0.299
	Birds/sqkm	0.270	0.327	0.283	0.458	0.180	0.462
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

No. busy: 26

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		14	18	12	63	22	22
180	154	0.091	0.117	0.078	0.409	0.143	0.143
	Birds/sqkm	0.321	0.375	0.216	0.445	0.202	0.220
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

VP3	SJW	28-Aug	pm/late	17:10	NX				1																
VP3	SJW	28-Aug	pm/late	17:20	NX					2															
VP3	SJW	28-Aug	pm/late	17:55	NX					1					1										
VP3	SJW	28-Aug	pm/late	18:05	NX													1	1						
VP3	SJW	28-Aug	pm/late	18:10	NX														1						
VP3	SJW	28-Aug	pm/late	18:15	NX								1												1
VP3	SJW	28-Aug	pm/late	18:35	NX								1						1						
VP3	AU	29-Aug	early	06:55	NX		1								3										
VP3	AU	29-Aug	early	07:00	NX										2	1									
VP3	AU	29-Aug	early	07:05	NX				2													1			
VP3	AU	29-Aug	early	07:25	NX	1						2													
VP3	AU	29-Aug	early	07:30	NX								2												
VP3	AU	29-Aug	early	07:35	NX							1			1	2									
VP3	AU	29-Aug	early	07:40	NX																	1			
VP3	AU	29-Aug	early	07:45	NX										1							1			
VP3	AU	29-Aug	early	07:50	NX	1																			
VP3	AU	29-Aug	early	07:55	NX										1										
VP3	AU	29-Aug	early	08:00	NX		1								2	2									
VP3	AU	29-Aug	early	08:05	NX				2	1			2		3										
VP3	AU	29-Aug	early	08:15	NX										1							1	1		
VP3	AU	29-Aug	early	08:20	NX	2							2												
VP3	AU	29-Aug	early	08:30	NX																		1	1	
VP3	AU	29-Aug	early	08:35	NX										1										
VP3	AU	29-Aug	early	08:45	NX										1	5			1			2			
VP3	AU	29-Aug	early	08:50	NX								2	1											
VP3	AU	29-Aug	early	08:55	NX	1	4								2			1							
VP3	AU	29-Aug	early	09:00	NX							1	1		1	3						1			
VP3	AU	29-Aug	early	09:05	NX							1	2												
VP3	AU	29-Aug	early	09:10	NX										1										
VP3	AU	29-Aug	early	09:20	NX	1									2										
VP3	AU	29-Aug	early	09:25	NX								1												
VP3	AU	29-Aug	early	09:30	NX								1									1			
VP3	AU	29-Aug	early	09:35	NX																	1			
						10	21	7	6	6	3	14	18	4	50	72	26	3	18	1	21	16	4		
VP3	SJW	05-Sep	early	06:35	NX								1												
VP3	SJW	05-Sep	early	06:45	NX							1													
VP3	SJW	05-Sep	early	07:00	NX							1													
VP3	SJW	05-Sep	early	07:05	NX													1							
VP3	SJW	05-Sep	early	07:30	NX										1										
VP3	SJW	05-Sep	early	07:45	NX																		1		
VP3	SJW	05-Sep	early	08:10	NX													1							
VP3	SJW	05-Sep	early	08:40	NX	1																			
VP3	SJW	20-Sep	p.m.	13:05	NX												1								
VP3	SJW	20-Sep	p.m.	13:10	NX												1								
VP3	SJW	20-Sep	p.m.	13:25	NX										1								1		
VP3	SJW	20-Sep	p.m.	13:50	NX											1									
VP3	SJW	20-Sep	p.m.	13:55	NX										1									2	
VP3	SJW	20-Sep	p.m.	14:30	NX												1								
VP3	SJW	20-Sep	p.m.	14:50	NX																		1		
VP3	SJW	20-Sep	p.m.	15:00	NX																				
VP3	SJW	20-Sep	p.m.	15:25	NX				1																
VP3	SJW	20-Sep	pm	15:40	NX										2										
						1	0	0	1	0	0	2	1	0	5	1	3	2	0	0	0	3	2		
						39	36	12	28	30	6	34	39	6	141	164	49	28	62	12	74	54	10		

No. busy: 16

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		38	15	36	148	22	41
180	164	0.232	0.091	0.220	0.902	0.134	0.250
	Birds/sqkm	0.817	0.293	0.610	0.967	0.189	0.386
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

No. busy: 3

Birds per snapshot 20-150 m							
No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		1	1	3	9	2	5
72	69	0.014	0.014	0.043	0.130	0.029	0.072
	Birds/sqkm	0.061	0.046	0.121	0.142	0.041	0.112
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Great Skua - Bird Occupancy Calculations

VP1 - Zone A

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.200	0.417	0.336	0.562	1.134	0.032	*From '2019 Nos VP1'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	2.800	5.844	4.704	7.870	15.869	0.443	
Zone area	km2	0.5102	0.5102	0.5102	0.5102	0.5102	0.5102	
Flight rate in zone	m/sec	1.429	2.981	2.400	4.016	8.096	0.226	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	2221714	5602800	4743360	7907330	13990554	314594	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	68877000	68877000	68877000	68877000	68877000	68877000	
Flight length through rotors	m	2606	6571	5563	9274	16408	369	
No. passes through rotors		469	1182	1001	1668	2951	66	
No. passes at 85% operational efficiency		398	1005	850	1418	2508	56	
No. striking rotors at 6.6% BM		26.29	66.30	56.13	93.57	165.56	3.72	
No. striking rotors at 99.5% avoidance		0.131	0.332	0.281	0.468	0.828	0.019	**2.039**

VP1 - Zone B

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.040	0.132	0.482	0.443	0.594	0.042	*From '2019 Nos VP1'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.556	1.850	6.747	6.196	8.317	0.586	
Zone area	km2	0.7707	0.7707	0.7707	0.7707	0.7707	0.7707	
Flight rate in zone	m/sec	0.429	1.426	5.200	4.775	6.410	0.452	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	666514	2679600	10277280	9403312	11075855	629187	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	104044500	104044500	104044500	104044500	104044500	104044500	
Flight length through rotors	m	517	2080	7979	7301	8599	488	
No. passes through rotors		93	374	1435	1313	1547	88	
No. passes at 85% operational efficiency		79	318	1220	1116	1315	75	
No. striking rotors at 6.6% BM		5.22	20.99	80.51	73.66	86.77	4.93	
No. striking rotors at 99.5% avoidance		0.026	0.105	0.403	0.368	0.434	0.025	**1.336**

VP1 - Zone C

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.114	0.246	0.135	0.239	0.666	0.069	*From '2019 Nos VP1'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	1.591	3.442	1.884	3.346	9.319	0.967	
Zone area	km2	1.1675	1.1675	1.1675	1.1675	1.1675	1.1675	
Flight rate in zone	m/sec	1.857	4.019	2.200	3.907	10.880	1.129	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	2888229	7551600	4348080	7693619	18799807	1572968	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	157612500	157612500	157612500	157612500	157612500	157612500	
Flight length through rotors	m	1480	3870	2228	3943	9635	806	
No. passes through rotors		266	696	401	709	1733	145	
No. passes at 85% operational efficiency		226	592	341	603	1473	123	
No. striking rotors at 6.6% BM		15	39	22	40	97	8	
No. striking rotors at 99.5% avoidance		0.075	0.195	0.112	0.199	0.486	0.041	**1.108**

VP1 - Zone D

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.071	0.278	0.289	0.350	0.432	0.075	*From '2019 Nos VP1'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.991	3.898	4.048	4.895	6.047	1.045	
Zone area	km2	0.8647	0.8647	0.8647	0.8647	0.8647	0.8647	
Flight rate in zone	m/sec	0.857	3.370	3.500	4.233	5.229	0.903	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	1333029	6333600	6917400	8334753	9035566	1258374	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	116734500	116734500	116734500	116734500	116734500	116734500	
Flight length through rotors	m	922	4383	4787	5768	6253	871	
No. passes through rotors		166	788	861	1037	1125	157	
No. passes at 85% operational efficiency		141	670	732	882	956	133	
No. striking rotors at 6.6% BM		9.31	44.22	48.30	58.19	63.09	8.79	
No. striking rotors at 99.5% avoidance		0.047	0.221	0.241	0.291	0.315	0.044	**1.159**

Great Skua - Bird Occupancy Calculations

VP3 - Zone A - this zone not used in the risk calculations

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.110	0.573	0.270	0.321	0.817	0.051	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	1.543	8.019	3.774	4.489	11.442	0.716	
Zone area	km2	0.2835	0.2835	0.2835	0.2835	0.2835	0.2835	
Flight rate in zone	m/sec	0.438	2.274	1.070	1.273	3.244	0.203	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	680400	4272369	2114874	2506255	5605463	282678	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	38272500	38272500	38272500	38272500	38272500	38272500	
Flight length through rotors	m	1436	9017	4464	5290	11831	597	
No. passes through rotors		258	1622	803	951	2128	107	
No. passes at 85% operational efficiency		220	1379	682	809	1809	91	
No. striking rotors at 6.6% BM		14.49	90.98	45.04	53.37	119.37	6.02	
No. striking rotors at 99.5% avoidance		0.072	0.455	0.225	0.267	0.597	0.030	**1.646**

VP3 - Zone B

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.234	0.192	0.327	0.375	0.293	0.046	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	3.273	2.685	4.574	5.246	4.105	0.651	
Zone area	km2	0.3119	0.3119	0.3119	0.3119	0.3119	0.3119	
Flight rate in zone	m/sec	1.021	0.838	1.427	1.636	1.280	0.203	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	1587600	1574031	2819832	3222327	2212683	282678	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	42106500	42106500	42106500	42106500	42106500	42106500	
Flight length through rotors	m	3046	3020	5410	6182	4245	542	
No. passes through rotors		548	543	973	1112	763	98	
No. passes at 85% operational efficiency		466	462	827	945	649	83	
No. striking rotors at 6.6% BM		30.73	30.47	54.58	62.37	42.83	5.47	
No. striking rotors at 99.5% avoidance		0.154	0.152	0.273	0.312	0.214	0.027	**1.132**

VP3 - Zone C

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.029	0.261	0.283	0.216	0.610	0.121	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.405	3.656	3.963	3.030	8.537	1.691	
Zone area	km2	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	
Flight rate in zone	m/sec	0.146	1.316	1.427	1.091	3.073	0.609	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	226800	2473477	2819832	2148218	5310439	848035	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	48600000	48600000	48600000	48600000	48600000	48600000	
Flight length through rotors	m	377	4111	4687	3571	8827	1410	
No. passes through rotors		68	739	843	642	1588	254	
No. passes at 85% operational efficiency		58	629	717	546	1349	215	
No. striking rotors at 6.6% BM		3.80	41.48	47.29	36.03	89.06	14.22	
No. striking rotors at 99.5% avoidance		0.019	0.207	0.236	0.180	0.445	0.071	**1.159**

