



AI Appendix 8E

Collision Risk Modelling Report





Lewis Wind Power

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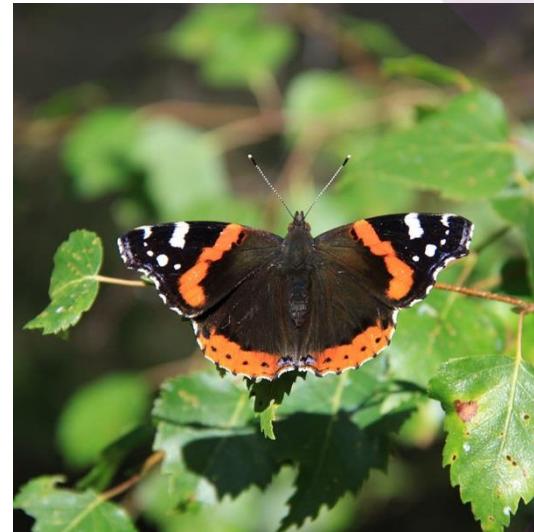
Stornoway Wind Farm Ltd

Stornoway Wind Farm

Additional Information

Chapter 8: Ornithology

Appendix 8E. Collision Risk Modelling Report



Report for

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Executive summary

Purpose of this report

Stornoway Wind Farm Limited (the Applicant) is proposing to construct and operate a wind farm currently anticipated to comprise up to 35 turbines with a generating capacity in excess of 50MW on the site of the existing consented (but not yet built) Stornoway Wind Farm. The Consented Stornoway Wind Farm gained section 36 consent and planning permission in September 2012 (Stornoway Wind Farm 2012) and in 2015 an application was made to amend this consent with regard to the layout, output and size of the wind turbines, this being granted in spring 2016 (Stornoway Wind Farm Variation 2016), with turbine tip heights of 145m and a turbine rotor diameter of 128m. The site of the Consented Stornoway Wind Farm is located to the south west of the town of Stornoway on the Isle of Lewis and centred on National Grid Reference (NGR) E137149, N933373.

The current application (Proposed Development) would comprise a revised layout, with turbine tip heights of approximately 156m and 180m and turbine rotor diameters of 136m and 150m respectively.

Changes to the Consented wind farm layout and / or turbine specifications could potentially have implications on the existing assessed ornithological impacts of the wind farm. Furthermore, the status of the baseline bird populations and flight activity patterns will have potentially changed since the original application. Therefore, a comprehensive suite of survey work was initiated in October 2017 and continued until September 2019 to provide two years baseline information.

This Appendix forms part of Chapter 8 Ornithology of the Additional Information (**AI**) submitted in support of the **EIA** for the Proposed Development and supersedes **Appendix 8F** of that submission. It documents the methodology of collision risk modelling (CRM) and presents results based on flight data collected from Vantage Point (VP) surveys covering two non-breeding and two breeding seasons (2017-2019). By way of comparison it also provides CRM results using the turbine parameters of the Stornoway Wind Farm Variation 2016 based on the same set of flight data.



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1. Introduction

- 1.1.1 This Appendix documents the methodology and results of collision risk modelling (CRM) based on flight activity data collected from Vantage Point (VP) surveys undertaken from October 2017 to August 2019. Data obtained during VP surveys was used to determine the theoretical collision risk for a range of species by incorporation into a CRM (Band et al. 2007) and herein referred to as 'the Band model'.
- 1.1.2 From October 2017 to September 2018, eight VP locations (VP 1- 8) were used and results from this period were reported within Appendix F of the Environmental Impact Assessment (**EIA**) (Wood, 2019) for the Proposed Development. From October 2018 onwards, VP locations were the same with the exception of two locations that were suspended. VP 6 and VP 7, located to the south west of the Site boundary of the Proposed Development, were excluded from the surveys as a large proportion of their viewshed fell outside of the Proposed Development boundary and 500m buffer. Any areas of their viewsheds that did fall within the proposed development boundary and 500m buffer were covered by the viewsheds of VP 5 and VP 8.
- 1.1.3 Furthermore, following the discovery of a red-throated diver breeding location in close proximity to VP 1 on the 5th June 2019, watches from that location were suspended in order to prevent unnecessary disturbance to that breeding pair, and a new location (VP 14) was established that covered a similar area to VP 1, and watches commenced from 18th June at the new location (**AI Figure 8E.1.1**).
- 1.1.4 In order to ensure that the CRM outputs from years 1 and 2 are based on the same data collection methods, the models originally presented within **EIA Appendix 8F** are re-presented here using data collected from VP's 1-5 and 8 and the results are included in Section 3 alongside results for Year 2. Where relevant, flight data collected from VP14 is also included in models for the 2019 breeding season.
- 1.1.5 Furthermore, **Section 3** also presents results based on the same set of flight activity data but using the turbine parameters from the existing Consented Stornoway Wind Farm Variation 2016 by way of comparison.
- 1.1.6 **Annex A** presents figures of flight activity of non-sensitive species included in the CRM, whilst figures for sensitive species are contained within the **AI Confidential Technical Appendix 8C**.
- 1.1.7 **Annex B** contains tables presenting the clipped flight data from height bands A, B and C recorded from VP's 1-5, 8 and 14 used for the first and second years CRM.
- 1.1.8 **Annex C** presents the CRM calculations for year 1 and year 2 for both the Consented Stornoway Wind Farm Variation 2016 and the Proposed Development, based on data collected from VP1-5, 8 and 14.

2. CRM Methodology

2.1 Introduction

- 2.1.1 The risk of birds colliding with the turbine rotors has been assessed using a model developed by Band, which estimates the number of bird collisions with the turbine rotors during a specified time period (Band et al. 2007; SNH 2000). The model requires input data based on species biometrics and flight characteristics, turbine specification and data on flights observed at the site. The amount of time that a species may be active within the survey area in any given season is also required for the model and must therefore be estimated.
- 2.1.2 The 'Band model' uses a two-stage approach, whereby the number of birds or flights passing through the air space swept by the rotors is determined at Stage 1 and the probability of a bird strike occurring is calculated at Stage 2. The product of Stage 1 and Stage 2 gives a theoretical annual collision mortality rate on the assumption that birds make no attempt to avoid collision.
- 2.1.3 However, it is widely accepted that many species are able to avoid turbine blades in a number of ways. Birds may exercise avoidance by detecting the wind farm or turbine and modifying their flight lines to avoid the structures or at close proximity, birds may see an oncoming blade and emergency avoidance action can be taken (SNH, 2000). As such, species specific avoidance rates were applied to the model to estimate the collision risk (SNH, 2017a).
- 2.1.4 The results of the model provides an estimate of the number of collisions that can be expected over a specific season, year, or for the lifetime of the wind farm.

2.2 Choice of Random or Regular Model

- 2.2.1 The Stage 1 calculation varies depending on whether flight activity follows a regular predictable pattern, or is random. The second stage is identical for both methods.
- 2.2.2 The modelling method for birds with predictable (Regular) flight activity, such as geese following a regular migration route or travelling from a winter roost to a regular feeding area, or divers travelling from breeding lochans to feed at sea or on larger water bodies requires the calculation of the number of birds flying through the turbine rotor swept area each year.
- 2.2.3 The modelling method with irregular (or Random) flight activity, such as raptors and waders, or divers at breeding lochans, requires the calculation of the amount of time birds were observed flying per unit of area surveyed. This level of flight activity is then applied to the Proposed Development in subsequent calculations of the collision risk.
- 2.2.4 Although flight activity in the 2017-18 non-breeding season for greylag goose exhibited a Regular pattern, activity recorded during the 2018-19 non-breeding season was primarily Random in pattern. Therefore, in order to provide a more comparable output between the two non-breeding seasons, and in contrast to **EIA Appendix 8F** where the model selected for greylag goose covering the 2017-18 non-breeding season was Regular, this report presents results for random models for both the 2017-18 and 2018-19 non-breeding seasons.



2.3 Model Parameters

Turbines

- 2.3.1 The turbine models proposed for the Proposed Development are the Vestas V150 and the Vestas V136, and their respective parameters shown, along with the parameters for the turbines from the Consented Stornoway Wind Farm Variation 2016, in **Table 8E.2.1**. The Vestas V136 will have a hub height of 88 m and rotor diameter of 68 m, with the potential collision risk height (PCH) of 20 – 156 m. The Vestas V150 will have a hub height of 105 m and rotor diameter of 75 m, with the potential collision risk height (PCH) being 30 – 180 m.
- 2.3.2 As a precautionary approach, the assumed PCH used in models for the Proposed Development will cover the lowest and highest tip heights from the two turbine models used, thus the PCH used was 20 – 180 m.
- 2.3.3 For the purposes of CRM, it has been assumed that turbines will be non-operational for 15 % of the time as per the original CRM (e.g. during periods when wind speed is too low or too high to operate, or during maintenance).

Table 8E.2.1 Turbine Technical Parameters

Parameter	Proposed Specification 156m Tip Height	Proposed Specification 180m Tip Height	Consented Specification 145m Tip Height
Number of turbines	10	25	36
Number of blades	3	3	3
Approximate hub height (m)	88	105	81
Approximate rotor radius (m)	68	75	64
Maximum height to blade tip (m)	156	180	145
Minimum height to blade tip (m)	20	30	17
PCH (m)	20-156	30-180	17-145
Pitch (Degrees)	12	12	7.5
Chord (m)	4.2	4.2	3.5
Rotation period (rpm)	4.7	4.7	4.6

Available Active Hours Per Season, Survey Effort and Observation Time

- 2.3.4 Available active hours are defined as the number of hours that a bird species may be potentially active in any given season, these seasons being defined by SNH (2017b), and those seasons and hours for the period August 2018 – August 2019 are presented in **Table 8E.2.2**. Details of active hours for the period August 2017 – August 2018 are contained within **EIA Appendix 8F**.
- 2.3.5 Available hours for flight activity were calculated to include daylight, one hour before sunrise and one hour after sunset (dusk) and 25% of the night for waders, geese and swans. Available hours for



flight activity were calculated to include daylight, one hour before sunrise and one hour after sunset (dusk) for all other species.

Table 8E.2.2 Available Active Hours August 2018 – August 2019

Species Group	Season	Available Hours
Merlin	Non-breeding (August 2018 – March 2019)	2,956.10
	Breeding (April 2019 – July 2019)	2,279.96
Eagle species	Non-breeding (September 2018 – January 2019)	1,672.82
	Breeding (February 2019 – August 2019)	3,563.84
Peregrine	Non-breeding (September 2018– February 2019)	1,991.02
	Breeding (March 2019 – August 2019)	3,245.64
Waders	Non-breeding (September 2018– February 2019)	2,579.25
	Breeding (March 2019 – July 2019)	2,949.62
Geese and swans	Non-breeding (September 2018– March 2019)	3,086.91
	Breeding (April 2019 – August 2019)	3,030.56
All other species	Non-breeding (September 2018 – March 2019)	2,419.89
	Breeding (April 2019 – August 2019)	2,816.77

2.3.6 Based on VP survey effort presented in **EIA Appendix 8F** for the period October 2017 to September 2018 and **AI Appendix 8B, Table 8E.2.3** presents the total observation effort from VP's 1-5, 8 and 14 from August 2017 (although observations began in October 2017) to August 2019. Observation effort relates to the total number of survey hours undertaken at VP locations within the seasons in question).

Table 8E.2.3 Observation Time

Species / Group	Season	Period	1	2	3	4	5	8	14
Merlin	Non-breeding	Aug 2017 – Mar 2018	54	54	54	54	54	54	-
	Breeding	Apr 2018 – Jul 2018	36	36	33	36	36	36	-
	Non-breeding	Aug 2018 – Mar 2019	69	72	78	72	78	75	-
	Breeding	Apr 2019 – Jul 2019	15	33	36	36	36	36	39
Eagle species	Non-breeding	Sep 2017 – Jan 2018	33	33	33	36	36	36	-
	Breeding	Feb 2018 – Aug 2018	66	66	66	63	63	63	-
	Non-breeding	Sep 2018 – Jan 2019	48	42	48	45	45	51	-
	Breeding	Feb 2019 – Aug 2019	27	66	63	63	66	60	48
Peregrine	Non-breeding	Sep 2017– Feb 2018	45	45	45	45	45	45	-



Species / Group	Season	Period	1	2	3	4	5	8	14
Waders	Breeding	Mar 2018 – Aug 2018	54	54	54	54	54	54	-
	Non-breeding	Sep 2018– Feb 2019	48	54	57	54	60	60	-
	Breeding	Mar 2019 – Aug 2019	27	54	54	54	54	51	48
	Non-breeding	Sep 2017– Feb 2018	45	45	45	45	45	45	-
	Breeding	Mar 2018 – Jul 2018	45	45	42	45	45	45	-
	Non-breeding	Sep 2018– Feb 2019	48	54	57	54	60	60	-
	Breeding	Mar 2019 – Jul 2019	27	42	45	45	45	45	48
	Non-breeding	Sep 2017– Mar 2018	54	54	54	54	54	54	-
	Breeding	Apr 2018 – Aug 2018	45	45	45	45	45	45	-
	Non-breeding	Sep 2018– Mar 2019	60	63	66	63	69	66	-
	Breeding	Apr 2019 – Aug 2019	15	45	45	45	45	45	48

2.3.7 Guidance (SNH 2017b) requires a minimum of 36 hours per season at each individual VP location, and for the majority of the species recorded this was exceeded, with the following exceptions:

- VP 1 during the 2019 breeding season. However, VP 1 covered the early part of the 2019 breeding season, whilst its replacement, VP 14, which covered a similar area survey area covered the later part of the 2019 breeding season. Furthermore, survey hours at VP 14 exceeded the minimum requirement. Therefore, the survey effort and results from both locations were included in the 2019 breeding season CRM.
- During the merlin breeding season, VP 3 in 2018 and VP 2 in 2019 both fell below the recommended minimum survey hours by three hours each. Given the effort at all other survey locations and the low levels of flight activity recorded by merlin, it was not felt that this shortfall would affect the results.
- During the 2017-2018 eagle non-breeding season, VP's 1, 2 and 3 fell short of the recommended minimum survey hours by three hours each. However, given the effort at all other survey locations it was not felt that this would compromise the results.