VP3 - Zone D - this zone not used in the risk calculations

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.170	0.493	0.458	0.445	0.982	0.142	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	2.381	6.904	6.407	6.235	13.754	1.988	
Zone area	km2	0.9186	0.9186	0.9186	0.9186	0.9186	0.9186	
Flight rate in zone	m/sec	2.188	6.342	5.885	5.727	12.634	1.826	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	3402000	11917662	11631806	11278145	21831805	2544104	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	124011000	124011000	124011000	124011000	124011000	124011000	
Flight length through rotors	m	2216	7763	7577	7346	14221	1657	
No. passes through rotors		399	1396	1363	1321	2558	298	
No. passes at 85% operational efficiency		339	1187	1158	1123	2174	253	
No. striking rotors at 6.6% BM		22.36	78.33	76.45	74.12	143.49	16.72	
No. striking rotors at 99.5% avoidance		0.112	0.392	0.382	0.371	0.717	0.084	**2.057**

VP3 - Zone E

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.221	0.253	0.180	0.202	0.189	0.041	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	3.089	3.548	2.518	2.824	2.652	0.573	
Zone area	km2	0.7082	0.7082	0.7082	0.7082	0.7082	0.7082	
Flight rate in zone	m/sec	2.188	2.513	1.783	2.000	1.878	0.406	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	3402000	4722092	3524790	3938400	3245268	565357	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	95607000	95607000	95607000	95607000	95607000	95607000	
Flight length through rotors	m	2874	3990	2978	3328	2742	478	
No. passes through rotors		517	718	536	598	493	86	
No. passes at 85% operational efficiency		439	610	455	509	419	73	
No. striking rotors at 6.6% BM		29.00	40.26	30.05	33.58	27.67	4.82	
No. striking rotors at 99.5% avoidance		0.145	0.201	0.150	0.168	0.138	0.024	**0.827**

VP3 - Zone F

		APRIL	MAY	JUNE	JULY	AUGUST	SEPT	
Flight density	birds/km2	0.064	0.250	0.462	0.220	0.386	0.112	*From '2019 Nos VP3'*
Flight speed	m/sec	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.900	3.507	6.465	3.085	5.399	1.565	
Zone area	km2	0.6483	0.6483	0.6483	0.6483	0.6483	0.6483	
Flight rate in zone	m/sec	0.583	2.274	4.191	2.000	3.500	1.014	
Hours available	hrs	432	522	549	547	480	387	
Monthly flight length AR	m	907200	4272369	8283256	3938400	6048000	1413391	
Rotor volume (1 turbine)	m3	80779	80779	80779	80779	80779	80779	
Zone risk volume	m3	87520500	87520500	87520500	87520500	87520500	87520500	
Flight length through rotors	m	837	3943	7645	3635	5582	1305	
No. passes through rotors		151	709	1375	654	1004	235	
No. passes at 85% operational efficiency		128	603	1169	556	853	199	
No. striking rotors at 6.6% BM		8.45	39.79	77.14	36.68	56.32	13.16	
No. striking rotors at 99.5% avoidance		0.042	0.199	0.386	0.183	0.282	0.066	**1.158**

Annex 4

VP	Observer	Date	Session	5-min ended	Sp.	W/E	N/S	SW/NE	SE/NW	Milling	Snapshot	W/E	N/S	SW/NE	SE/NW	Milling	Snapshot		
OVP1	NH	18/04/18	early	07:10	GB	1					1	1							
OVP1	NH	18/04/18	early	07:25	GB	1					1	1							
OVP1	NH	18/04/18	early	07:50	GB	1						1					1		
OVP1	NH	18/04/18	early	08:25	GB	1					1								
OVP1	NH	18/04/18	early	08:05	too busy														
					1						3						1	1	
OVP1	AU	01/05/18	early	06:10	too busy														
OVP1	AU	01/05/18	early	06:50	too busy														
OVP1	AU	01/05/18	early	06:55	too busy														
OVP1	AU	01/05/18	early	07:00	too busy														
OVP1	AU	01/05/18	early	07:05	too busy														
OVP1	AU	01/05/18	early	07:10	too busy														
OVP1	AU	01/05/18	early	07:15	too busy														
OVP1	AU	01/05/18	early	07:20	too busy														
OVP1	AU	01/05/18	early	07:25	too busy														
OVP1	AU	01/05/18	early	07:30	too busy														
OVP1	AU	01/05/18	early	07:45	too busy														
OVP1	AU	01/05/18	early	07:50	too busy														
OVP1	AU	01/05/18	early	08:05	too busy														
OVP1	AU	01/05/18	early	08:10	too busy														
OVP1	AU	01/05/18	early	08:15	too busy														
OVP1	AU	01/05/18	early	08:20	too busy														
OVP1	AU	01/05/18	early	08:25	too busy														
OVP1	AU	01/05/18	early	08:55	too busy														
OVP1	NH	17/05/18	am	12:30	too busy														
					19						0						0	19	
OVP1	NH	07/06/18	early	07:35	GB	2					0	2					0		
OVP1	NH	07/06/18	early	06:15	tb														
OVP1	NH	07/06/18	early	06:25	tb														
OVP1	NH	07/06/18	early	06:30	tb														
OVP1	NH	07/06/18	early	06:35	tb														
OVP1	NH	07/06/18	early	07:10	tb														
OVP1	NH	07/06/18	early	07:15	tb														
OVP1	NH	24/06/18	pm	15:15	too busy														
					7						0						0	7	
OVP1	SJW	04/07/18	late	20:50	GB	1					1								
OVP1	SJW	18/07/18	pm	12:25	GB		1				1								
OVP1	SJW	18/07/18	pm	13:55	GB	1					1								
OVP1	SJW	18/07/18	pm	14:30	GB		2				2								
OVP1	SJW	18/07/18	pm	14:55	GB								1				1		
OVP1	SJW	02/07/18	am	12:05	too busy														
OVP1	SJW	02/07/18	am	12:10	too busy														
OVP1	SJW	02/07/18	am	12:20	too busy														
OVP1	SJW	02/07/18	am	13:45	too busy														
OVP1	SJW	02/07/18	am	13:55	too busy														
OVP1	SJW	04/07/18	late	20:05	too busy														
OVP1	SJW	04/07/18	late	20:10	too busy														
OVP1	SJW	04/07/18	late	20:15	too busy														
OVP1	SJW	04/07/18	late	21:00	too busy														
OVP1	SJW	04/07/18	late	21:55	too busy														
					10						5						1	10	
OVP1	AU	06/08/18	a.m.	12:10	GB												1		
OVP1	AU	06/08/18	a.m.	12:15	GB											1			
OVP1	AU	08/08/18	late	20:25	GB		1												
OVP1	AU	06/08/18	a.m.	11:55	too busy														
OVP1	AU	08/08/18	late	18:40	too busy														
OVP1	AU	08/08/18	late	20:45	too busy														
OVP1	SJW	20/08/18	pm	13:45	too busy														
					4						0						1	4	
OVP1	SJW	11/09/18	early	09:10	GB	1					1								
OVP1	SJW	11/09/18	early	09:30	GB	1					1								
OVP1	SJW	26/09/18	am	08:25	GB								1				1		
OVP1	SJW	26/09/18	am	08:40	GB	1					1								
OVP1	SJW	26/09/18	am	10:15	GB		1				1								
OVP1	SJW	11/09/18	early	06:35	TB														
OVP1	SJW	26/09/18	am	10:25	TB														
					2						4						1	2	
		October			0						1						0	0	
		November			0						1						0	0	
		December			0						0						1	0	
		January			0						0						1	0	
		February			0						1						0	0	
		March			0						0						0	0	

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		3	1
72	71	0.04	0.01
	Birds/sqkm	0.021	0.007
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	53	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	65	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		5	1
72	62	0.08	0.02
	Birds/sqkm	0.041	0.008
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	1
72	68	0.00	0.01
	Birds/sqkm	0.000	0.007
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		4	1
72	70	0.06	0.01
	Birds/sqkm	0.029	0.007
	Zone area	1.98	1.97

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		1	0
72	72	0.01	0.00
	Birds/sqkm	0.008	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		1	0
72	72	0.01	0.00
	Birds/sqkm	0.008	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	1
72	72	0.00	0.01
	Birds/sqkm	0.000	0.006
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		1	0
72	72	0.01	0.00
	Birds/sqkm	0.008	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	72	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.78	2.19

VP	Observer	Date	Session	5-min ended	Sp.	W/E	N/S	SW/NE	SE/NW	Milling	Snapshot	W/E	N/S	SW/NE	SE/NW	Milling	Snapshot		
OVP3	SJW	18/04/18	pm	15:10	GB	1					1		1				1		
OVP3	SJW	18/04/18	pm	15:35	GB									1			1		
OVP3	SJW	18/04/18	pm	16:15	GB	3					3								
OVP3	SJW	18/04/18	pm	16:25	GB								2				2		
OVP3	SJW	18/04/18	pm	16:30	GB							1					1		
OVP3	SJW	18/04/18	pm	17:00	GB								1		1		2		
OVP3	SJW	18/04/18	pm		GB							1					1		
OVP3	SJW	18/04/18	pm		GB			3			3				1		1		
OVP3	SJW	18/04/18	pm		GB		1				1								
OVP3	SJW	18/04/18	pm		GB							1					1		
OVP3	SJW	18/04/18	pm		GB				1		1	2					2		
OVP3	NH	25/04/18	am	10:55	GB										1		1		
OVP3	NH	25/04/18	am	11:00	GB											1	1		
OVP3	NH	25/04/18	am	12:50	GB			2			1			2			1		
OVP3	NH	25/04/18	am	13:00	GB											2	2		
OVP3	SJW	18/04/18	pm	15:25	too busy														
OVP3	SJW	18/04/18	pm	15:45	too busy														
OVP3	SJW	18/04/18	pm	16:05	too busy														
OVP3	SJW	18/04/18	pm	16:10	too busy														
OVP3	NH	25/04/18	am	10:35	too busy														
OVP3	NH	25/04/18	am	10:40	too busy														
OVP3	NH	25/04/18	am	11:50	too busy														
					7						**10**						**17**	7	
OVP3	SJW	10/05/18	late	19:00	GB							1					1		
OVP3	SJW	10/05/18	late	19:55	GB		2				2								
OVP3	SJW	19/05/18	early	04:50	GB							1					1		
OVP3	SJW	19/05/18	early	05:00	GB		1				1								
OVP3	SJW	19/05/18	early	05:15	GB							1					1		
OVP3	SJW	19/05/18	early	06:30	GB										1		1		
OVP3	SJW	19/05/18	early		GB							1			4		2		
OVP3	SJW	19/05/18	early	05:25	too busy														
OVP3	SJW	19/05/18	early	05:30	too busy														
					2						**3**						**6**	2	
OVP3	SJW	04/06/18	late	19:15	GB		1				1								
OVP3	SJW	04/06/18	late	21:05	GB		1				1								
OVP3	NH	24/06/18	am	09:55	GB						1						0		
OVP3	NH	24/06/18	am	10:40	GB											1			
OVP3	NH	24/06/18	am	11:30	GB						0						2		
OVP3	NH	24/06/18	am	11:35	GB						1						1		
OVP3	NH	24/06/18	am	11:40	GB						0						1		
OVP3	NH	24/06/18	am	11:45	GB						0						1		
OVP3	NH	24/06/18	am	12:50	GB						1						0		
OVP3	SJW	04/06/18	late	19:55	too busy														
OVP3	SJW	04/06/18	late	20:00	too busy														
OVP3	SJW	04/06/18	late	20:20	too busy														
OVP3	NH	24/06/18	am	10:25	too busy														
OVP3	NH	24/06/18	am	12:20	too busy														
					5						**5**						**5**	5	
OVP3	SJW	03/07/18	early	05:00	GB		1				1								
OVP3	NH	19/07/18	am	12:25	GB		1				1		1						
OVP3	NH	20/07/18	pm	15:05	GB							1					1		
OVP3	NH	20/07/18	pm	15:15	GB											2	2		
OVP3	SJW	03/07/18	early	04:40	too busy														
OVP3	SJW	03/07/18	early	06:00	too busy														
OVP3	NH	19/07/18	am	10:45	too busy														
OVP3	NH	19/07/18	am	10:50	too busy														
OVP3	NH	19/07/18	am	11:10	too busy														
OVP3	NH	19/07/18	am	11:15	too busy														
OVP3	NH	19/07/18	am	11:35	too busy														
OVP3	NH	19/07/18	am	11:40	too busy														
OVP3	NH	19/07/18	am	12:10	too busy														
OVP3	NH	19/07/18	am	12:30	too busy														
OVP3	NH	20/07/18	pm	14:20	too busy														
OVP3	NH	20/07/18	pm	14:25	too busy														
OVP3	NH	20/07/18	pm	14:45	too busy														
OVP3	NH	20/07/18	pm	15:45	too busy														
OVP3	NH	20/07/18	pm	17:00	too busy														
OVP3	NH	20/07/18	pm	17:05	too busy														
					16						**2**						**3**	16	
OVP3	NH	07/08/18	early	06:30	GB						1						0		
OVP3	NH	07/08/18	early	07:50	GB						0						1		
OVP3	NH	07/08/18	early	08:35	GB				1		0				1		1		
OVP3	NH	07/08/18	early	08:40	GB						0						1		
OVP3	NH	20/08/18	am	11:10	GB	1													
OVP3	NH	22/08/18	pm	14:35	GB						1						0		
OVP3	NH	22/08/18	pm	14:40	too busy														
OVP3	NH	07/08/18	early	07:25	tb														
OVP3	NH	07/08/18	early	07:35	tb														
OVP3	NH	07/08/18	early	07:40	tb														
OVP3	NH	07/08/18	early	08:20	tb														
					5						**2**						**3**	5	
OVP3	SJW	10/09/18	late	18:35	GB										1		1		
OVP3	SJW	10/09/18	late	19:30	GB		1				1								
OVP3	SJW	25/09/18	pm	12:05	GB			1			1								
OVP3	SJW	25/09/18	pm	12:30	GB		1				1								
OVP3	SJW	25/09/18	pm	12:40	GB		2				2			1			1		
OVP3	SJW	25/09/18	pm	13:10	GB				1		1								
OVP3	SJW	25/09/18	pm	13:30	GB							1					1		
OVP3	SJW	25/09/18	pm	13:50	GB								1				1		
OVP3	SJW	25/09/18	pm	14:05	GB										1		1		
OVP3	SJW	25/09/18	pm	14:30	GB				1		1								
OVP3	SJW	25/09/18	pm	14:50	GB								1				1		
OVP3	SJW	25/09/18	pm	12:50	TB														
OVP3	SJW	25/09/18	pm	13:15	TB														
OVP3	SJW	25/09/18	pm	14:10	TB														
					3						**7**						**6**	3	
October					0						**0**						**0**	0	
November					0						**0**						**0**	0	
December					0						**0**						**2**	0	
January					0						**0**						**0**	0	
February					0						**0**						**0**	0	
March					0						**0**						**4**	0	

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		10	17
72	65	0.15	0.26
	Birds/sqkm	0.086	0.119
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		3	6
72	70	0.04	0.09
	Birds/sqkm	0.024	0.039
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		5	5
72	67	0.07	0.07
	Birds/sqkm	0.042	0.034
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		2	3
72	56	0.04	0.05
	Birds/sqkm	0.020	0.024
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		2	3
72	67	0.03	0.04
	Birds/sqkm	0.017	0.020
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		7	6
72	69	0.10	0.09
	Birds/sqkm	0.057	0.040
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	72	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	72	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	2
72	72	0.00	0.03
	Birds/sqkm	0.000	0.013
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	72	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	0
72	72	0.00	0.00
	Birds/sqkm	0.000	0.000
	Zone area	1.78	2.19

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B
		0	4
72	72	0.00	0.06
	Birds/sqkm	0.000	0.025
	Zone area	1.78	2.19

Great Black-backed Gull - Bird Occupancy Calculations

VP1 - Zone A		Breeding Season							Non-breeding Season								
		APRIL	MAY	JUNE	JULY	AUGUST			SEPT	OCT	NOV	DEC	JAN	FEB	MAR		
Bird density	birds/km2	0.021	0.000	0.000	0.041	0.000	*From 'GB 2018 nos'*		0.029	0.008	0.008	0.000	0.000	0.008	0.000	*From 'GB 2018 nos'*	
Flight speed	m/sec	14	14	14	14	14			14	14	14	14	14	14	14		
At-risk flight rate	m/sec/km2	0.299	0.000	0.000	0.570	0.000			0.404	0.109	0.109	0.000	0.000	0.109	0.000		
Zone area	km2	1.9800	1.9800	1.9800	1.9800	1.9800			1.98	1.98	1.98	1.98	1.98	1.98	1.98		
Flight rate in zone	m/sec	0.592	0.000	0.000	1.129	0.000			0.800	0.216	0.216	0.000	0.000	0.216	0.000		
Hours available	hrs	432	522	549	547	480			387	319	236	198	220	258	365		
Monthly flight length at risk	m	919977	0	0	2223290	0			1114560	248390	183762	0	0	200892	0		
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335			71335	71335	71335	71335	71335	71335	71335		
Zone risk volume	m3	267300000	267300000	267300000	267300000	267300000			267300000	267300000	267300000	267300000	267300000	267300000	267300000		
Flight length through rotors	m	246	0	0	593	0			297	66	49	0	0	54	0		
No. passes through rotors		50	0	0	121	0			61	14	10	0	0	11	0		
No. passes at 85% operational efficiency		43	0	0	103	0			51	11	8	0	0	9	0		
No. striking rotors at Band Model 7.3%		3.10	0.00	0.00	7.50	0.00			3.76	0.84	0.62	0.00	0.00	0.68	0.00		
No. striking rotors at 98% avoidance		0.062	0.000	0.000	0.150	0.000	**0.212**	**0.230** (x 1.087 to allow for the extra 5m at 15-20m)	0.075	0.017	0.012	0.000	0.000	0.014	0.000	**0.118**	**0.128** (x 1.087 to allow for the extra 5m at 15-20m)

VP1 - Zone B																	
		APRIL	MAY	JUNE	JULY	AUGUST			SEPT	OCT	NOV	DEC	JAN	FEB	MAR		
Bird density	birds/km2	0.007	0.000	0.000	0.008	0.007	*From 'GB 2018 nos'*		0.007	0.000	0.000	0.006	0.006	0.000	0.000	*From 'GB 2018 nos'*	
Flight speed	m/sec	14	14	14	14	14			14	14	14	14	14	14	14		
At-risk flight rate	m/sec/km2	0.100	0.000	0.000	0.115	0.105			0.102	0.000	0.000	0.089	0.089	0.000	0.000		
Zone area	km2	1.97	1.97	1.97	1.97	1.97			1.97	1.97	1.97	1.97	1.97	1.97	1.97		
Flight rate in zone	m/sec	0.197	0.000	0.000	0.226	0.206			0.200	0.000	0.000	0.175	0.175	0.000	0.000		
Hours available	hrs	432	522	549	547	480			387	319	236	198	220	258	365		
Monthly flight length at risk	m	306659	0	0	444658	355765			278640	0	0	124677	138530	0	0		
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335			71335	71335	71335	71335	71335	71335	71335		
Zone risk volume	m3	265950000	265950000	265950000	265950000	265950000			265950000	265950000	265950000	265950000	265950000	265950000	265950000		
Flight length through rotors	m	82	0	0	119	95			75	0	0	33	37	0	0		
No. passes through rotors		17	0	0	24	19			15	0	0	7	8	0	0		
No. passes at 85% operational efficiency		14	0	0	21	17			12.7500	0.0000	0.0000	5.7893	6.4326	0.0000	0.0000		
No. striking rotors at Band Model 7.3%		1.04	0.00	0.00	1.51	1.21			0.9308	0.0000	0.0000	0.4226	0.4696	0.0000	0.0000		
No. striking rotors at 98% avoidance		0.021	0.000	0.000	0.030	0.024	**0.075**	**0.082** (x 1.087 to allow for the extra 5m at 15-20m)	0.019	0.000	0.000	0.008	0.009	0.000	0.000	**0.036**	**0.040** (x 1.087 to allow for the extra 5m at 15-20m)

VP3 - Zone B																	
		APRIL	MAY	JUNE	JULY	AUGUST			SEPT	OCT	NOV	DEC	JAN	FEB	MAR		
Bird density	birds/km2	0.119	0.039	0.034	0.024	0.020	*From 'GB 2018 nos'*		0.040	0.000	0.000	0.013	0.000	0.000	0.025	*From 'GB 2018 nos'*	
Flight speed	m/sec	14	14	14	14	14			14	14	14	14	14	14	14		
At-risk flight rate	m/sec/km2	1.672	0.548	0.477	0.342	0.286			0.556	0.000	0.000	0.178	0.000	0.000	0.355		
Zone area	km2	2.19	2.19	2.19	2.19	2.19			2.19	2.19	2.19	2.19	2.19	2.19	2.19		
Flight rate in zone	m/sec	3.662	1.200	1.045	0.750	0.627			1.217	0.000	0.000	0.389	0.000	0.000	0.778		
Hours available	hrs	432	522	549	547	480			387	319	236	198	220	258	365		
Monthly flight length at risk	m	5694425	2255040	2064896	1476900	1083224			1696070	0	0	277200	0	0	1022000		
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335			71335	71335	71335	71335	71335	71335	71335		
Zone risk volume	m3	295650000	295650000	295650000	295650000	295650000			295650000	295650000	295650000	295650000	295650000	295650000	295650000		
Flight length through rotors	m	1374	544	498	356	261			409	0	0	67	0	0	247		
No. passes through rotors		280	111	101	73	53			83	0	0	14	0	0	50		
No. passes at 85% operational efficiency		238	94	86	62	45			71	0	0	12	0	0	43		
No. striking rotors at Band Model 7.3%		17.36	6.88	6.30	4.50	3.30			5.17	0.00	0.00	0.85	0.00	0.00	3.12		
No. striking rotors at 98% avoidance		0.347	0.138	0.126	0.090	0.066	**0.767**	**0.834** (x 1.087 to allow for the extra 5m at 15-20m)	0.103	0.000	0.000	0.017	0.000	0.000	0.062	**0.183**	**0.199** (x 1.087 to allow for the extra 5m at 15-20m)