2.4 Random Model

Definition of Terms

- 2.4.1 The collision risk zone (CRZ) is defined as the wind farm polygon (WFP). This was taken as the perimeter of the Proposed Development Site boundary plus a 500m buffer, as per previous CRM iterations used in the Stornoway Wind Farm Variation 2016. SNH guidance currently recommends a 500m buffer to allow for observer inaccuracies when mapping flights during surveys (SNH, 2017b).
- 2.4.2 The Vantage Point View-Shed is the survey area associated with each VP, calculated as a 180 degree arc of a 2km-radius applied around each VP location.



- 2.4.3 The Flight risk area (FRA) is defined as the area of visibility of each viewed at minimum collision-risk height, in this instance at 20m, that falls within the CRZ, and was calculated using GIS (**Annex A, AI Figure 8E.1.1**).
- 2.4.4 FRAw is an adjustment calculation that accounts for the difference between the height bands used for recording collision risk height flights and the length of the turbine blades. The flight activity surveys were carried out prior to turbine model selection and used four height bands that are not identical to the PCH of the final turbine dimensions. Following the recommended methodology, the altitude of the birds were recorded at 15 second intervals, and flights were split across four height bands:
- A: <20m;
 - B: 20-100m;
 - C: 100-200m, and
 - D: 200m>.
- 2.4.5 For the Proposed Development, height bands B and C covers a greater area (180m) than the rotor swept volume area (150m), and therefore the overall bird activity is weighted to reflect that the swept area is smaller than the recording area, decreasing the overall bird activity. For the Consented Stornoway Wind Farm Variation 2016, the rotor swept volume is 128m, whilst height bands A, B C cover 200m.
- 2.4.6 The collision risk volume is defined as the volume of the airspace between the minimum and maximum risk height band (180m for the Proposed Development and 150m for the Consented Stornoway Wind Farm Variation 2016) and is used in random models (SNH 2000).
- 2.4.7 The rotor-swept volume is defined as the volume of air that would be swept by all of the rotors in the wind farm. For an individual rotor this is determined by the area swept (πr^2) multiplied by the thickness of the rotor blades plus the length of the focal species (SNH 2000).

Selection of Flights

- 2.4.8 The approach taken on the selection of flights for inclusion in CRM was the same as that used in the Consented Stornoway Wind Farm Variation 2016 and that undertaken for **EIA Appendix 8F**. All flights that were observed at PCH (within height bands B and C for the Proposed Development, height bands A, B and C for the Consented Stornoway Wind Farm Variation 2016) falling within the CRZ were included. Those flights that extended beyond the CRZ were clipped to the CRZ boundary (i.e. only the time spent within the CRZ was included in the collision risk model). Where flights at PCH originated or ended outside of the CRZ, the amount of time for the clipped flight at PCH within CRZ was calculated as a proportion of the clipped flight length to the total flight length at PCH. Where a flight represented the activity of more than one bird, total flight time was calculated based on number of birds multiplied by the time at PCH within the CRZ.
- 2.4.9 **Table 8E.2.4** summarises the flight times at PCH from VP's 1-5, 8 and 14 for the 2017-2018 non-breeding and 2018 breeding season and the 2018-2019 non-breeding and 2019 breeding seasons for both the Proposed and Consented Developments.
- 2.4.10 Those highlighted in bold were included in CRM, whilst those not in bold were considered to have insufficient flight activity levels to make the CRM results meaningful or were scoped out from assessment purposes in **AI Appendix 8D Table 1**, and so were excluded from CRM.
- 2.4.11 **Annex A, AI Figures 8E.2.1 – 8E.2.5** shows the clipped flights at PCH within the CRZ included in the modelling for non-sensitive species (breeding golden plover, breeding great skua, breeding

greylag goose, non-breeding greylag goose, non-breeding whooper swan), whilst figures for sensitive species are shown in the confidential **A1 Appendix 8C**.

^{2.4.12} **Annex B** provides details of flights included in the CRM calculations.

Table 8E.2.3 Species Flight Time in Seconds

	Season	Year	Total Number Flights	Proposed Development Total Seconds at PCH (height bands B and C)	Consented Development Total Seconds at PCH (height bands A, B and C)
Arctic skua	Breeding	2018	1	45	45
		2019	0	0	0
Barnacle goose	Non-breeding	2017-18	0	0	0
		2018-19	1	1,170	1,170
Black-throated diver	Non-breeding	2017-18	0	0	0
		2018-19	3	480	750
Breeding		2018	13	1,323	1,796
		2019	19	2,158	2,916
Black-tailed godwit	Breeding	2018	1	200	200
		2019	0	0	0
Dunlin	Breeding	2018	3	26	101
		2019	5	174	341
Golden eagle	Non-breeding	2017-18	9	959	1,019
		2018-19	27	2,981	3,810
Breeding		2018	26	2,210	2,852
		2019	39	6,469	7,314
Golden plover	Non-breeding	2017-18	5	0	1009
		2018-19	6	145	376
Breeding		2018	10	383	595
		2019	26	4,382	4,944
Goosander	Non-breeding	2017-18	0	0	0
		2018-19	3	117	312
Great skua	Non-breeding	2017-18	0	0	0
		2018-19	3	45	105
Breeding		2018	266	14,624	25,385



	Season	Year	Total Number Flights	Proposed Development Total Seconds at PCH (height bands B and C)	Consented Development Total Seconds at PCH (height bands A, B and C)
		2019	263	19,522	33,169
Greenshank	Breeding	2018	5	509	539
		2019	5	131	251
Greylag goose	Non-breeding	2017-18	19	7,684	18,335
		2018-19	14	7,097	13,054
	Breeding	2018	48	1,830	6,735
		2019	23	6,354	9,049
Hen harrier	Non-breeding	2017-18	28	887	3,004
		2018-19	55	671	6,610
	Breeding	2018	92	3,575	11,740
		2019	52	2,113	6,781
Merlin	Non-breeding	2017-18	2	30	82
		2018-19	14	371	881
	Breeding	2018	12	180	563
		2019	8	341	565
Peregrine	Non-breeding	2017-18	0	0	0
		2018-19	1	90	90
	Breeding	2018	1	15	30
		2019	1	15	15
Red-breasted merganser	Breeding	2018	1	0	0
		2019	1	0	30
Red-throated diver	Breeding	2018	112	11,655	13,204
		2019	94	15,228	16,735
Short-eared owl	Non-breeding	2017-18	1	0	195
		2018-19	0	0	0
	Breeding	2018	5	15	690
		2019	5	315	945
Teal	Non-breeding	2017-18	0	0	0
		2018-19	1	0	30



	Season	Year	Total Number Flights	Proposed Development Total Seconds at PCH (height bands B and C)	Consented Development Total Seconds at PCH (height bands A, B and C)
White-fronted goose	Breeding	2018	2	45	75
		2019	1	0	60
White-tailed eagle	Non-breeding	2017-18	11	973	1,121
		2018-19	17	1,698	2,131
Whooper swan	Non-breeding	Breeding	2018	15	1,465
			2019	13	1,597
		2017-18	7	3,532	3,532
		2018-19	4	885	6,451
		Breeding	2018	0	0
			2019	2	177
					297

2.4.13 The following species were taken forward for random CRM (bold in **Table 8E.2.4**):

- Breeding season: black-throated diver; golden eagle; golden plover; great skua; greenshank; greylag goose; hen harrier; merlin; red-throated diver; white-tailed eagle, and
- Non-breeding season: golden eagle; hen harrier; white-tailed eagle and whooper swan.

Bird Parameters

2.4.14 Morphometric measurements for bird species were taken from the BTO (<https://www.bto.org/about-birds/birdfacts>) with flight speeds from Alerstam et al. (2007) or alternatively from Bruderer and Boldt (2001) (**Table 8E.2.5**). Avoidance rates were taken from current guidance (SNH, 2017a).

Table 8E.2.4 Bird Biometric Parameters

Species	Avoidance Rate %	Length (m)	Wing Span (m)	Flight Speed (m/s)	Flight Style
Black-throated diver	99.5	0.66	1.20	19.3	Flapping
Golden eagle	99	0.82	2.03	11.9	Gliding
Golden plover	98	0.28	0.72	13.7	Flapping
Great skua	99.5	0.56	1.36	14.9	Flapping
Greenshank	98	0.32	0.69	12.3	Flapping
Greylag goose	99.8	0.82	1.64	17	Flapping



Species	Avoidance Rate %	Length (m)	Wing Span (m)	Flight Speed (m/s)	Flight Style
Hen harrier	99	0.48	1.1	9.1	Flapping
Merlin	98	0.28	0.56	13.4	Flapping
Red-throated diver	99.5	0.69	1.16	17.89	Flapping
White-tailed eagle	95	0.80	2.30	10.20	Gliding
Whooper swan	99.5	1.52	2.30	17.3	Flapping

2.5 Regular Model

Definition of Terms

- 2.5.1 The risk window was defined as a window of width equal to the width of the windfarm (including blade length) perpendicular to the general flight direction of the bird species being modelled, and of a height equal to the maximum height of the highest turbine.
- 2.5.2 The area occupied by the rotors was determined by multiplying the number of turbines by πr^2 . Where rotors overlapped when viewed in cross-section, the full cross sectional area of all rotors was included as the risk to birds is doubled if passing through two successive rotors.
- 2.5.3 The proportion of the risk window occupied by rotors was expressed as a proportion of the area occupied by rotors / risk window.

Selection of Flights

- 2.5.4 The modelling method for birds with predictable flight activity, such as geese following a regular migration route or travelling from a winter roost to a regular feeding area, or divers travelling from breeding lochans to feed at sea or on larger water bodies requires the calculation of the number of birds flying through the turbine rotor swept area each year.
- 2.5.5 The first step was to identify the risk window relevant for each species. This is defined as 'a window of width equal to the width of the wind farm perpendicular to the general flight direction of the birds' (SNH, 2000), and will be different for each species modelled, depending on their predominant direction of flight. The length of the risk windows also allows for a 50m micro-siting allowance plus an additional 75m either side to allow for the radius of the rotor blade. **Table 8E.2.6** presents the risk windows selected for each species included in regular CRM, and the number of turbines within that risk window whilst the relevant risk windows are illustrated in **AI Figures 8E.2.7 and 8E.2.8, Annex A**.
- 2.5.6 For the Consented Stornoway Wind Farm Variation 2016, the number of turbines within the risk window was calculated based on the consented site layout.
- 2.5.7 Calculations of available active time were based on the appropriate season (**Table 8E.2.4**), and survey effort included all VP locations within the appropriate season. As a precautionary measure, the total number of birds recorded at PCH within a 500m buffer of the wind farm polygon for each species was included for analysis, regardless of whether it actually crossed the risk window or not.



- 2.5.8 PCH for the Consented Stornoway Wind Farm Variation 2016 covered height bands A, B and C, whilst the PCH for the Proposed Development covered height bands B and C. The following species were taken forward CRM for regular flights:
- Breeding season: common tern, and
 - Non-breeding season: pink-footed goose.
- 2.5.9 Full details of all flights included in the random CRM models for the proposed development recorded between September 2018 – August 2019 are shown in **Annex B** and details of CRM calculations are presented in **Annex C**.

Table 8E.2.5 Number of Birds Observed Passing Through Risk Window

	Season	Period	Scheme	Risk window (m)	Number of turbines	Total number flights	Total number birds	Total number birds at PCH
Common tern	Breeding	2018	Proposed	3502	12	60	145	66
			Consented	3502	16	60	145	145
	2019	Proposed	3502	12	75	265	127	
		Consented	3502	16	75	265	240	
Pink-footed goose	Non-breeding	2017-18	Proposed	6217	35	0	0	0
			Consented	6217	36	0	0	0
	2018-19	Proposed	6217	35	11	1,354	607	
		Consented	6217	36	11	1,354	607	

Bird Parameters

- 2.5.10 Morphometric measurements for bird species were taken from the BTO (<https://www.bto.org/about-birds/birdfacts>) with flight speeds from Alerstam et al. (2007) or alternatively from Bruderer and Boldt (2001). Avoidance rates were taken from current guidance (SNH, 2017a). (**Table 8E.2.7**)

Table 8E.2.6 Bird Biometric Parameters

Species	Avoidance Rate %	Length (m)	Wing Span (m)	Flight Speed (m/s)	Flight Style
Common tern	98	0.34	0.8	10.9	Flapping
Pink-footed goose	99.8	0.76	1.61	17.3	Flapping



3. Results

3.1.1 A summary of the CRM results for year one and year two are shown in **Table 8E.3.1** below, whilst details of model calculations are presented in **Annex C**. In addition, results based on the turbine parameters for the Consented Stornoway Wind Farm Variation 2016 are also shown so that direct comparison can be made between the Consented and Proposed Development.

Table 8F.3.1 Predicted collision rates

Species	Avoidance Rate %	Season	Potential collisions	Proposed Development			Consented Development		
				Year 1	Year 2	Combined average	Year 1	Year 2	Combined average
Black-throated diver	99.5	Breeding	Per year	0.045	0.073	0.059	0.042	0.068	0.055
			Over 25 years	1.13	1.83	1.48	1.05	1.70	1.38
Common tern	98	Breeding	Per year	0.232	0.419	0.326	0.568	0.881	0.725
			Over 25 years	5.80	10.47	8.14	14.20	22.03	18.12
Golden eagle	99	Breeding	Per year	0.117	0.352	0.235	0.098	0.259	0.179
			Over 25 years	2.93	8.80	5.87	2.46	6.47	4.47
	98	Non-breeding	Per year	0.044	0.101	0.073	0.031	0.084	0.058
			Over 25 years	1.11	2.52	1.82	0.77	2.10	1.44
Golden plover	98	Breeding	Per year	0.034	0.316	0.175	0.035	0.233	0.134
			Over 25 years	0.85	7.91	4.38	0.87	5.83	3.35
Great skua	99.5	Breeding	Per year	0.411	0.545	0.478	0.481	0.624	0.553
			Over 25 years	10.28	13.63	11.96	12.03	15.61	13.82
Greenshank	98	Breeding	Per year	0.045	0.009	0.027	0.031	0.012	0.022
			Over 25 years	1.13	0.24	0.69	0.78	0.30	0.54
Greylag goose	99.8	Breeding	Per year	0.028	0.096	0.062	0.071	0.094	0.083
			Over 25 years	0.71	2.41	1.56	1.78	2.34	2.06



Species	Avoidance Rate %	Season	Potential collisions	Proposed Development			Consented Development		
				Year 1	Year 2	Combined average	Year 1	Year 2	Combined average
		Non-breeding	Per year	0.096	0.074	0.085	0.157	0.093	0.125
			Over 25 years	2.40	1.85	2.13	3.93	2.33	3.13
Hen harrier	99	Breeding	Per year	0.154	0.091	0.123	0.309	0.177	0.243
			Over 25 years	3.86	2.27	3.07	7.71	4.42	6.07
		Non-breeding	Per year	0.027	0.018	0.023	0.057	0.106	0.082
			Over 25 years	0.69	0.44	0.57	1.41	2.64	2.03
Merlin	98	Breeding	Per year	0.016	0.029	0.023	0.032	0.031	0.032
			Over 25 years	0.39	0.72	0.56	0.79	0.78	0.79
Pink-footed goose	99.8	Non-breeding	Per year	0.000	0.294	0.147	0.000	0.123	0.062
			Over 25 years	0.00	7.35	3.68	0.00	3.08	1.54
Red-throated diver	99.5	Breeding	Per year	0.386	0.501	0.444	0.296	0.372	0.334
			Over 25 years	9.65	12.52	11.09	7.40	9.31	8.36
	95	Breeding	Per year	0.369	0.413	0.391	0.279	0.298	0.289
			Over 25 years	9.22	10.31	9.77	6.97	7.45	7.21
		Non-breeding	Per year	0.213	0.273	0.243	0.156	0.217	0.187
			Over 25 years	5.33	6.82	6.08	3.90	5.43	4.67
Whooper swan	99.5	Non-breeding	Per year	0.160	0.034	0.097	0.110	0.170	0.140
			Over 25 years	3.99	0.85	2.42	2.74	4.25	3.50