VP3 - Zone A - not included in the collision risk workings																	
		APRIL	MAY	JUNE	JULY	AUGUST			SEPT	OCT	NOV	DEC	JAN	FEB	MAR		
Bird density	birds/km2	0.086	0.024	0.042	0.020	0.017	*From 'GB 2018 nos'*		0.057	0.000	0.000	0.000	0.000	0.000	0.000	*From 'GB 2018 nos'*	
Flight speed	m/sec	14	14	14	14	14			14	14	14	14	14	14	14		
At-risk flight rate	m/sec/km2	1.210	0.337	0.587	0.281	0.235			0.798	0.000	0.000	0.000	0.000	0.000	0.000		
Zone area	km2	1.78	1.78	1.78	1.78	1.78			1.78	1.78	1.78	1.78	1.78	1.78	1.78		
Flight rate in zone	m/sec	2.154	0.600	1.045	0.500	0.418			1.420	0.000	0.000	0.000	0.000	0.000	0.000		
Hours available	hrs	432	522	549	547	480			387	319	236	198	220	258	365		
Monthly flight length at risk	m	3349662	1127520	2064896	984600	722149			1978748	0	0	0	0	0	0		
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335			71335	71335	71335	71335	71335	71335	71335		
Zone risk volume	m3	240300000	240300000	240300000	240300000	240300000			240300000	240300000	240300000	240300000	240300000	240300000	240300000		
Flight length through rotors	m	994	335	613	292	214			587	0	0	0	0	0	0		
No. passes through rotors		203	68	125	60	44			120	0	0	0	0	0	0		
No. passes at 85% operational efficiency		172	58	106	51	37			101.69	0.00	0.00	0.00	0.00	0.00	0.00		
No. striking rotors at Band Model 7.3%		12.57	4.23	7.75	3.69	2.71			7.42	0.00	0.00	0.00	0.00	0.00	0.00		
No. striking rotors at 98% avoidance		0.251	0.085	0.155	0.074	0.054	**0.619**	**0.673** (x 1.087 to allow for the extra 5m at 15-20m)	0.148	0.000	0.000	0.000	0.000	0.000	0.000	**0.148**	**0.161** (x 1.087 to allow for the extra 5m at 15-20m)

VP	Observer	Date	Session	5-min ended	Sp.	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	
						Zone A				Zone B				Zone C				Zone D				Zone E				Zone F				
VP1	SJW	16-Apr	a.m.	11:35	busy																									
VP1	SJW	16-Apr	a.m.	12:15	busy																									
VP1	SJW	16-Apr	a.m.	13:05	busy																									
VP1	SJW	16-Apr	a.m.	12:55	GB													1												
VP1	AU	29-Apr	a.m.	11:45	busy																									
VP1	AU	29-Apr	a.m.	13:15	busy																									
VP1	AU	29-Apr	a.m.	13:20	busy																									
VP1	AU	29-Apr	a.m.	13:25	busy																									
VP1	AU	29-Apr	a.m.	13:40	busy																									
VP1	AU	29-Apr	late	17:35	busy																									
VP1	AU	29-Apr	late	17:50	busy																									
					10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	10
VP1	SJW	08-May	p.m.	15:15	busy																									
VP1	SJW	08-May	p.m.	15:20	busy																									
VP1	SJW	08-May	p.m.	16:45	busy																									
VP1	SJW	08-May	p.m.	16:50	busy																									
VP1	SJW	08-May	p.m.	16:55	busy																									
VP1	SJW	08-May	p.m.	17:10	busy																									
VP1	SJW	08-May	p.m.	17:15	busy																									
VP1	AU	09-May	early	05:20	busy																									
VP1	AU	09-May	early	05:30	busy																									
VP1	AU	09-May	early	05:50	busy																									
VP1	AU	09-May	early	06:00	busy																									
VP1	AU	09-May	early	06:25	busy																									
VP1	AU	09-May	early	06:30	busy																									
VP1	AU	09-May	early	06:35	busy																									
VP1	AU	09-May	early	06:45	busy																									
VP1	AU	09-May	early	07:15	busy																									
VP1	AU	09-May	early	07:30	busy																									
VP1	AU	09-May	early	07:35	busy																									
VP1	AU	27-May	a.m.	10:15	busy																									
VP1	AU	27-May	a.m.	10:20	busy																									
VP1	AU	27-May	a.m.	10:30	busy																									
VP1	AU	27-May	a.m.	10:55	busy																									
VP1	AU	27-May	a.m.	11:00	busy																									
VP1	AU	27-May	a.m.	11:35	busy																									
VP1	AU	27-May	a.m.	11:45	busy																									
VP1	AU	27-May	a.m.	12:30	busy																									
VP1	AU	27-May	a.m.	12:35	busy																									
VP1	AU	27-May	a.m.	12:40	busy																									
VP1	SJW	27-May	late	19:00	busy																									
VP1	SJW	27-May	late	19:05	busy																									
VP1	SJW	27-May	late	19:10	busy																									
VP1	SJW	27-May	late	19:20	busy																									
VP1	SJW	27-May	late	19:25	busy																									
VP1	SJW	27-May	late	19:35	busy																									
VP1	SJW	27-May	late	19:45	busy																									
VP1	SJW	27-May	late	21:25	busy																									
VP1	SJW	27-May	late	20:05	GB						3																			
					36	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
VP1	SJW	10-Jun	late	19:15	busy																									
VP1	SJW	10-Jun	late	19:35	busy																									
VP1	SJW	10-Jun	late	21:05	busy																									
VP1	SJW	10-Jun	late	19:45	GB	1																								
VP1	SJW	12-Jun	p.m.	17:00	busy																									
VP1	SJW	12-Jun	p.m.	17:05	busy																									
VP1	SJW	12-Jun	p.m.	17:50	busy																									
VP1	SJW	12-Jun	p.m.	18:00	busy																									
VP1	SJW	12-Jun	p.m.	18:05	busy																									
VP1	SJW	12-Jun	p.m.	18:20	busy																									
VP1	SJW	12-Jun	p.m.	19:10	busy																									
VP1	SJW	12-Jun	p.m.	19:45	busy																									
VP1	SJW	12-Jun	p.m.	19:50	busy																									
VP1	SJW	12-Jun	p.m.	19:40	GB						1																			
VP1	AU	13-Jun	a.m.	08:20	busy																									
VP1	AU	13-Jun	a.m.	08:30	busy																									
VP1	AU	13-Jun	a.m.	08:35	busy																									
VP1	AU	13-Jun	a.m.	08:50	busy																									
VP1	AU	13-Jun	a.m.	09:00	busy																									
VP1	AU	13-Jun	a.m.	09:05	busy																									
VP1	AU	13-Jun	a.m.	09:25	busy																									
VP1	AU	13-Jun	a.m.	09:50	busy																									
VP1	AU	13-Jun	a.m.	09:55	busy																									
VP1	AU	13-Jun	a.m.	10:00	busy																									
VP1	SJW	28-Jun	pm	17:45	busy																									
VP1	SJW	28-Jun	pm	18:10	busy																									
VP1	SJW	28-Jun	pm	15:30	GB						3																			
VP1	SJW	28-Jun	pm	16:35	GB					1																				
VP1	SJW	28-Jun	pm	17:35	GB					1																				
VP1	AU	29-Jun	early	04:00	busy																									
VP1	AU	29-Jun	early	04:10	busy																									
VP1	AU	29-Jun	early	04:15	busy																									
VP1	AU	29-Jun	early	04:20	busy																									
VP1	AU	29-Jun	early	04:30	busy																									
VP1	AU	29-Jun	early	04:35	busy																									
VP1	AU	29-Jun	early	04:45	busy																									
VP1	AU	29-Jun	early	05:05	busy																									
VP1	AU	29-Jun	early	05:10	busy																									
VP1	AU	29-Jun	early	05:15	busy																									
VP1	AU	29-Jun	early	05:20	busy																									
VP1	AU	29-Jun	early	05:50	busy																									
VP1	AU	29-Jun	early	06:05	busy																									
VP1	AU	29-Jun	early	06:10	busy																									
VP1	AU	29-Jun	early	06:45	busy																									
VP1	AU	29-Jun	early	06:50	busy																									
					40	1	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40
VP1	SJW	02-Jul	am	09:50	busy																									
VP1	SJW	02-Jul	am	10:00	busy																									
VP1	SJW	02-Jul	am	11:10	busy																									
VP1	SJW	02-Jul	am	12:05	busy																									
VP1	AU	02-Jul	late	18:55	busy																									
VP1	AU	02-Jul	late	19:00	busy																									
VP1	AU	02-Jul	late	19:30	busy																									
VP1	AU	02-Jul	late	19:35	busy																									
VP1	AU	02-Jul	late	20:05	busy																									
VP1	AU	02-Jul	late	20:10	busy																									
VP1	AU	02-Jul	late	20:15	busy																									
VP1	AU	02-Jul	late	20:20	busy																									
VP1	AU	02-Jul	late	20:40	busy																									
VP1	AU	02-Jul	late	21:00	busy																									
VP1	AU	02-Jul	late	21:20	busy																									
VP1	AU	02-Jul	late	21:25	busy																									
VP1	AU	02-Jul	late	21:45	busy																									
VP1	SJW	02-Jul	am	11:15	GB	1																								
VP1	AU	16-Jul	p.m.	13:45	busy																									
VP1	AU	16-Jul	p.m.	13:55	busy																									
VP1	AU	16-Jul	p.m.	14:15	busy																									
VP1	AU	16-Jul	p.m.	15:45	busy																									
VP1	AU	16-Jul	p.m.	15:50	busy																									
VP1	AU	16-Jul	p.m.	15:55	busy																									
VP1	AU	16-Jul	pm/late	16:50	busy																									
VP1	AU	16-Jul	pm/late	17:05	busy																									
VP1	AU	16-Jul	pm/late	17:20	busy																									
VP1	AU	16-Jul	pm/late	17:30	busy																									
VP1	AU	16-Jul	pm/late	17:35	busy																									
VP1	AU	16-Jul	pm/late	19:25	busy																									
VP1	AU	16-Jul	p.m.	14:30	GB					1																				
VP1	AU	24-Jul	early	05:05	busy																									
					30	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
VP1	AU	05-Aug	p.m.	13:40	busy																									
VP1	AU	05-Aug	p.m.	14:05	busy																									
VP1	AU	05-Aug	p.m.	16:00	busy																									
VP1	AU	05-Aug	p.m.	16:05	busy																									

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		0	0	0	1
108	98	0.00	0.00	0.00	0.01
	Birds/sqkm	0.000	0.000	0.000	0.012
	Zone area	0.5102	0.7707	1.1675	0.8647