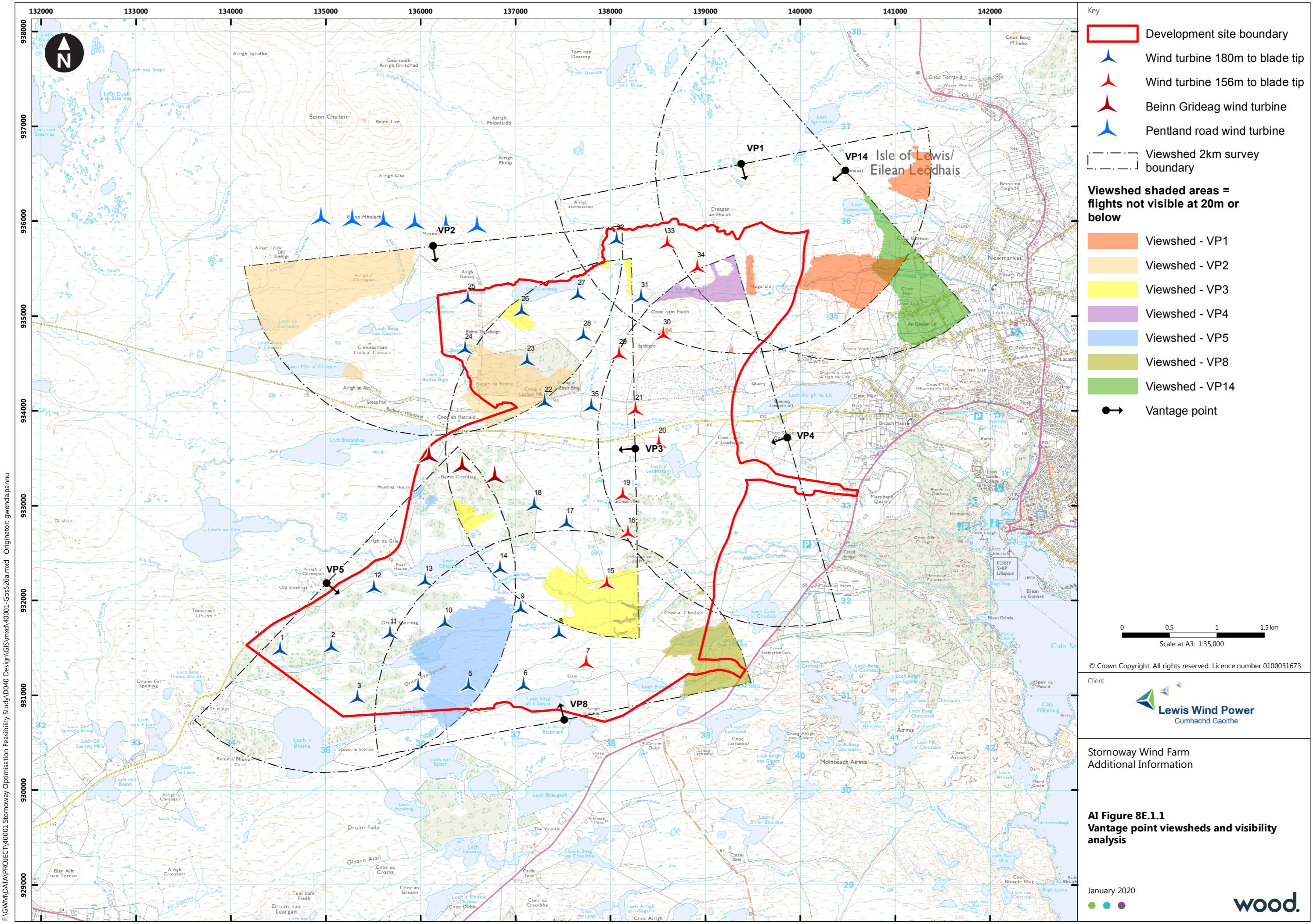


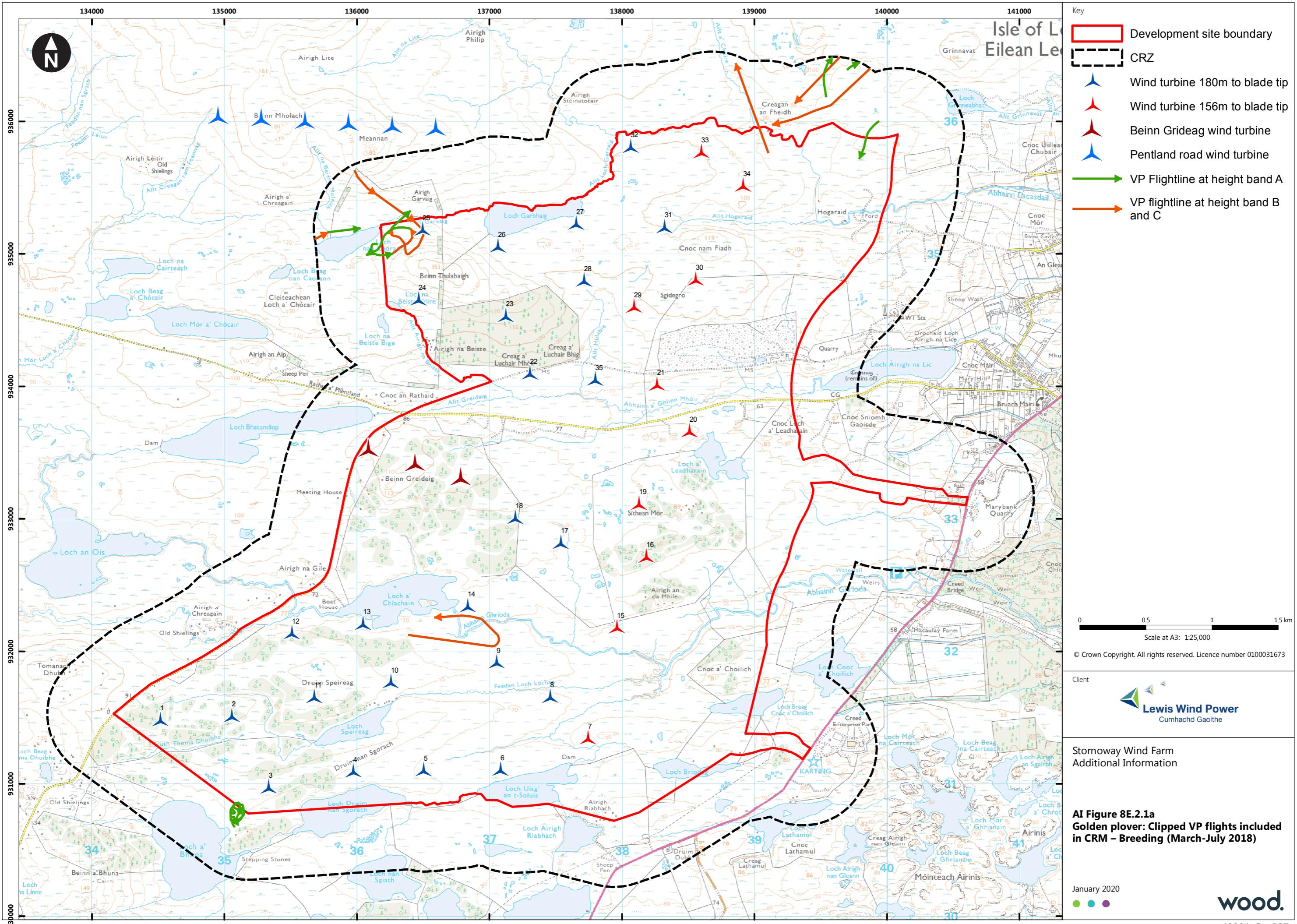
4. References

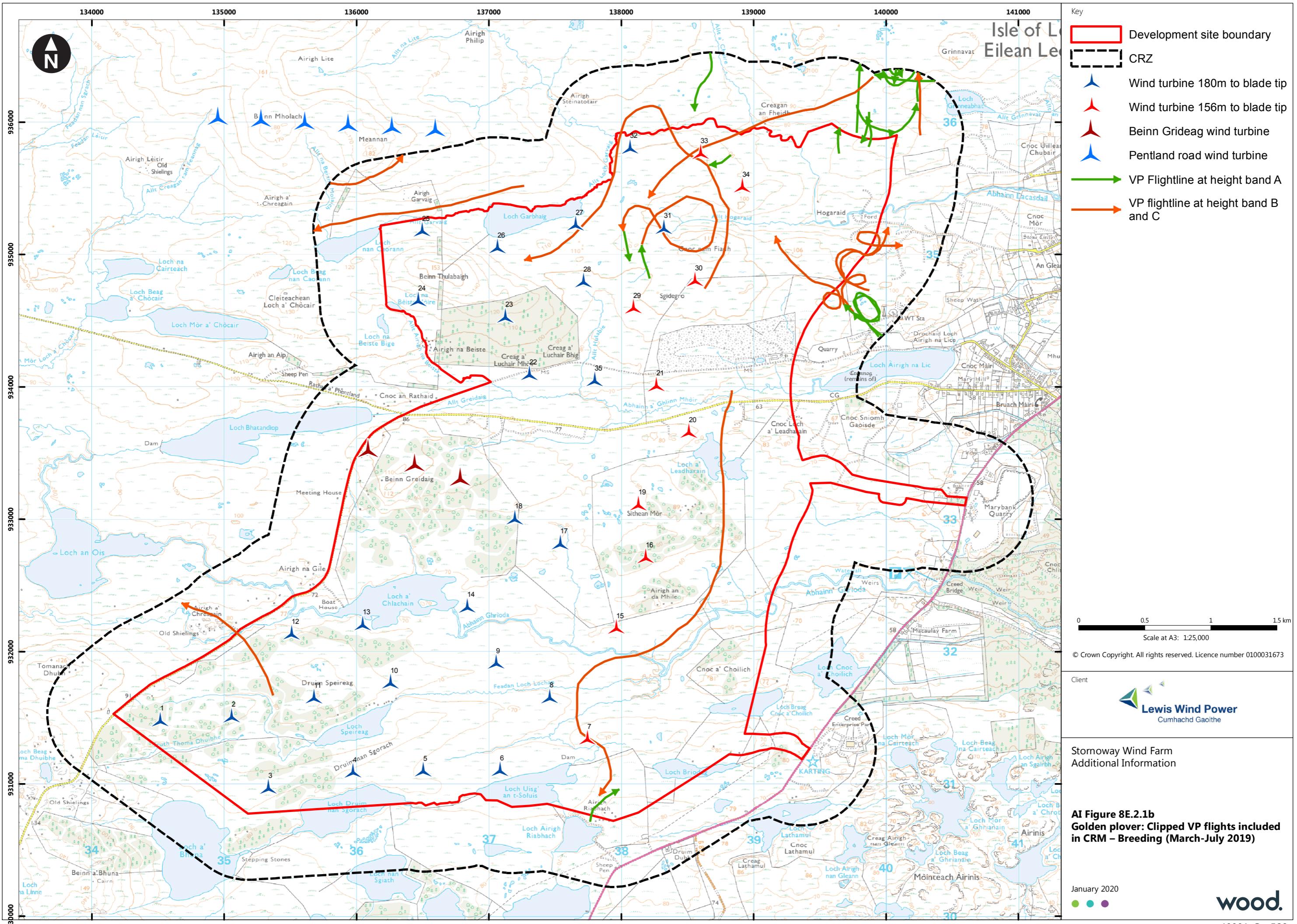
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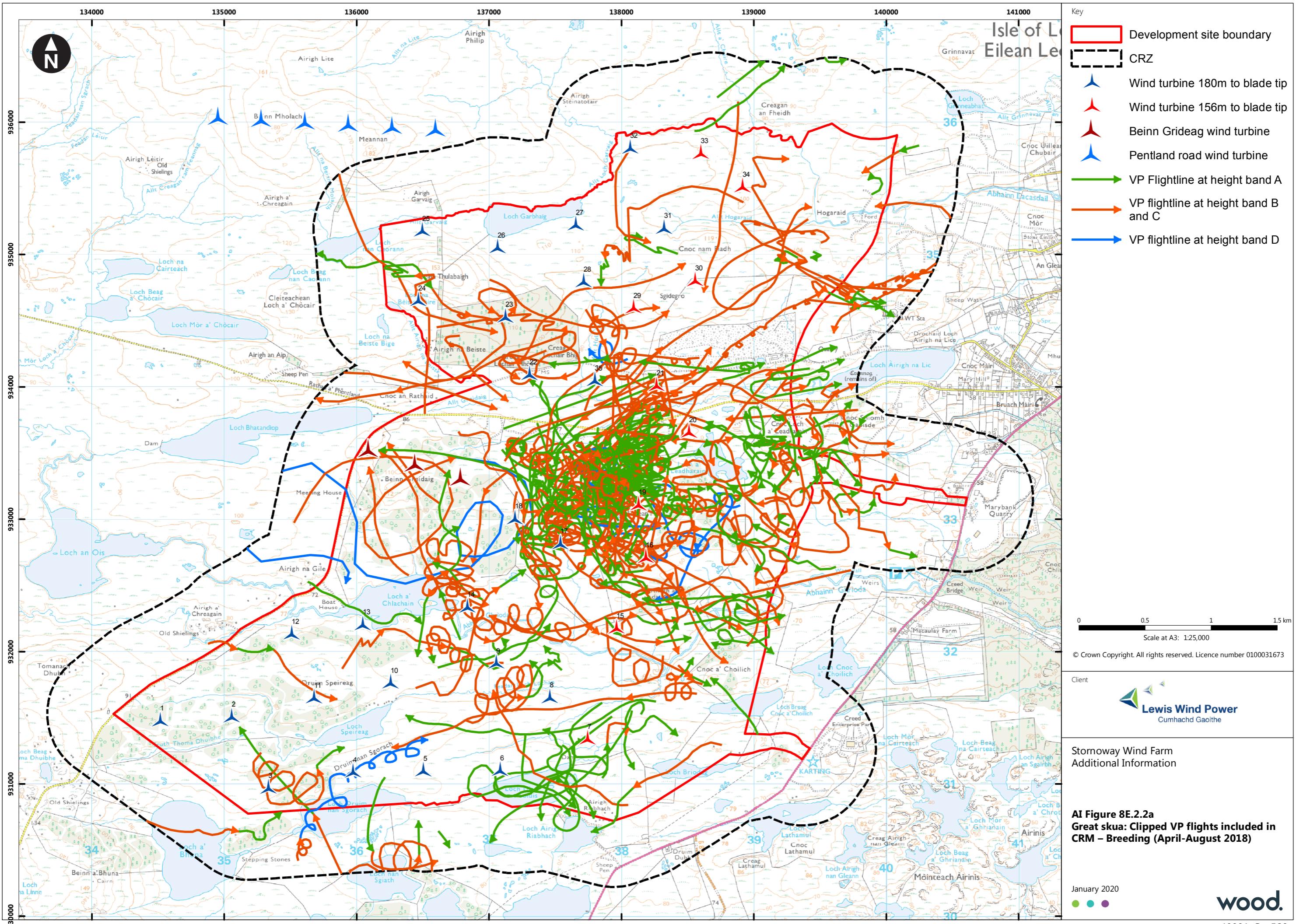
Annex A