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		0	3	0	0
144	108	0.00	0.03	0.00	0.00
	Birds/sqkm	0.000	0.036	0.000	0.000
	Zone area	0.5102	0.7707	1.1675	0.8647

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		1	6	0	0
180	140	0.01	0.04	0.00	0.00
	Birds/sqkm	0.014	0.056	0.000	0.000
	Zone area	0.5102	0.7707	1.1675	0.8647

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D
		1	1	0	0
159	129	0.01	0.01	0.00	0.00
	Birds/sqkm	0.015	0.010	0.000	0.000
	Zone area	0.5102	0.7707	1.1675	0.8647

VP1	AU	05-Aug	p.m.	16:10	busy																										
VP1	AU	05-Aug	p.m.	16:15	busy																										
VP1	AU	05-Aug	p.m.	16:20	busy																										
VP1	AU	05-Aug	p.m.	16:25	busy																										
VP1	AU	05-Aug	p.m.	16:35	busy																										
VP1	AU	05-Aug	pm/late	17:25	busy																										
VP1	AU	05-Aug	pm/late	17:30	busy																										
VP1	AU	05-Aug	pm/late	18:20	busy																										
VP1	AU	05-Aug	pm/late	18:30	busy																										
VP1	AU	05-Aug	pm/late	18:35	busy																										
VP1	AU	05-Aug	p.m.	12:50	GB																										
VP1	AU	05-Aug	p.m.	14:15	GB									1				1													
VP1	AU	05-Aug	p.m.	15:40	GB	1																									
VP1	AU	20-Aug	late	17:40	busy																										
VP1	AU	20-Aug	late	17:45	busy																										
VP1	AU	20-Aug	late	18:25	busy																										
VP1	AU	20-Aug	late	18:30	busy																										
VP1	AU	20-Aug	late	18:45	busy																										
VP1	AU	20-Aug	late	18:55	busy																										
VP1	AU	20-Aug	late	19:00	busy																										
VP1	AU	20-Aug	late	19:15	busy																										
VP1	AU	20-Aug	late	19:20	busy																										
VP1	AU	20-Aug	late	19:30	busy																										
VP1	AU	21-Aug	a.m.	10:45	busy																										
VP1	AU	21-Aug	a.m.	11:05	busy																										
VP1	AU	21-Aug	a.m.	11:45	busy																										
VP1	AU	21-Aug	a.m.	11:50	busy																										
VP1	AU	21-Aug	a.m.	11:55	busy																										
VP1	AU	21-Aug	a.m.	12:00	busy																										
VP1	AU	28-Aug	pm/late	16:40	busy																										
VP1	SJW	29-Aug	early	06:45	busy																										
VP1	SJW	29-Aug	early	08:15	busy																										
VP1	SJW	29-Aug	early	08:20	busy																										
VP1	SJW	29-Aug	early	09:25	busy																										
						1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	35
					35																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			1	0	1	1
201	166		0.01	0.00	0.01	0.01
		Birds/sqkm	0.012	0.000	0.005	0.007
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	04-Sep	p.m.	17:25	busy																										
VP1	SJW	04-Sep	p.m.	17:30	busy																										
VP1	SJW	04-Sep	p.m.	18:00	busy																										
VP1	SJW	04-Sep	p.m.	18:05	busy																										
VP1	SJW	04-Sep	p.m.	18:10	busy																										
VP1	SJW	04-Sep	p.m.	18:20	busy																										
VP1	SJW	20-Sep	a.m.	10:05	busy																										
VP1	SJW	20-Sep	a.m.	10:20	busy																										
VP1	SJW	20-Sep	a.m.	11:15	busy																										
VP1	SJW	20-Sep	a.m.	11:20	busy																										
VP1	SJW	20-Sep	a.m.	09:35	GB	1																									
VP1	SJW	20-Sep	a.m.	10:50	GB					1																					
						1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
					10																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			1	1	0	0
72	62		0.02	0.02	0.00	0.00
		Birds/sqkm	0.032	0.021	0.000	0.000
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	08-Oct	p.m.	14:25	busy																										
VP1	SJW	08-Oct	p.m.	15:05	busy																										
VP1	SJW	08-Oct	p.m.	15:10	busy																										
VP1	SJW	08-Oct	p.m.	15:15	busy																										
VP1	SJW	08-Oct	p.m.	13:15	GB													1													
VP1	SJW	08-Oct	p.m.	13:45	GB	1																									
VP1	SJW	08-Oct	p.m.	13:55	GB					1																					
VP1	SJW	08-Oct	p.m.	14:10	GB						2																				
VP1	SJW	08-Oct	p.m.	14:15	GB					1																					
VP1	SJW	08-Oct	p.m.	14:50	GB	1																									
VP1	SJW	25-Oct	a.m.	09:15	busy																										
VP1	SJW	25-Oct	a.m.	09:05	GB													1													
VP1	SJW	25-Oct	a.m.	09:55	GB									1																	
						2	0	0	0	2	2	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	5
					5																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			2	4	1	2
72	67		0.03	0.06	0.01	0.03
		Birds/sqkm	0.059	0.077	0.013	0.035
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	01-Nov	a.m.	09:45	GB													1													
VP1	SJW	01-Nov	a.m.	10:15	GB	1																									
VP1	SJW	01-Nov	a.m.	10:35	GB													2													
VP1	SJW	01-Nov	a.m.	11:00	GB									1																	
VP1	SJW	01-Nov	a.m.	11:30	GB													1													
VP1	SJW	29-Nov	p.m.	12:45	busy																										
VP1	SJW	29-Nov	p.m.	13:10	busy																										
VP1	SJW	29-Nov	p.m.	13:30	busy																										
VP1	SJW	29-Nov	p.m.	12:55	GB									1																	
VP1	SJW	29-Nov	p.m.	14:45	GB					1																					
VP1	SJW	29-Nov	p.m.	15:15	GB									1																	
						1	0	0	0	1	0	0	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	3
					3																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			1	1	3	4
72	69		0.01	0.01	0.04	0.06
		Birds/sqkm	0.028	0.019	0.037	0.067
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	03-Dec	a.m.	10:05	GB													1													
VP1	SJW	03-Dec	a.m.	10:55	GB									1																	
VP1	SJW	19-Dec	p.m.	13:20	busy																										
VP1	SJW	19-Dec	p.m.	13:50	busy																										
VP1	SJW	19-Dec	p.m.	13:55	busy																										
VP1	SJW	19-Dec	p.m.	12:20	GB									1																	
VP1	SJW	19-Dec	p.m.	12:30	GB	1																									
VP1	SJW	19-Dec	p.m.	13:05	GB									1																	
VP1	SJW	19-Dec	p.m.	14:15	GB	1																									
						2	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
					3																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			2	0	3	1
72	69		0.03	0.00	0.04	0.01
		Birds/sqkm	0.057	0.000	0.037	0.017
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	09-Jan	p.m.	15:45	busy																										
VP1	SJW	09-Jan	p.m.	13:55	GB									1																	
VP1	SJW	09-Jan	p.m.	14:15	GB													1													
VP1	SJW	09-Jan	p.m.	15:15	GB									1																	
VP1	SJW	22-Jan	a.m.	08:15	busy																										
VP1	SJW	22-Jan	a.m.	10:55	busy																										
VP1	SJW	22-Jan	a.m.	10:05	GB	1																									
VP1	SJW	22-Jan	a.m.	10:35	GB									1																	
						1	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
					3																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			1	0	3	1
72	69		0.01	0.00	0.04	0.01
		Birds/sqkm	0.028	0.000	0.037	0.017
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	SJW	13-Feb	p.m.	14:50	busy																										
VP1	SJW	13-Feb	p.m.	14:55	busy																										
VP1	SJW	13-Feb	p.m.	15:00	busy																										
VP1	SJW	19-Feb	a.m.	08:40	busy																										
VP1	SJW	19-Feb	a.m.	08:45	busy																										
VP1	SJW	19-Feb	a.m.	10:45	GB									1																	
						0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
					5																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			0	0	1	0
72	67		0.00	0.00	0.01	0.00
		Birds/sqkm	0.000	0.000	0.013	0.000
		Zone area	0.5102	0.7707	1.1675	0.8647

VP1	AU	04-Mar	a.m.	10:00	busy																										
VP1	AU	04-Mar	a.m.	10:55	busy																										
VP1	AU	04-Mar	a.m.	11:00	busy																										
VP1	SJW	20-Mar	p.m.	13:55	busy																										
VP1	SJW	20-Mar	p.m.	14:00	busy																										
VP1	SJW	20-Mar	p.m.	14:10	busy																										
VP1	SJW	20-Mar	p.m.	14:15	busy																										
VP1	SJW	20-Mar	p.m.	14:40	busy																										
VP1	SJW	20-Mar	p.m.	14:45	busy																										
VP1	SJW	20-Mar	p.m.	14:50	busy																										
VP1	SJW	20-Mar	p.m.	14:55	busy																										
VP1	SJW	20-Mar	p.m.	13:40	GB											1															
VP1	SJW	20-Mar	p.m.	14:30	GB					1									1												
VP1	SJW	20-Mar	p.m.	15:10	GB																										
						0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	11
					11																										

Birds per snapshot 20-150 m						
No. 5-mins	Net snaps		Zone A	Zone B	Zone C	Zone D
			0	1	1	1
72	61		0.00	0.02	0.02	0.02
		Birds/sqkm	0.000	0.021	0.014	0.019
		Zone area	0.5102	0.7707	1.1675	0.8647