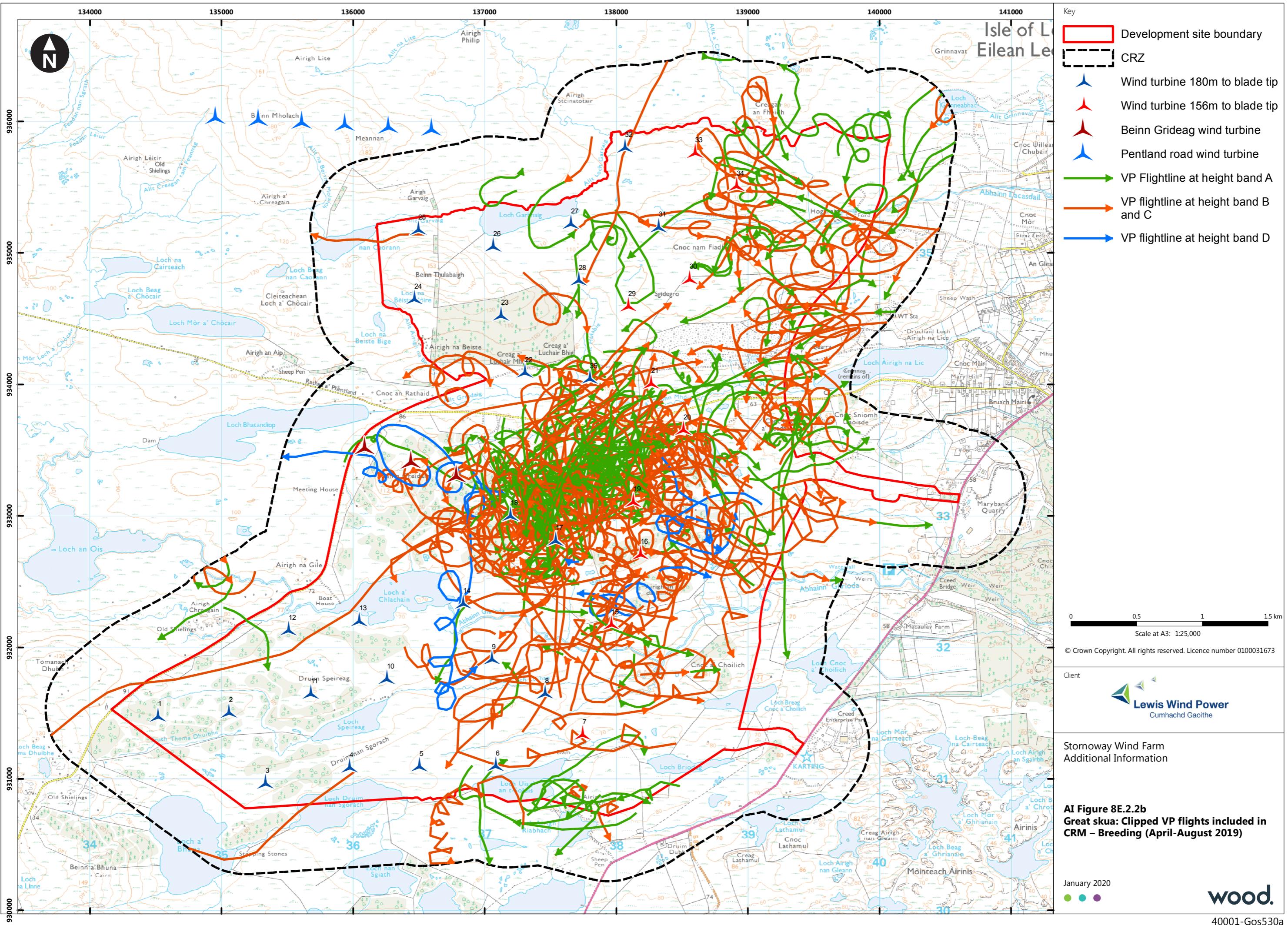
Figures

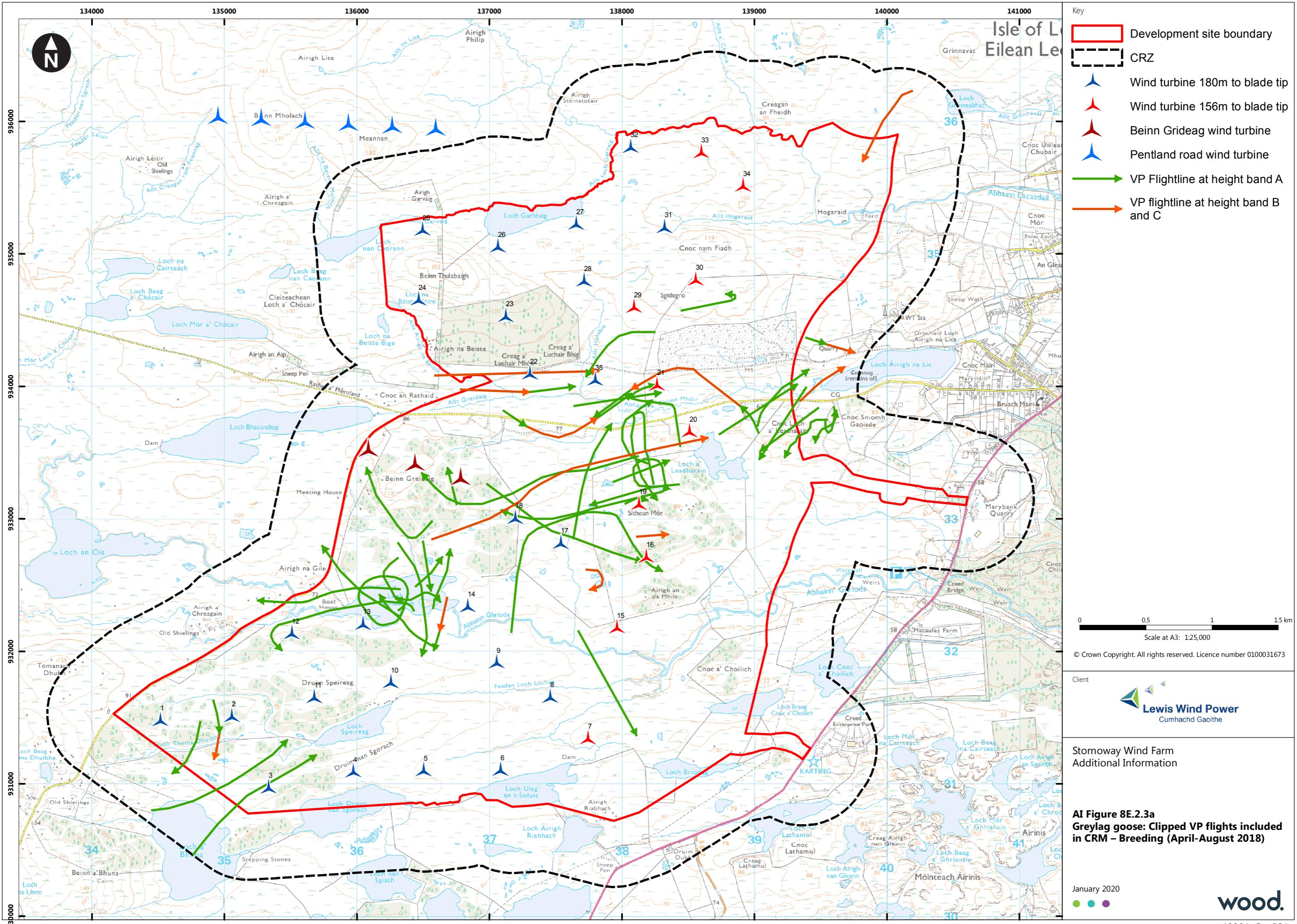


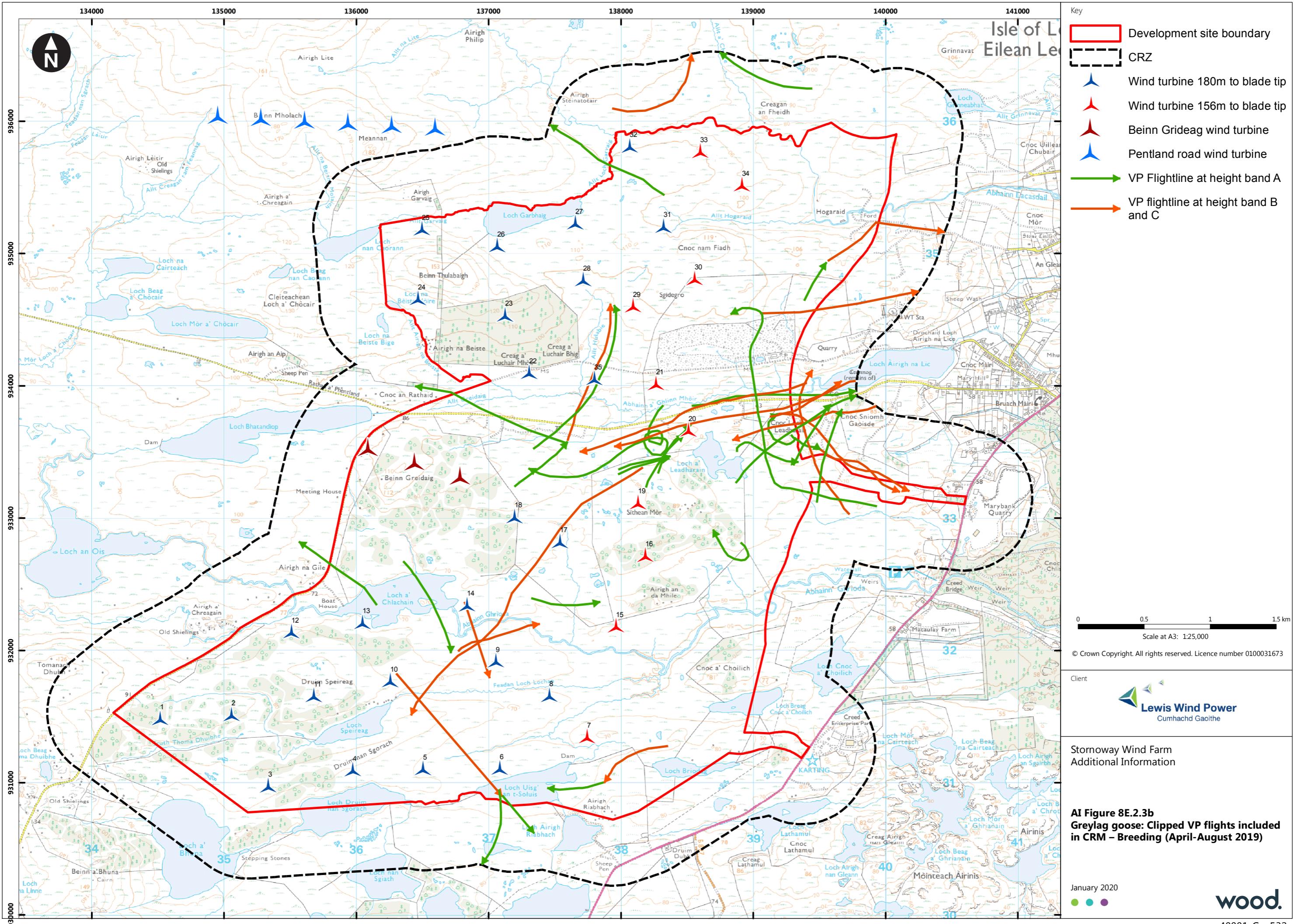


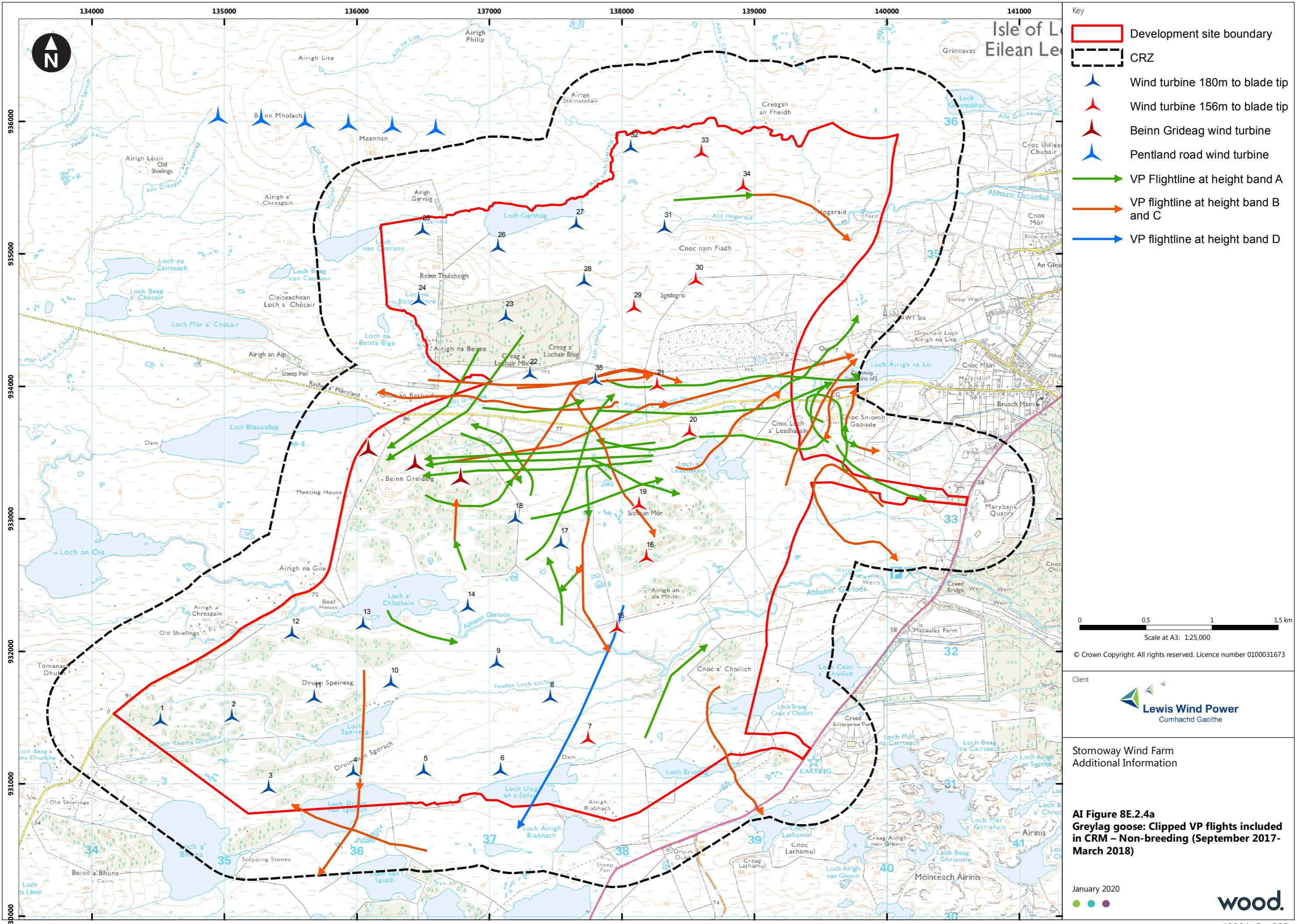


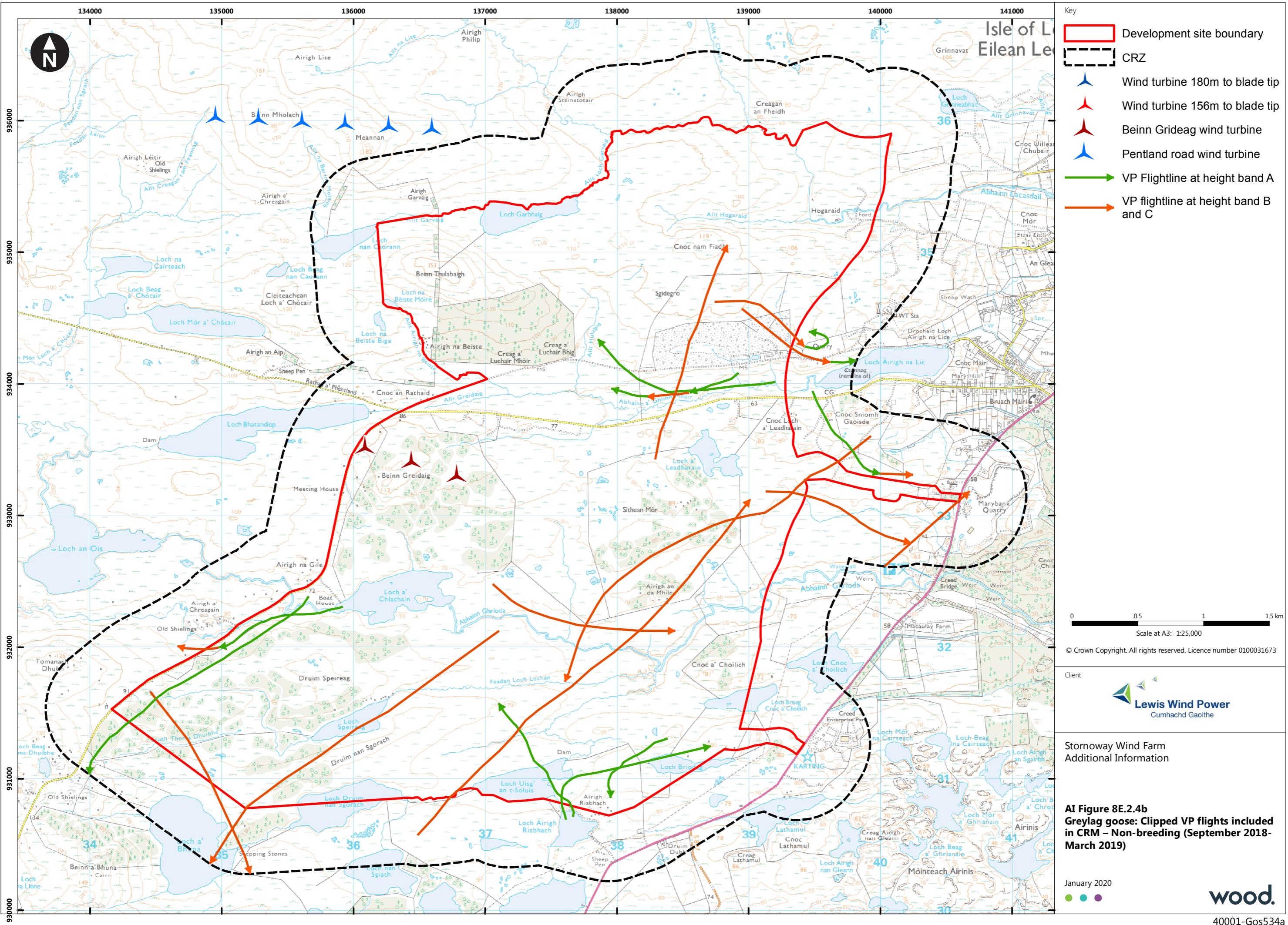


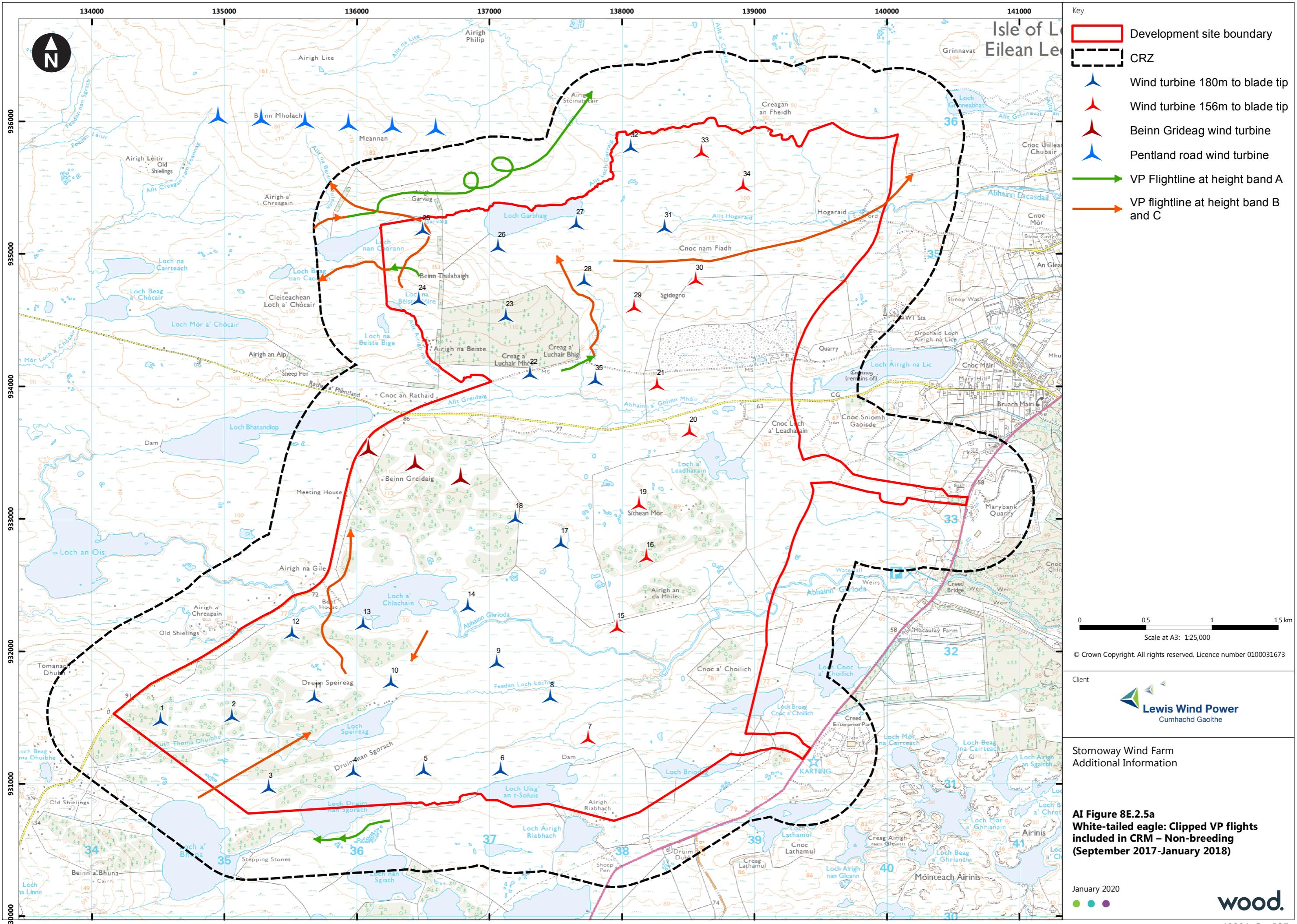


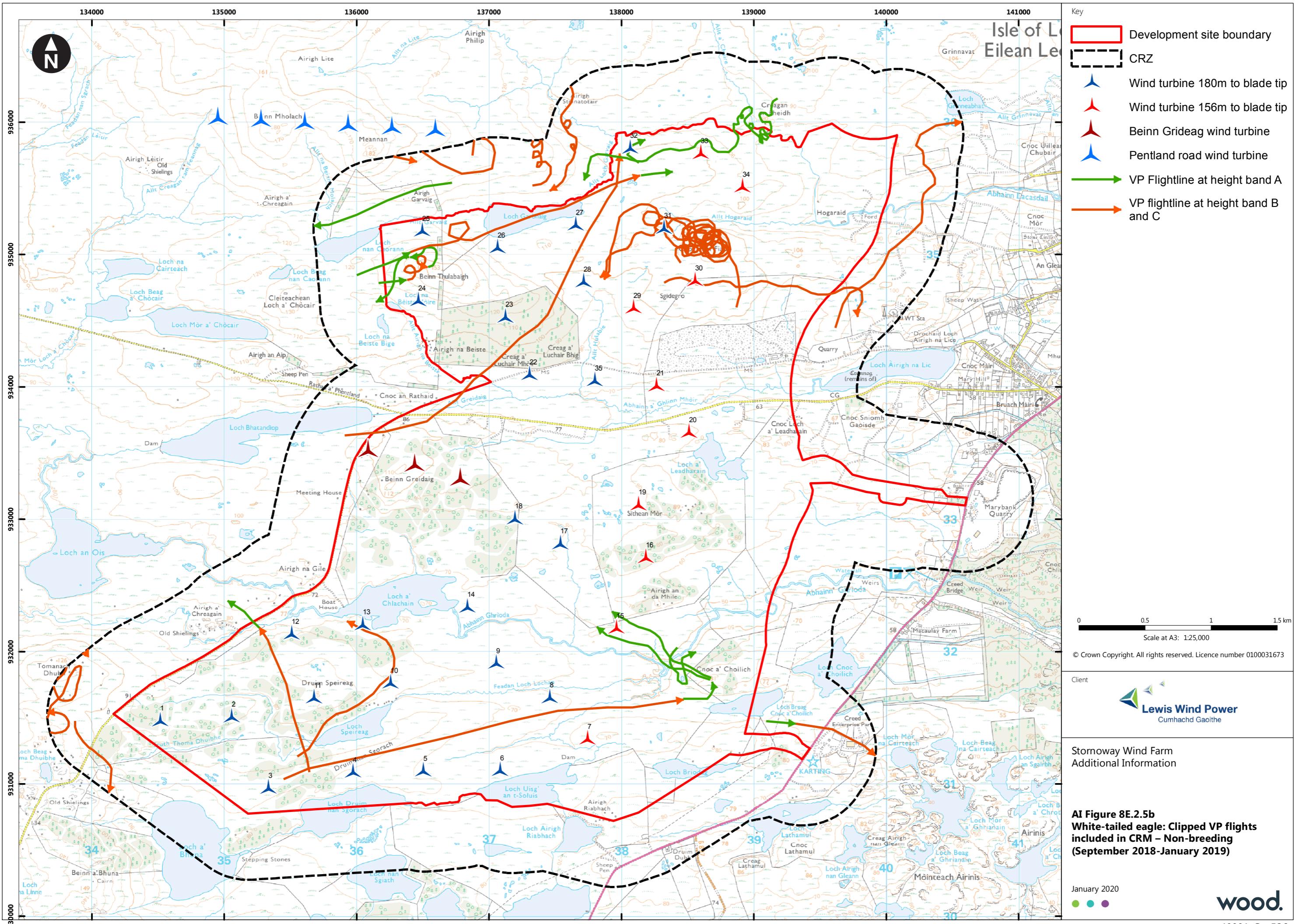


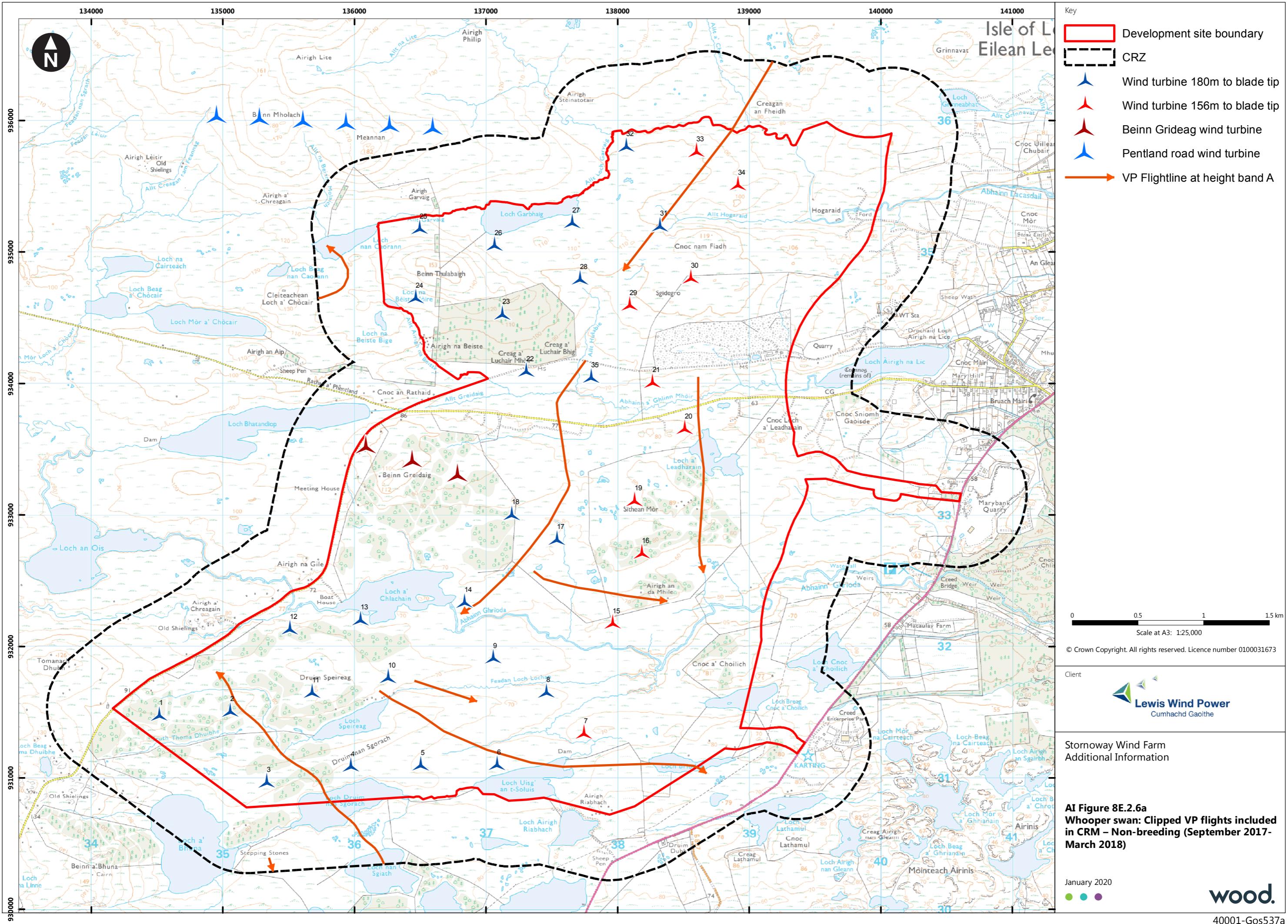


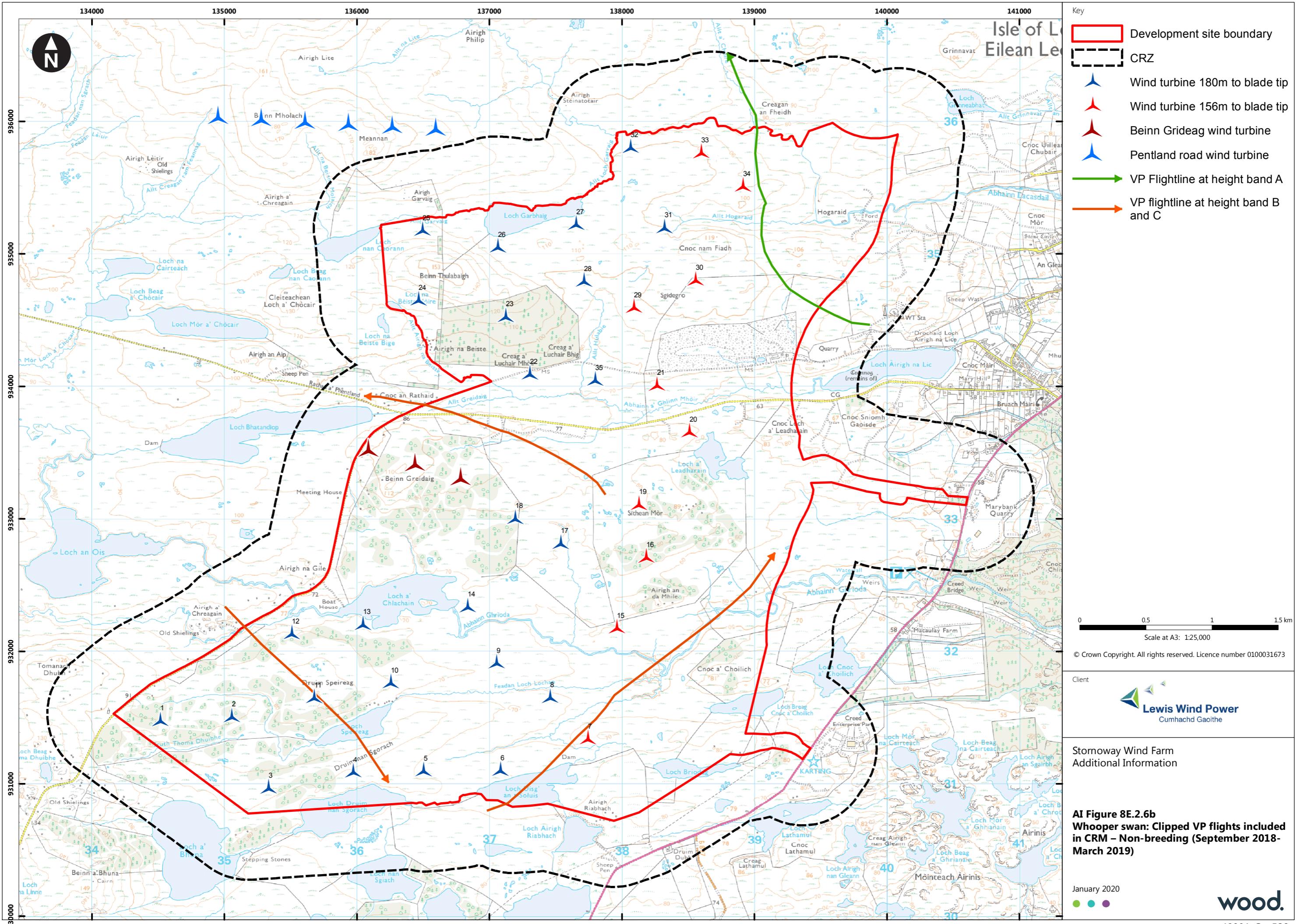


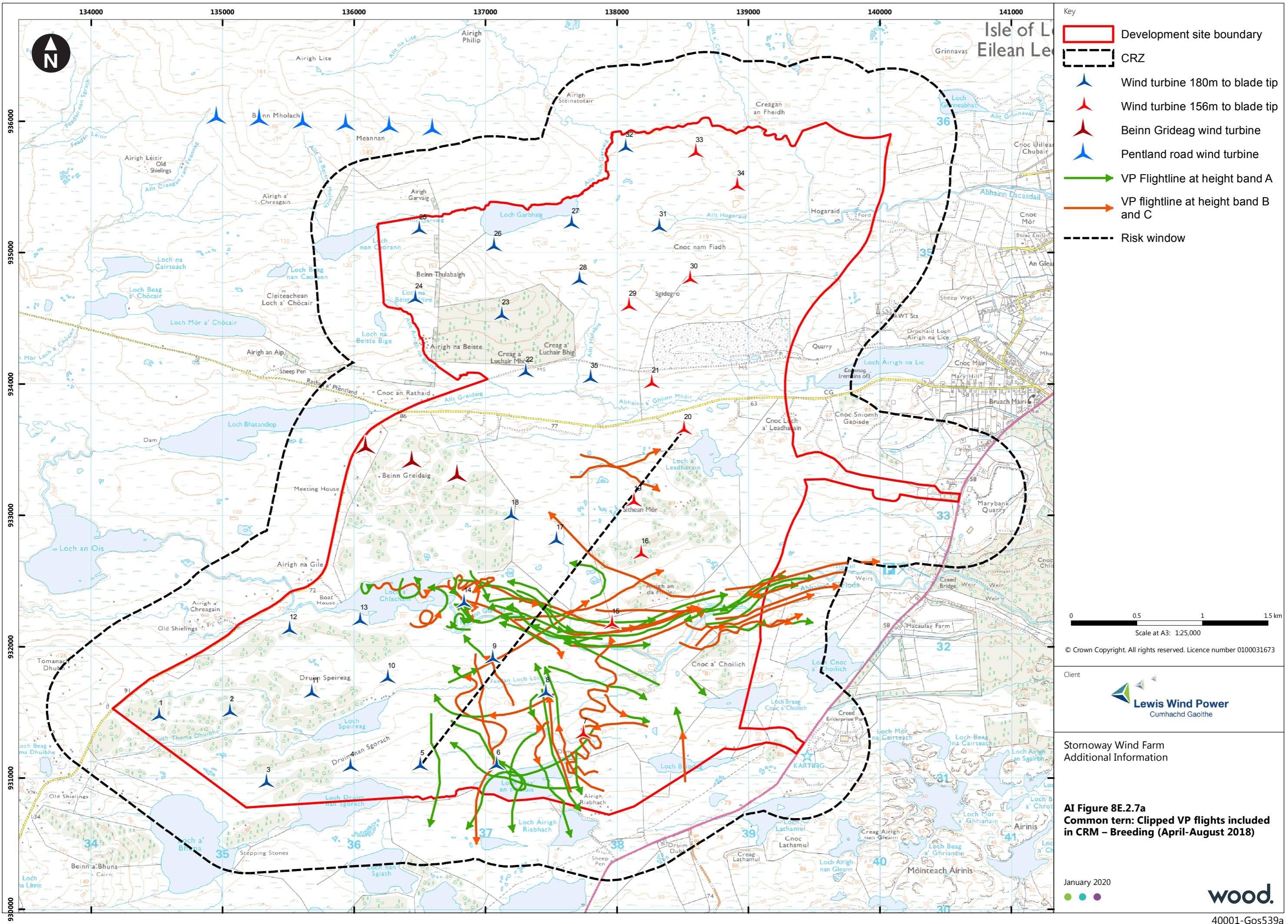


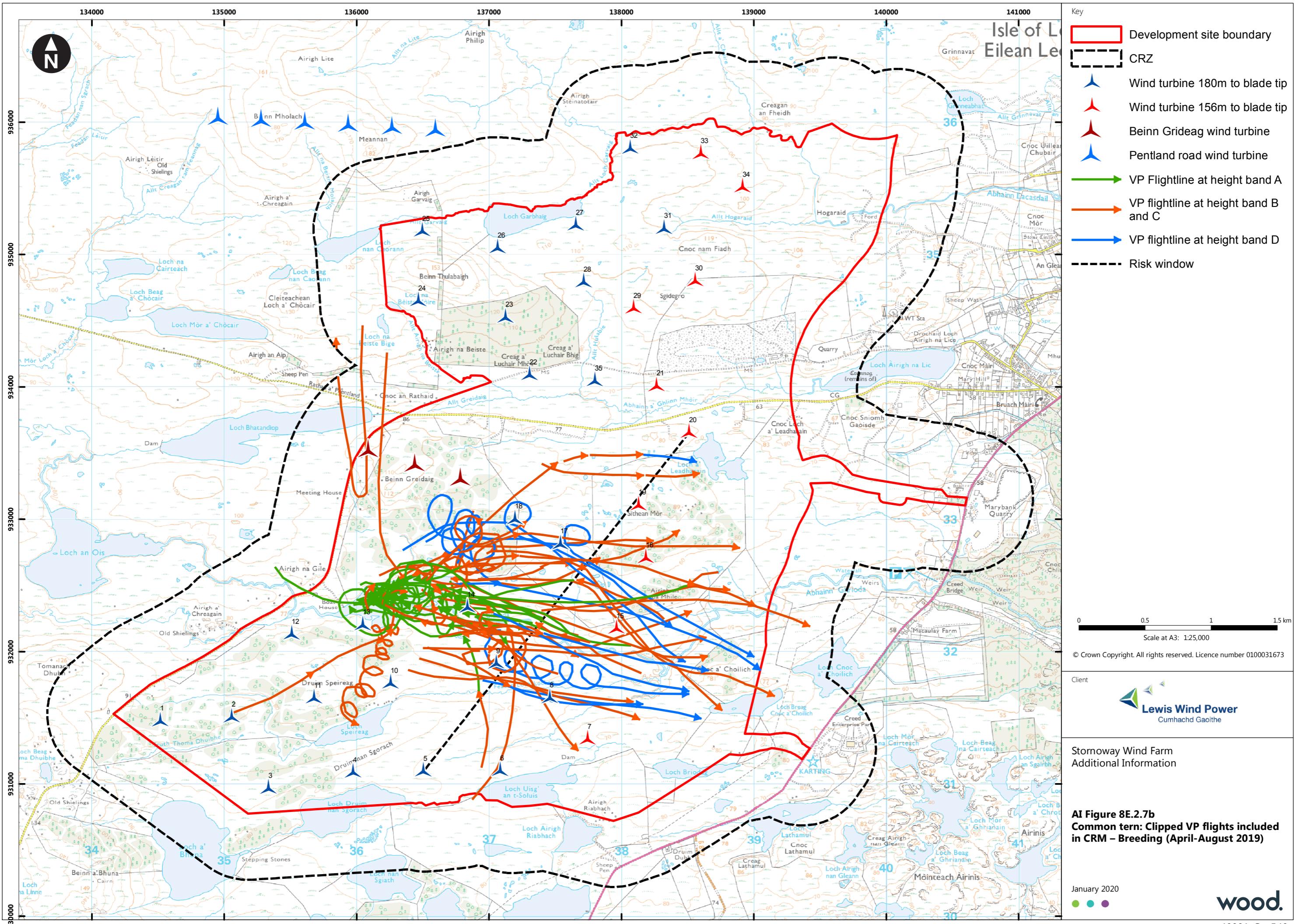


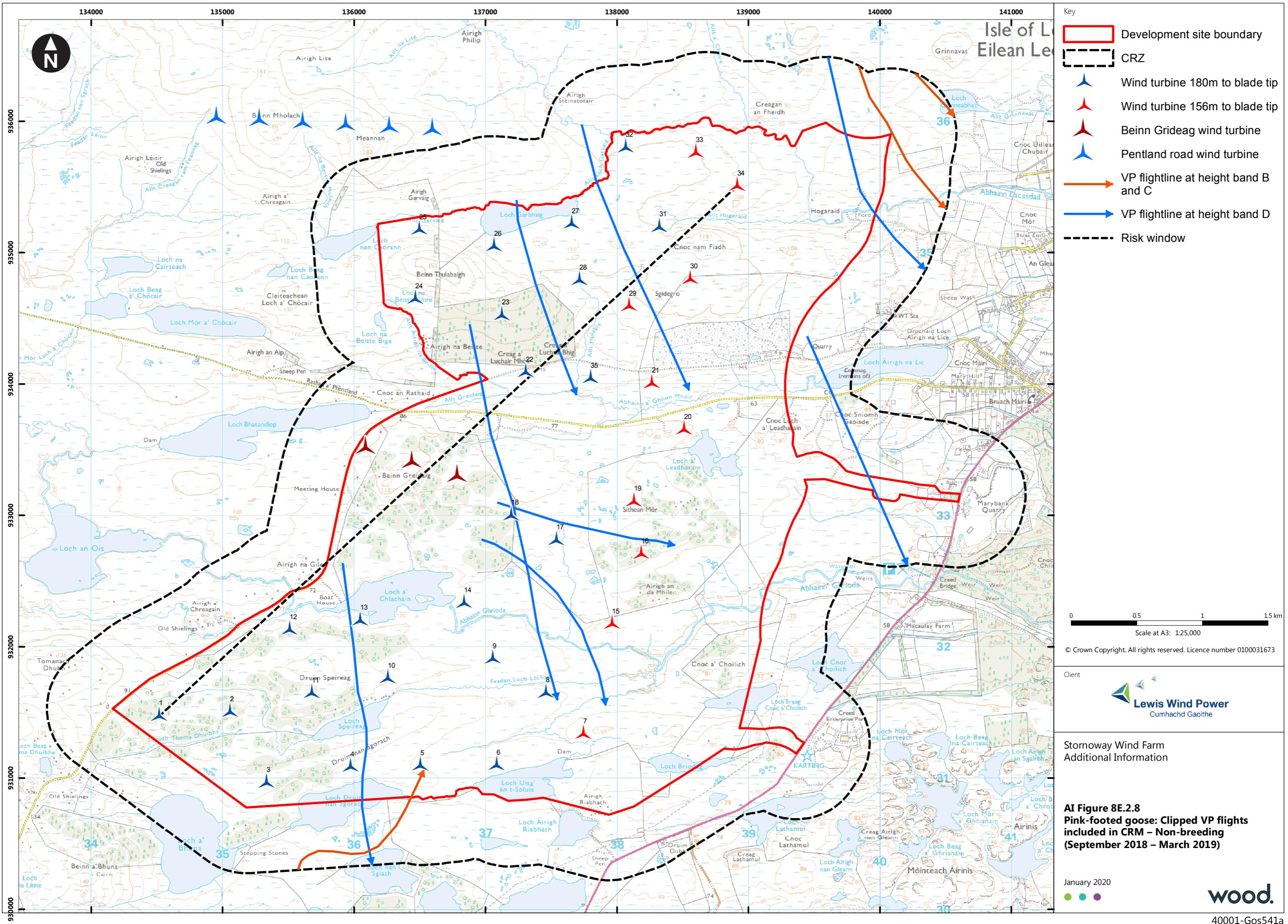












Annex B

Flight Data used for CRM

B.1a VP Flight Data: Black-throated Diver – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0057_a	8	BV	26/04/2018	15:09	60	1471.11	1471.11	100	1	B	60
BS_SW_0057_b	8	BV	26/04/2018	15:09	15	126.81	126.81	100	1	A	15
BS_SW_0187	3	BV	24/05/2018	05:37	60	2856.63	2856.63	100	1	B	60