VP	Observer	Date	Session	5-min ended	Sp.	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	-50	-100	-150	-200	
VP3	SJW	16-Apr	p.m.	15:20	busy																									
VP3	SJW	16-Apr	p.m.	15:40	busy																									
VP3	SJW	16-Apr	p.m.	16:05	busy																									
VP3	SJW	16-Apr	p.m.	17:00	busy																									
VP3	SJW	16-Apr	p.m.	15:10	GB					1																				
VP3	SJW	16-Apr	p.m.	15:25	GB																					1				
VP3	SJW	16-Apr	p.m.	15:45	GB																					2				
VP3	SJW	16-Apr	p.m.	15:55	GB													1												
VP3	SJW	16-Apr	p.m.	16:25	GB																	3								
VP3	SJW	16-Apr	p.m.	16:45	GB													1					2							
VP3	SJW	16-Apr	p.m.	17:10	GB	1																								
VP3	SJW	16-Apr	p.m.	17:35	GB																		1							
VP3	SJW	16-Apr	p.m.	17:50	GB													1												
VP3	SJW	29-Apr	a.m.	11:20	busy																									
VP3	SJW	29-Apr	a.m.	11:25	busy																									
VP3	SJW	29-Apr	a.m.	12:20	busy																									
VP3	SJW	29-Apr	a.m.	13:00	busy																									
VP3	SJW	29-Apr	a.m.	13:35	busy																									
VP3	SJW	29-Apr	late	19:05	busy																									
VP3	SJW	29-Apr	late	19:20	busy																									
VP3	SJW	29-Apr	late	19:25	busy																									
VP3	SJW	29-Apr	a.m.	11:15	GB	1																								
VP3	SJW	29-Apr	a.m.	11:30	GB																	1								
VP3	SJW	29-Apr	a.m.	11:35	GB	1																								
VP3	SJW	29-Apr	a.m.	11:45	GB																					1				
VP3	SJW	29-Apr	a.m.	12:00	GB																	1								
VP3	SJW	29-Apr	a.m.	12:05	GB					1																				
VP3	SJW	29-Apr	a.m.	12:40	GB									1																
VP3	SJW	29-Apr	a.m.	13:40	GB																	1								
VP3	SJW	29-Apr	late	17:35	GB					1																				
VP3	SJW	29-Apr	late	18:00	GB													1												
VP3	SJW	29-Apr	late	18:50	GB						1																			
VP3	SJW	29-Apr	late	19:35	GB					1																				
						3	0	0	0	4	1	0	0	1	0	0	0	4	0	0	0	6	3	0	0	4	0	0	0	
VP3	AU	08-May	p.m.	14:50	busy																									
VP3	AU	08-May	p.m.	16:30	busy																									
VP3	AU	08-May	p.m.	17:05	busy																									
VP3	AU	08-May	p.m.	17:20	busy																									
VP3	AU	08-May	p.m.	14:30	GB																									
VP3	AU	08-May	p.m.	15:40	GB																		1							
VP3	AU	08-May	p.m.	16:15	GB															1										
VP3	AU	08-May	p.m.	16:40	GB					1																				
VP3	AU	08-May	p.m.	17:00	GB									1														2		
VP3	SJW	09-May	early	05:20	busy																									
VP3	SJW	09-May	early	05:55	busy																									
VP3	SJW	09-May	early	06:30	busy																									
VP3	SJW	09-May	early	06:35	busy																									
VP3	SJW	09-May	early	07:25	busy																									
VP3	SJW	09-May	early	07:45	busy																									
VP3	SJW	09-May	early	05:10	GB																	1								
VP3	SJW	09-May	early	07:05	GB																							1		
VP3	SJW	09-May	early	07:10	GB									1																
VP3	SJW	09-May	early	07:30	GB	1																1								
VP3	SJW	09-May	early	08:00	GB									1																
VP3	SJW	27-May	a.m.	09:50	busy																									
VP3	SJW	27-May	a.m.	10:35	busy																									
VP3	SJW	27-May	a.m.	10:40	busy																									
VP3	SJW	27-May	a.m.	10:45	busy																									
VP3	SJW	27-May	a.m.	10:50	busy																									
VP3	SJW	27-May	a.m.	11:05	busy																									
VP3	SJW	27-May	a.m.	11:50	busy																									
VP3	AU	27-May	late	18:55	busy																									
VP3	AU	27-May	late	19:00	busy																									
VP3	AU	27-May	late	19:05	busy																									
VP3	AU	27-May	late	19:10	busy																									
VP3	AU	27-May	late	19:15	busy																									
VP3	AU	27-May	late	19:25	busy																									
VP3	AU	27-May	late	19:30	busy																									
VP3	AU	27-May	late	19:40	busy																									
VP3	AU	27-May	late	20:10	busy																									
VP3	AU	27-May	late	21:30	busy																									
VP3	SJW	27-May	a.m.	10:05	GB						2																			
VP3	SJW	27-May	a.m.	10:25	GB	1																								
VP3	SJW	27-May	a.m.	11:10	GB														3			1								
VP3	SJW	27-May	a.m.	11:40	GB	1																								
VP3	SJW	27-May	a.m.	11:55	GB									1																
						3	0	0	0	1	2	0	0	4	0	0	0	0	3	1	0	3	1	0	0	0	3	0	0	
VP3	AU	10-Jun	late	20:30	busy																									
VP3	AU	10-Jun	late	20:55	busy																									
VP3	AU	10-Jun	late	21:00	busy																									
VP3	AU	10-Jun	late	20:40	GB															1										
VP3	AU	12-Jun	pm/late	20:05	GB																			1						
VP3	SJW	13-Jun	a.m.	08:10	busy																									
VP3	SJW	13-Jun	a.m.	08:15	busy																									
VP3	SJW	13-Jun	a.m.	09:15	busy																									
VP3	SJW	13-Jun	a.m.	09:50	busy																									
VP3	SJW	13-Jun	a.m.	07:25	GB					1																				
VP3	SJW	13-Jun	a.m.	09:40	GB																					1				
VP3	AU	28-Jun	p.m.	17:05	busy																									
VP3	AU	28-Jun	p.m.	17:10	busy																									
VP3	AU	28-Jun	p.m.	17:15	busy																									
VP3	AU	28-Jun	p.m.	17:20	busy																									
VP3	AU	28-Jun	p.m.	17:25	busy																									
VP3	AU	28-Jun	p.m.	17:35	busy																									
VP3	AU	28-Jun	p.m.	17:40	busy																									
VP3	AU	28-Jun	p.m.	17:50	busy																									
VP3	AU	28-Jun	p.m.	17:55	busy																									
VP3	AU	28-Jun	p.m.	18:00	busy																									
VP3	AU	28-Jun	p.m.	18:05	busy																									
VP3	AU	28-Jun	p.m.	18:10	busy																									
VP3	AU	28-Jun	p.m.	18:15	busy																									
VP3	AU	28-Jun	p.m.	15:20	GB										1															
VP3	AU	28-Jun	p.m.	16:00	GB									1														1		
VP3	AU	28-Jun	p.m.	16:25	GB													1												
VP3	AU	28-Jun	p.m.	16:40	GB									2																
VP3	AU	28-Jun	p.m.	16:45	GB									1																
VP3	AU	28-Jun	p.m.	16:50	GB		1																							
VP3	AU	28-Jun	p.m.	16:55	GB									1																
VP3	AU	28-Jun	p.m.	17:00	GB																							2		
VP3	AU	28-Jun	p.m.	17:45	GB		1																							
VP3	SJW	29-Jun	early	03:55	busy																									
VP3	SJW	29-Jun	early	04:10	busy																									
VP3	SJW	29-Jun	early	06:35	busy																									
VP3	SJW	29-Jun	early	04:40	GB																	1								
VP3	SJW	29-Jun	early	05:30	GB																	1								
						0	2	0	0	1	0	0	0	5	1	0	0	1	0	1	0	0	2	1	0	3	1	0	0	
VP3	AU	02-Jul	a.m.	10:50	busy																									
VP3	AU	02-Jul	a.m.	12:35	busy																									
VP3	AU	02-Jul	a.m.	12:40	busy																									
VP3	AU	02-Jul	a.m.	12:45	busy																									
VP3	SJW	02-Jul	late	18:55	busy																									
VP3	SJW	02-Jul	late	19:20	busy																									
VP3	SJW	02-Jul	late	21:05	busy																									
VP3	SJW	02-Jul	late	21:10	busy																									
VP3	SJW	02-Jul	late	21:15	busy																									
VP3	SJW	02-Jul	late	21:30	busy																									
VP3	AU	02-Jul	a.m.	10:10	GB									1																
VP3	AU	02-Jul	a.m.	10:20	GB										1															
VP3	AU	02-Jul	a.m.	11:10	GB														1											
VP3	SJW	02-Jul	late	19:55	GB																							1		
VP3	SJW	16-Jul	p.m.	13:20	busy																									
VP3	SJW	16-Jul	p.m.	13:55	busy																									
VP3	SJW	16-Jul	p.m.	14:00	busy																									
VP3	SJW	16-Jul	p.m.	14:45	busy																									
VP3	SJW	16-Jul	p.m.	15:50	busy																									
VP3	SJW	16-Jul	p.m.	15:55	busy																									

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		3	5	1	4	9	4
108	96	0.03	0.05	0.01	0.04	0.09	0.04
	Birds/sqkm	0.110	0.167	0.029	0.045	0.132	0.064
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		3	3	4	4	4	3
144	117	0.03	0.03	0.03	0.03	0.03	0.03
	Birds/sqkm	0.035	0.082	0.095	0.037	0.048	0.040
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		2	1	6	2	3	4
180	157	0.01	0.01	0.04	0.01	0.02	0.03
	Birds/sqkm	0.043	0.020	0.106	0.014	0.027	0.039
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

VP3	SJW	16-Jul	p.m.	16:00	busy																								
VP3	SJW	16-Jul	pm/late	17:45	busy																								
VP3	SJW	16-Jul	pm/late	17:50	busy																								
VP3	SJW	16-Jul	pm/late	18:00	busy																								
VP3	SJW	16-Jul	pm/late	18:10	busy																								
VP3	SJW	16-Jul	pm/late	18:15	busy																								
VP3	SJW	16-Jul	p.m.	13:40	GB																	1							
VP3	AU	23-Jul	early	06:40	busy																								
VP3	AU	23-Jul	early	06:45	busy																								
VP3	AU	23-Jul	early	06:50	busy																								
VP3	AU	23-Jul	early	08:00	busy																								
VP3	AU	23-Jul	early	06:55	GB									1															
						26	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	26
VP3	AU	06-Aug	p.m.	13:10	busy																								
VP3	AU	06-Aug	p.m.	14:20	busy																								
VP3	AU	06-Aug	p.m.	12:55	GB											1													
VP3	AU	06-Aug	p.m.	13:00	GB		1	3																					
VP3	AU	06-Aug	p.m.	13:15	GB														1										
VP3	AU	06-Aug	p.m.	15:10	GB																					1			
VP3	AU	06-Aug	p.m.	15:25	GB																					1			
VP3	AU	06-Aug	p.m.	15:55	GB												1												
VP3	SJW	20-Aug	late	19:25	busy																								
VP3	SJW	20-Aug	late	19:35	busy																								
VP3	SJW	20-Aug	late	19:40	busy																								
VP3	SJW	21-Aug	a.m.	10:40	busy																								
VP3	SJW	21-Aug	a.m.	10:45	busy																								
VP3	SJW	21-Aug	a.m.	11:45	busy																								
VP3	SJW	21-Aug	a.m.	12:35	busy																								
VP3	SJW	28-Aug	pm/late	16:15	busy																								
VP3	SJW	28-Aug	pm/late	16:20	busy																								
VP3	SJW	28-Aug	pm/late	16:40	busy																								
VP3	SJW	28-Aug	pm/late	17:15	busy																								
VP3	SJW	28-Aug	pm/late	17:50	busy																								
VP3	SJW	28-Aug	pm/late	18:20	busy																								
VP3	SJW	28-Aug	pm/late	18:45	GB					1																			
VP3	AU	29-Aug	early	08:10	busy																								
VP3	AU	29-Aug	early	09:35	GB																	2							
						16	0	1	3	0	1	0	0	0	0	0	0	1	0	1	1	0	0	2	0	0	2	0	0	0	16
VP3	SJW	05-Sep	early	08:25	GB																	1							
VP3	SJW	20-Sep	p.m.	14:10	busy																								
VP3	SJW	20-Sep	p.m.	14:15	busy																								
VP3	SJW	20-Sep	p.m.	14:20	busy																								
						3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
VP3	SJW	08-Oct	a.m.	09:25	busy																								
VP3	SJW	08-Oct	a.m.	09:30	busy																								
VP3	SJW	08-Oct	a.m.	10:10	busy																								
VP3	SJW	08-Oct	a.m.	09:45	GB									1															
VP3	SJW	08-Oct	a.m.	10:00	GB	1																							
VP3	SJW	08-Oct	a.m.	10:20	GB										1														
VP3	SJW	08-Oct	a.m.	11:00	GB																	2							
VP3	SJW	08-Oct	a.m.	11:20	GB												1												
VP3	SJW	24-Oct	p.m.	15:15	GB	1																							
VP3	SJW	24-Oct	p.m.	15:50	GB					1																			
VP3	SJW	24-Oct	p.m.	15:55	GB																					1			
VP3	SJW	24-Oct	p.m.	16:20	GB												1												
						3	2	0	0	0	1	0	0	0	1	1	0	0	2	0	0	0	0	2	0	0	1	0	0	0	3
VP3	SJW	01-Nov	p.m.	15:35	busy																								
VP3	SJW	01-Nov	p.m.	13:55	GB	1																							
VP3	SJW	01-Nov	p.m.	15:00	GB					1																			
VP3	SJW	01-Nov	p.m.	15:10	GB	1																							
VP3	AU	29-Nov	p.m.	13:50	busy																								
VP3	AU	29-Nov	p.m.	13:55	busy																								
						3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
VP3	SJW	04-Dec	a.m.	08:45	GB	1																							
VP3	SJW	04-Dec	a.m.	09:15	GB	1																							
VP3	SJW	04-Dec	a.m.	10:30	GB	1																							
VP3	SJW	04-Dec	a.m.	11:00	GB									2															
VP3	SJW	20-Dec	p.m.	12:55	busy																								
VP3	SJW	20-Dec	p.m.	14:20	busy																								
VP3	SJW	20-Dec	p.m.	12:40	GB					2																			
VP3	SJW	20-Dec	p.m.	14:35	GB												1												
VP3	SJW	20-Dec	p.m.	14:50	GB					1																			
						2	3	0	0	0	3	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
VP3	SJW	09-Jan	a.m.	10:05	busy																								
VP3	SJW	09-Jan	a.m.	09:40	GB																	1							
VP3	SJW	09-Jan	a.m.	10:20	GB																					1			
VP3	SJW	09-Jan	a.m.	11:45	GB									1															
VP3	SJW	22-Jan	p.m.	15:00	busy																								
VP3	SJW	22-Jan	p.m.	13:50	GB	1																							
VP3	SJW	22-Jan	p.m.	15:35	GB									1															
						2	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2
VP3	SJW	13-Feb	a.m.	08:05	busy																								
VP3	SJW	13-Feb	a.m.	09:40	busy																								
VP3	SJW	13-Feb	a.m.	09:45	busy																								
VP3	SJW	13-Feb	a.m.	09:50	busy																								
VP3	SJW	13-Feb	a.m.	10:00	busy																								
VP3	SJW	13-Feb	a.m.	10:45	busy																								
VP3	SJW	13-Feb	a.m.	10:20	GB																						1		
VP3	SJW	19-Feb	p.m.	14:15	busy																								
VP3	SJW	19-Feb	p.m.	14:20	busy																								
VP3	SJW	19-Feb	p.m.	13:00	GB																					1			
VP3	SJW	19-Feb	p.m.	13:20	GB										1														
VP3	SJW	19-Feb	p.m.	14:45	GB																	1							
						8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	8
VP3	SJW	04-Mar	a.m.	09:35	busy																								
VP3	SJW	04-Mar	a.m.	09:40	busy																								
VP3	SJW	04-Mar	a.m.	09:45	busy																								
VP3	SJW	04-Mar	a.m.	11:00	busy																								
VP3	SJW	04-Mar	a.m.	11:05	busy																								
VP3	SJW	04-Mar	a.m.	09:25	GB																						2		
VP3	SJW	04-Mar	a.m.	10:00	GB					1																			
VP3	SJW	04-Mar	a.m.	10:35	GB						1																		
VP3	SJW	20-Mar	a.m.	09:55	busy																								
VP3	SJW	20-Mar	a.m.	11:50	busy																								
VP3	SJW	20-Mar	a.m.	11:55	busy																								
VP3	SJW	20-Mar	a.m.	12:00	busy																								
VP3	SJW	20-Mar	a.m.	10:00	GB																						1		
VP3	SJW	20-Mar	a.m.	10:10	GB					1																			
VP3	SJW	20-Mar	a.m.	10:20	GB									1															
VP3	SJW	20-Mar	a.m.	11:15	GB					1																			
						9	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	9

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		0	0	3	1	1	1
180	154	0.00	0.00	0.02	0.01	0.01	0.01
	Birds/sqkm	0.000	0.000	0.054	0.027	0.009	0.010
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		4	1	0	2	2	2
180	164	0.02	0.01	0.00	0.01	0.01	0.01
	Birds/sqkm	0.086	0.020	0.000	0.043	0.017	0.019
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		0	0	0	0	1	0
72	69	0.00	0.00	0.00	0.00	0.01	0.00
	Birds/sqkm	0.000	0.000	0.000	0.000	0.020	0.000
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		2	1	2	2	2	1
72	69	0.03	0.01	0.03	0.03	0.03	0.01
	Birds/sqkm	0.102	0.046	0.081	0.032	0.041	0.022
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		2	1	0	0	0	0
72	69	0.03	0.01	0.00	0.00	0.00	0.00
	Birds/sqkm	0.102	0.046	0.000	0.000	0.000	0.000
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		3	3	2	1	0	0
72	70	0.04	0.04	0.03	0.01	0.00	0.00
	Birds/sqkm	0.151	0.137	0.079	0.016	0.000	0.000
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		1	0	2	0	1	1
72	70	0.01	0.00	0.03	0.00	0.01	0.01
	Birds/sqkm	0.050	0.000	0.079	0.000	0.020	0.022
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		0	0	1	0	1	2
72	64	0.00	0.00	0.02	0.00	0.02	0.03
	Birds/sqkm	0.000	0.000	0.043	0.000	0.022	0.048
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Birds per snapshot 20-150 m

No. 5-mins	Net snaps	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
		0	4	1	0	0	3
72	63	0.00	0.06	0.02	0.00	0.00	0.05
	Birds/sqkm	0.000	0.204	0.044	0.000	0.000	0.073
	Zone area	0.2835	0.3119	0.36	0.9186	0.7082	0.6483

Great Black-backed Gull - Bird Occupancy Calculations

VP1 - Zone A		Breeding Season						Non-breeding Season							
		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.000	0.000	0.014	0.015	0.012	*From 'GB 2019 nos'*	0.032	0.059	0.028	0.057	0.028	0.000	0.000	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.000	0.000	0.196	0.213	0.165		0.443	0.819	0.398	0.795	0.398	0.000	0.000	
Zone area	km2	0.5102	0.5102	0.5102	0.5102	0.5102		0.5102	0.5102	0.5102	0.5102	0.5102	0.5102	0.5102	
Flight rate in zone	m/sec	0.000	0.000	0.100	0.109	0.084		0.226	0.418	0.203	0.406	0.203	0.000	0.000	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	0	0	197640	213712	145735		314594	479928	172383	289252	160696	0	0	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	68877000	68877000	68877000	68877000	68877000		68877000	68877000	68877000	68877000	68877000	68877000	68877000	
Flight length through rotors	m	0	0	205	221	151		326	497	179	300	166	0	0	
No. passes through rotors		0	0	42	45	31		66	101	36	61	34	0	0	
No. passes at 85% operational efficiency		0	0	35	38	26		56	86	31	52	29	0	0	
No. striking rotors at Band Model 7.3%		0.00	0.00	2.59	2.80	1.91		4.12	6.28	2.26	3.79	2.10	0.00	0.00	
No. striking rotors at 98% avoidance		0.000	0.000	0.052	0.056	0.038	**0.146**	0.082	0.126	0.045	0.076	0.042	0.000	0.000	**0.371**

VP1 - Zone B															
		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.000	0.036	0.056	0.010	0.000	*From 'GB 2019 nos'*	0.021	0.077	0.019	0.000	0.000	0.000	0.021	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.000	0.505	0.779	0.141	0.000		0.293	1.084	0.263	0.000	0.000	0.000	0.298	
Zone area	km2	0.7707	0.7707	0.7707	0.7707	0.7707		0.7707	0.7707	0.7707	0.7707	0.7707	0.7707	0.7707	
Flight rate in zone	m/sec	0.000	0.389	0.600	0.109	0.000		0.226	0.836	0.203	0.000	0.000	0.000	0.230	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	0	730800	1185840	213712	0		314594	959857	172383	0	0	0	301574	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	104044500	104044500	104044500	104044500	104044500		104044500	104044500	104044500	104044500	104044500	104044500	104044500	
Flight length through rotors	m	0	501	813	147	0		216	658	118	0	0	0	207	
No. passes through rotors		0	102	166	30	0		44	134	24	0	0	0	42	
No. passes at 85% operational efficiency		0	87	141	25	0		37	114	20	0	0	0	36	
No. striking rotors at Band Model 7.3%		0.00	6.33	10.27	1.85	0.00		2.73	8.32	1.49	0.00	0.00	0.00	2.61	
No. striking rotors at 98% avoidance		0.000	0.127	0.205	0.037	0.000	**0.369**	0.055	0.166	0.030	0.000	0.000	0.000	0.052	**0.303**

VP1 - Zone C															
		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.000	0.000	0.000	0.000	0.005	*From 'GB 2019 nos'*	0.000	0.013	0.037	0.037	0.037	0.013	0.014	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.000	0.000	0.000	0.000	0.072		0.000	0.179	0.521	0.521	0.521	0.179	0.197	
Zone area	km2	1.1675	1.1675	1.1675	1.1675	1.1675		1.1675	1.1675	1.1675	1.1675	1.1675	1.1675	1.1675	
Flight rate in zone	m/sec	0.000	0.000	0.000	0.000	0.084		0.000	0.209	0.609	0.609	0.609	0.209	0.230	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	0	0	0	0	145735		0	239964	517148	433878	482087	194078	301574	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	157612500	157612500	157612500	157612500	157612500		157612500	157612500	157612500	157612500	157612500	157612500	157612500	
Flight length through rotors	m	0	0	0	0	66		0	109	234	196	218	88	136	
No. passes through rotors		0	0	0	0	13		0	22	48	40	44	18	28	
No. passes at 85% operational efficiency		0	0	0	0	11		0	19	41	34	38	15	24	
No. striking rotors at Band Model 7.3%		0.00	0.00	0.00	0.00	0.83		0.00	1.37	2.96	2.48	2.76	1.11	1.72	
No. striking rotors at 98% avoidance		0.000	0.000	0.000	0.000	0.017	**0.017**	0.000	0.027	0.059	0.050	0.055	0.022	0.034	**0.248**