BS_SW_0214	1	BV	24/05/2018	20:37	45	2326.56	1339.14	58	1	C	26
BS_SW_0275_a	5	BV	21/06/2018	12:40	90	2939.11	2939.11	100	1	B	90
BS_SW_0275_b	5	BV	21/06/2018	12:40	15	232.40	232.40	100	1	A	15
BS_SW_0296_a	8	BV	23/06/2018	21:38	30	888.68	888.68	100	1	B	30
BS_SW_0296_b	8	BV	23/06/2018	21:38	45	795.18	674.96	85	1	A	38
BS_SW_0298_a	8	BV	27/06/2018	05:20	15	492.84	492.84	100	1	B	15
BS_SW_0298_b	8	BV	27/06/2018	05:20	45	651.46	651.46	100	1	A	45
BS_SW_0390_a	3	BV	27/06/2018	18:02	15	322.18	322.18	100	1	B	15
BS_SW_0390_b	3	BV	27/06/2018	18:02	90	3079.18	3079.18	100	1	C	90
BS_SW_0390_c	3	BV	27/06/2018	18:02	45	1461.42	1461.42	100	1	B	45
BS_SW_0390_d	3	BV	27/06/2018	18:02	30	563.92	563.92	100	1	A	30
BS_SW_0469	8	BV	16/07/2018	10:05	15	363.32	363.32	100	1	B	15
BS_SW_0681	8	BV	08/08/2018	13:36	60	1202.77	1122.65	93	2	B	112



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0682	8	BV	08/08/2018	13:45	15	120.70	120.70	100	2	A	30
BS_SW_0733	8	BV	13/08/2018	17:47	15	228.85	228.85	100	2	A	30
BS_SW_0744	8	BV	13/08/2018	20:14	15	267.11	267.11	100	1	A	15
BS_SW_0745	8	BV	13/08/2018	20:15	45	1164.87	1164.87	100	1	A	45
BS_SW_0802_a	8	BV	15/08/2018	11:25	45	723.91	723.91	100	2	B	90
BS_SW_0802_b	8	BV	15/08/2018	11:25	45	833.83	833.83	100	2	A	90
BS_SW_0805	8	BV	15/08/2018	11:44	15	281.02	281.02	100	2	A	30
BS_SW_0806_a	8	BV	15/08/2018	12:02	15	423.56	423.56	100	4	A	60
BS_SW_0806_b	8	BV	15/08/2018	12:02	45	1051.23	1051.23	100	4	B	180
BS_SW_0806_c	8	BV	15/08/2018	12:02	90	2174.17	2174.17	100	4	C	360
BS_SW_0808_a	8	BV	15/08/2018	12:13	45	836.68	836.68	100	2	B	90
BS_SW_0808_b	8	BV	15/08/2018	12:13	15	336.39	336.39	100	2	A	30
BS_SW_0849	5	BV	24/08/2018	18:05	45	1122.45	1122.45	100	1	B	45