VP1 - Zone D															
		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.012	0.000	0.000	0.000	0.007	*From 'GB 2019 nos'*	0.000	0.035	0.067	0.017	0.017	0.000	0.019	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.165	0.000	0.000	0.000	0.098		0.000	0.483	0.939	0.235	0.235	0.000	0.265	
Zone area	km2	0.8647	0.8647	0.8647	0.8647	0.8647		0.8647	0.8647	0.8647	0.8647	0.8647	0.8647	0.8647	
Flight rate in zone	m/sec	0.143	0.000	0.000	0.000	0.084		0.000	0.418	0.812	0.203	0.203	0.000	0.230	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	222171	0	0	0	145735		0	479928	689530	144626	160696	0	301574	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	116734500	116734500	116734500	116734500	116734500		116734500	116734500	116734500	116734500	116734500	116734500	116734500	
Flight length through rotors	m	136	0	0	0	89		0	293	421	88	98	0	184	
No. passes through rotors		28	0	0	0	18		0	60	86	18	20	0	38	
No. passes at 85% operational efficiency		24	0	0	0	15		0	51	73	15	17	0	32	
No. striking rotors at Band Model 7.3%		1.72	0.00	0.00	0.00	1.13		0.00	3.71	5.33	1.12	1.24	0.00	2.33	
No. striking rotors at 98% avoidance		0.034	0.000	0.000	0.000	0.023	**0.057**	0.000	0.074	0.107	0.022	0.025	0.000	0.047	**0.274**

Great Black-backed Gull - Bird Occupancy Calculations

VP3 - Zone A - this zone not used in the risk calculations

		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.110	0.090	0.045	0.000	0.086	*From 'GB 2019 nos'*	0.000	0.102	0.102	0.151	0.050	0.000	0.000	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	1.543	1.266	0.629	0.000	1.204		0.000	1.431	1.431	2.116	0.705	0.000	0.000	
Zone area	km2	0.2835	0.2835	0.2835	0.2835	0.2835		0.2835	0.2835	0.2835	0.2835	0.2835	0.2835	0.2835	
Flight rate in zone	m/sec	0.438	0.359	0.178	0.000	0.341		0.000	0.406	0.406	0.600	0.200	0.000	0.000	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	680400	674585	352479	0	590049		0	466017	344765	427680	158400	0	0	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	38272500	38272500	38272500	38272500	38272500		38272500	38272500	38272500	38272500	38272500	38272500	38272500	
Flight length through rotors	m	1268	1257	657	0	1100		0	869	643	797	295	0	0	
No. passes through rotors		258	256	134	0	224		0	177	131	162	60	0	0	
No. passes at 85% operational efficiency		220	218	114	0	190		0	150	111	138	51	0	0	
No. striking rotors at Band Model 7.3%		16.03	15.89	8.30	0.00	13.90		0.00	10.98	8.12	10.07	3.73	0.00	0.00	
No. striking rotors at 98% avoidance		0.321	0.318	0.166	0.000	0.278	1.082	0.000	0.220	0.162	0.201	0.075	0.000	0.000	0.658

VP3 - Zone B

		Breeding Season						Non-breeding Season							
		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.167	0.082	0.020	0.000	0.020	*From 'GB 2019 nos'*	0.000	0.046	0.046	0.137	0.000	0.000	0.204	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	2.338	1.151	0.286	0.000	0.274		0.000	0.651	0.651	1.924	0.000	0.000	2.850	
Zone area	km2	0.3119	0.3119	0.3119	0.3119	0.3119		0.3119	0.3119	0.3119	0.3119	0.3119	0.3119	0.3119	
Flight rate in zone	m/sec	0.729	0.359	0.089	0.000	0.085		0.000	0.203	0.203	0.600	0.000	0.000	0.889	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	1134000	674585	176239	0	147512		0	233009	172383	427680	0	0	1168000	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	42106500	42106500	42106500	42106500	42106500		42106500	42106500	42106500	42106500	42106500	42106500	42106500	
Flight length through rotors	m	1921	1143	299	0	250		0	395	292	725	0	0	1979	
No. passes through rotors		391	233	61	0	51		0	80	59	148	0	0	403	
No. passes at 85% operational efficiency		333	198	52	0	43		0	68	51	125	0	0	343	
No. striking rotors at Band Model 7.3%		24.28	14.44	3.77	0.00	3.16		0.00	4.99	3.69	9.16	0.00	0.00	25.01	
No. striking rotors at 98% avoidance		0.486	0.289	0.075	0.000	0.063	**0.913**	0.000	0.100	0.074	0.183	0.000	0.000	0.500	**0.857**

VP3 - Zone C

		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.029	0.095	0.106	0.054	0.000	*From 'GB 2019 nos'*	0.000	0.081	0.000	0.079	0.079	0.043	0.044	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.405	1.330	1.486	0.758	0.000		0.000	1.127	0.000	1.111	1.111	0.608	0.617	
Zone area	km2	0.3600	0.3600	0.3600	0.3600	0.3600		0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	
Flight rate in zone	m/sec	0.146	0.479	0.535	0.273	0.000		0.000	0.406	0.000	0.400	0.400	0.219	0.222	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	226800	899446	1057437	537055	0		0	466017	0	285120	316800	203175	292000	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	48600000	48600000	48600000	48600000	48600000		48600000	48600000	48600000	48600000	48600000	48600000	48600000	
Flight length through rotors	m	333	1320	1552	788	0		0	684	0	419	465	298	429	
No. passes through rotors		68	269	316	161	0		0	139	0	85	95	61	87	
No. passes at 85% operational efficiency		58	229	269	136	0		0	118	0	72	80	52	74	
No. striking rotors at Band Model 7.3%		4.21	16.68	19.61	9.96	0.00		0.00	8.64	0.00	5.29	5.88	3.77	5.42	
No. striking rotors at 98% avoidance		0.084	0.334	0.392	0.199	0.000	**1.009**	0.000	0.173	0.000	0.106	0.118	0.075	0.108	**0.580**

VP3 - Zone D - this zone not used in the risk calculations

		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.045	0.037	0.014	0.007	0.013	*From 'GB 2019 nos'*	0.000	0.032	0.000	0.016	0.000	0.000	0.000	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.635	0.521	0.194	0.099	0.186		0.000	0.442	0.000	0.218	0.000	0.000	0.000	
Zone area	km2	0.9186	0.9186	0.9186	0.9186	0.9186		0.9186	0.9186	0.9186	0.9186	0.9186	0.9186	0.9186	
Flight rate in zone	m/sec	0.583	0.479	0.178	0.091	0.171		0.000	0.406	0.000	0.200	0.000	0.000	0.000	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	907200	899446	352479	179018	295024		0	466017	0	142560	0	0	0	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	124011000	124011000	124011000	124011000	124011000		124011000	124011000	124011000	124011000	124011000	124011000	124011000	
Flight length through rotors	m	522	517	203	103	170		0	268	0	82	0	0	0	
No. passes through rotors		106	105	41	21	35		0	55	0	17	0	0	0	
No. passes at 85% operational efficiency		90	90	35	18	29		0	46	0	14	0	0	0	
No. striking rotors at Band Model 7.3%		6.59	6.54	2.56	1.30	2.14		0.00	3.39	0.00	1.04	0.00	0.00	0.00	
No. striking rotors at 98% avoidance		0.132	0.131	0.051	0.026	0.043	0.383	0.000	0.068	0.000	0.021	0.000	0.000	0.000	0.088

VP3 - Zone E

		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.132	0.048	0.027	0.009	0.017	*From 'GB 2019 nos'*	0.020	0.041	0.000	0.000	0.020	0.022	0.000	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	1.853	0.676	0.378	0.128	0.241		0.286	0.573	0.000	0.000	0.282	0.309	0.000	
Zone area	km2	0.7082	0.7082	0.7082	0.7082	0.7082		0.7082	0.7082	0.7082	0.7082	0.7082	0.7082	0.7082	
Flight rate in zone	m/sec	1.313	0.479	0.268	0.091	0.171		0.203	0.406	0.000	0.000	0.200	0.219	0.000	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	2041200	899446	528718	179018	295024		282678	466017	0	0	158400	203175	0	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	95607000	95607000	95607000	95607000	95607000		95607000	95607000	95607000	95607000	95607000	95607000	95607000	
Flight length through rotors	m	1523	671	394	134	220		211	348	0	0	118	152	0	
No. passes through rotors		310	137	80	27	45		43	71	0	0	24	31	0	
No. passes at 85% operational efficiency		264	116	68	23	38		37	60	0	0	20	26	0	
No. striking rotors at Band Model 7.3%		19.25	8.48	4.99	1.69	2.78		2.67	4.39	0.00	0.00	1.49	1.92	0.00	
No. striking rotors at 98% avoidance		0.385	0.170	0.100	0.034	0.056	**0.744**	0.053	0.088	0.000	0.000	0.030	0.038	0.000	**0.209**

VP3 - Zone F

		APRIL	MAY	JUNE	JULY	AUGUST		SEPT	OCT	NOV	DEC	JAN	FEB	MAR	
Flight density	birds/km2	0.064	0.040	0.039	0.010	0.019	*From 'GB 2019 nos'*	0.000	0.022	0.000	0.000	0.022	0.048	0.073	*From 'GB 2019 nos'*
Flight speed	m/sec	14	14	14	14	14		14	14	14	14	14	14	14	
AR flight rate	m/sec/km2	0.900	0.554	0.550	0.140	0.263		0.000	0.313	0.000	0.000	0.308	0.675	1.028	
Zone area	km2	0.6483	0.6483	0.6483	0.6483	0.6483		0.6483	0.6483	0.6483	0.6483	0.6483	0.6483	0.6483	
Flight rate in zone	m/sec	0.583	0.359	0.357	0.091	0.171		0.000	0.203	0.000	0.000	0.200	0.438	0.667	
Hours available	hrs	432	522	549	547	480		387	319	236	198	220	258	365	
Monthly flight length AR	m	907200	674585	704958	179018	295024		0	233009	0	0	158400	406350	876000	
Rotor volume (1 turbine)	m3	71335	71335	71335	71335	71335		71335	71335	71335	71335	71335	71335	71335	
Zone risk volume	m3	87520500	87520500	87520500	87520500	87520500		87520500	87520500	87520500	87520500	87520500	87520500	87520500	
Flight length through rotors	m	739	550	575	146	240		0	190	0	0	129	331	714	
No. passes through rotors		151	112	117	30	49		0	39	0	0	26	67	145	
No. passes at 85% operational efficiency		128	95	99	25	42		0	33	0	0	22	57	124	
No. striking rotors at Band Model 7.3%		9.34	6.95	7.26	1.84	3.04		0.00	2.40	0.00	0.00	1.63	4.19	9.02	
No. striking rotors at 98% avoidance		0.187	0.139	0.145	0.037	0.061	**0.569**	0.000	0.048	0.000	0.000	0.033	0.084	0.180	**0.345**