B.1b VP Flight Data: Black-throated Diver – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0303_a	3	BV	15/04/2019	19:01	15	75.49	75.49	100	2	A	30
40001_VP_0303_b	3	BV	15/04/2019	19:01	45	878.19	878.19	100	2	B	90
40001_VP_0303_c	3	BV	15/04/2019	19:01	15	144.11	144.11	100	2	A	30
40001_VP_0379_a	3	BV	07/05/2019	09:36	45	1717.88	1717.88	100	1	A	45
40001_VP_0379_b	3	BV	07/05/2019	09:36	450	7836.29	7836.29	100	1	B	450
40001_VP_0416_a	8	BV	09/05/2019	19:05	30	232.30	232.30	100	1	C	30
40001_VP_0321	1	BV	15/05/2019	20:49	150	2960.58	2960.58	100	1	B	150
40001_VP_0335_a	8	BV	02/06/2019	21:58	15	410.99	410.99	100	2	B	30
40001_VP_0335_b	8	BV	02/06/2019	21:58	15	120.68	120.68	100	2	A	30
40001_VP_0700	8	BV	09/06/2019	09:44	45	1007.08	1007.08	100	1	A	45
40001_VP_0814_a	8	BV	24/06/2019	20:10	45	1448.14	1448.14	100	1	B	45
40001_VP_0814_b	8	BV	24/06/2019	20:10	15	37.01	37.01	100	1	A	15
40001_VP_0815_a	8	BV	24/06/2019	21:20	45	1181.07	1181.07	100	2	B	90
40001_VP_0815_b	8	BV	24/06/2019	21:20	15	31.86	31.86	100	2	A	30
40001_VP_0466	8	BV	02/07/2019	06:11	45	1073.28	1073.28	100	1	A	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0733_a	8	BV	06/07/2019	13:01	45	1525.83	1525.83	100	2	A	90
40001_VP_0733_b	8	BV	06/07/2019	13:01	15	459.18	459.18	100	2	B	30
40001_VP_0733_c	8	BV	06/07/2019	13:01	15	445.79	445.79	100	2	A	30
40001_VP_0734_a	8	BV	06/07/2019	13:01	45	500.20	500.20	100	1	A	45
40001_VP_0734_b	8	BV	06/07/2019	13:01	15	548.55	548.55	100	1	B	15
40001_VP_0734_c	8	BV	06/07/2019	13:01	15	399.79	399.79	100	1	A	15
40001_VP_0734_d	8	BV	06/07/2019	13:01	30	1140.79	1140.79	100	1	B	30
40001_VP_0739_a	8	BV	06/07/2019	13:43	45	838.39	838.39	100	5	A	225
40001_VP_0739_b	8	BV	06/07/2019	13:43	180	5816.31	5816.31	100	5	B	900
40001_VP_0742	8	BV	06/07/2019	13:45	60	1782.07	1782.07	100	1	A	60
40001_VP_0476_a	8	BV	22/07/2019	19:27	30	1162.10	1162.10	100	1	B	30
40001_VP_0476_b	8	BV	22/07/2019	19:27	15	143.44	143.44	100	1	A	15
40001_VP_0477	8	BV	22/07/2019	19:55	45	1169.54	1169.54	100	1	B	45
40001_VP_0480_a	14	BV	27/07/2019	14:22	15	265.36	139.33	53	1	A	8
40001_VP_0480_b	14	BV	27/07/2019	14:22	45	1729.33	381.40	22	1	B	10
40001_VP_1070	5	BV	22/08/2019	09:32	90	1059.59	1059.59	100	1	B	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1106_a	14	BV	24/08/2019	17:13	30	1280.17	269.24	21	1	B	6
40001_VP_1111_a	14	BV	24/08/2019	19:01	75	2076.24	1583.94	76	1	B	57
40001_VP_1111_b	14	BV	24/08/2019	19:01	60	774.35	774.35	100	1	C	60

B.2a VP Flight Data: Common Tern – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0172	8	CN	10/06/2018	12:36	45	990.46	990.46	100	2	A	90
BS_SW_0173_a	8	CN	10/06/2018	12:39	15	258.05	258.05	100	21	A	315
BS_SW_0173_b	8	CN	10/06/2018	12:39	105	987.11	987.11	100	21	B	2205
BS_SW_0173_c	8	CN	10/06/2018	12:39	30	520.67	520.67	100	21	A	630
BS_SW_0281_a	8	CN	23/06/2018	18:48	15	254.04	254.04	100	1	B	15
BS_SW_0281_b	8	CN	23/06/2018	18:48	30	176.71	176.71	100	1	A	30
BS_SW_0282_a	8	CN	23/06/2018	18:49	30	432.77	432.77	100	1	B	30
BS_SW_0282_b	8	CN	23/06/2018	18:49	30	900.01	900.01	100	1	A	30
BS_SW_0282_c	8	CN	23/06/2018	18:49	150	1100.70	1100.70	100	1	B	150
BS_SW_0282_d	8	CN	23/06/2018	18:49	15	130.54	130.54	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0289	8	CN	23/06/2018	20:03	75	1091.07	1091.07	100	1	A	75
BS_SW_0290_a	8	CN	23/06/2018	21:18	45	532.52	532.52	100	1	B	45
BS_SW_0290_b	8	CN	23/06/2018	21:18	30	483.38	483.38	100	1	A	30
BS_SW_0291	8	CN	23/06/2018	21:19	75	1222.25	1222.25	100	1	B	75
BS_SW_0294	8	CN	23/06/2018	21:33	60	1082.09	1082.09	100	1	B	60
BS_SW_0295	8	CN	23/06/2018	21:34	60	1054.85	1054.85	100	1	A	60
BS_SW_0300_a	8	CN	27/06/2018	05:45	15	133.76	133.76	100	1	B	15
BS_SW_0300_b	8	CN	27/06/2018	05:45	90	1380.58	1380.58	100	1	A	90
BS_SW_0320	3	CN	30/06/2018	08:31	30	681.20	681.20	100	1	C	30
BS_SW_0433	5	CN	09/07/2018	14:33	30	709.76	709.76	100	1	B	30
BS_SW_0434	5	CN	09/07/2018	14:39	15	277.95	277.95	100	1	A	15
BS_SW_0435_a	5	CN	09/07/2018	14:56	15	194.58	194.58	100	1	A	15
BS_SW_0435_b	5	CN	09/07/2018	14:56	30	586.46	586.46	100	1	B	30
BS_SW_0435_c	5	CN	09/07/2018	14:56	15	486.11	486.11	100	1	C	15
BS_SW_0440	5	CN	09/07/2018	16:43	60	424.59	424.59	100	30	A	1800
BS_SW_0443_a	5	CN	09/07/2018	18:30	15	150.14	150.14	100	1	A	15
BS_SW_0443_b	5	CN	09/07/2018	18:30	30	958.50	958.50	100	1	B	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0447	5	CN	09/07/2018	19:30	30	535.43	535.43	100	2	A	60
BS_SW_0461_a	8	CN	16/07/2018	09:15	15	293.74	293.74	100	1	A	15
BS_SW_0461_b	8	CN	16/07/2018	09:15	45	885.35	885.35	100	1	B	45
BS_SW_0461_c	8	CN	16/07/2018	09:15	15	750.36	750.36	100	1	A	15
BS_SW_0463	8	CN	16/07/2018	09:28	30	510.43	510.43	100	2	A	60
BS_SW_0464_a	8	CN	16/07/2018	09:30	45	792.85	792.85	100	3	A	135
BS_SW_0464_b	8	CN	16/07/2018	09:30	105	1037.95	1037.95	100	3	B	315
BS_SW_0465	8	CN	16/07/2018	09:39	90	829.14	829.14	100	1	B	90
BS_SW_0470	8	CN	16/07/2018	10:14	30	607.40	607.40	100	1	A	30
BS_SW_0472	8	CN	16/07/2018	10:39	45	801.03	801.03	100	1	A	45
BS_SW_0473_a	8	CN	16/07/2018	10:42	45	537.86	537.86	100	3	A	135
BS_SW_0473_b	8	CN	16/07/2018	10:42	90	989.60	989.60	100	3	B	270
BS_SW_0474	8	CN	16/07/2018	10:47	45	420.34	420.34	100	8	A	360
BS_SW_0477	8	CN	16/07/2018	11:14	45	607.79	607.79	100	4	A	180
BS_SW_0478_a	8	CN	16/07/2018	11:20	15	458.87	458.87	100	1	B	15
BS_SW_0478_b	8	CN	16/07/2018	11:20	15	224.93	224.93	100	1	A	15
BS_SW_0479_a	8	CN	16/07/2018	11:23	15	605.35	605.35	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0479_b	8	CN	16/07/2018	11:23	15	312.62	312.62	100	1	A	15
BS_SW_0480_a	8	CN	16/07/2018	11:54	30	262.69	262.69	100	1	A	30
BS_SW_0480_b	8	CN	16/07/2018	11:54	30	393.85	393.85	100	1	B	30
BS_SW_0480_c	8	CN	16/07/2018	11:54	30	909.77	909.77	100	1	A	30
BS_SW_0560_a	8	CN	25/07/2018	13:30	30	385.48	385.48	100	1	B	30
BS_SW_0560_b	8	CN	25/07/2018	13:30	15	193.54	193.54	100	1	A	15
BS_SW_0562_b	8	CN	25/07/2018	14:03	15	194.15	194.15	100	3	A	45
BS_SW_0563	8	CN	25/07/2018	14:04	45	1490.03	1490.03	100	1	B	45
BS_SW_0564	8	CN	25/07/2018	14:08	30	416.11	416.11	100	1	A	30
BS_SW_0565	8	CN	25/07/2018	14:24	30	554.62	554.62	100	1	A	30
BS_SW_0566	8	CN	25/07/2018	14:34	45	854.45	854.45	100	1	A	45
BS_SW_0568_a	8	CN	25/07/2018	14:44	15	205.81	205.81	100	1	A	15
BS_SW_0568_b	8	CN	25/07/2018	14:44	15	413.30	413.30	100	1	B	15
BS_SW_0568_c	8	CN	25/07/2018	14:44	15	635.32	635.32	100	1	A	15
BS_SW_0570_a	8	CN	25/07/2018	15:03	30	673.56	673.56	100	1	B	30
BS_SW_0570_b	8	CN	25/07/2018	15:03	15	453.62	453.62	100	1	A	15
BS_SW_0571	8	CN	25/07/2018	15:15	60	1524.07	1524.07	100	2	B	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0572	8	CN	25/07/2018	15:29	30	829.47	829.47	100	1	A	30
BS_SW_0573_a	8	CN	25/07/2018	15:48	45	767.55	767.55	100	1	B	45
BS_SW_0573_b	8	CN	25/07/2018	15:48	15	263.01	263.01	100	1	A	15
BS_SW_0574	8	CN	25/07/2018	16:14	60	2734.18	2734.18	100	1	B	60
BS_SW_0585	3	CN	25/07/2018	19:36	45	755.84	755.84	100	4	B	180
BS_SW_0552_a	4	CN	26/07/2018	09:24	15	298.11	298.11	100	1	B	15
BS_SW_0552_b	4	CN	26/07/2018	09:24	15	336.18	336.18	100	1	A	15
BS_SW_0552_c	4	CN	26/07/2018	09:24	15	210.54	210.54	100	1	B	15
BS_SW_0552_d	4	CN	26/07/2018	09:24	15	162.79	162.79	100	1	A	15
BS_SW_0554	4	CN	26/07/2018	09:52	45	796.66	796.66	100	3	A	135
BS_SW_0555	4	CN	26/07/2018	09:54	30	655.71	655.71	100	1	A	30
BS_SW_0556	4	CN	26/07/2018	10:11	45	892.25	892.25	100	1	A	45
BS_SW_0592	4	CN	27/07/2018	13:28	45	1201.04	1099.53	92	2	B	82
BS_SW_0593	4	CN	27/07/2018	13:28	60	872.41	728.62	84	2	B	100
BS_SW_0595_a	4	CN	27/07/2018	13:35	15	356.36	356.36	100	2	B	30
BS_SW_0595_b	4	CN	27/07/2018	13:35	15	230.52	230.52	100	2	A	30
BS_SW_0598	4	CN	27/07/2018	14:16	45	1095.79	1095.79	100	1	B	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0600	4	CN	27/07/2018	14:45	60	1016.14	994.04	98	2	B	117
BS_SW_0601	4	CN	27/07/2018	14:47	45	1054.42	1054.42	100	1	B	45
BS_SW_0603	4	CN	27/07/2018	15:32	30	360.12	360.12	100	3	A	90
BS_SW_0625	8	CN	30/07/2018	16:15	60	1150.60	1150.60	100	1	A	60
BS_SW_0626	8	CN	30/07/2018	16:17	45	887.77	887.77	100	5	A	225
BS_SW_0629	8	CN	30/07/2018	17:25	30	354.11	354.11	100	1	A	30
BS_SW_0684	8	CN	08/08/2018	13:58	15	159.35	159.35	100	2	A	30
BS_SW_0685	8	CN	08/08/2018	14:51	15	183.29	183.29	100	1	A	15
BS_SW_0686	8	CN	08/08/2018	15:00	15	182.64	182.64	100	1	A	15
BS_SW_0734	8	CN	13/08/2018	18:06	30	497.76	497.76	100	1	B	30

B.2b VP Flight Data: Common Tern – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0422_a	8	CN	09/05/2019	19:59	75	600.51	600.51	100	2	B	150
40001_VP_0422_b	8	CN	09/05/2019	19:59	15	439.72	439.72	100	2	A	30
40001_VP_0458	5	CN	11/05/2019	06:35	15	1081.19	1081.19	100	6	A	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0459	5	CN	11/05/2019	07:51	135	1244.72	1244.72	100	5	A	675
40001_VP_0462_a	5	CN	11/05/2019	08:10	90	828.09	828.09	100	11	A	990
40001_VP_0462_b	5	CN	11/05/2019	08:10	105	733.45	733.45	100	11	B	1155
40001_VP_0462_c	5	CN	11/05/2019	08:10	150	2502.09	2502.09	100	11	C	1650
40001_VP_0464_a	5	CN	11/05/2019	08:38	30	343.29	343.29	100	5	B	150
40001_VP_0464_b	5	CN	11/05/2019	08:38	30	648.07	648.07	100	5	A	150
40001_VP_0521	3	CN	19/06/2019	11:19	75	1787.34	1787.34	100	2	B	150
40001_VP_0530	3	CN	19/06/2019	11:56	75	2562.01	2354.32	92	1	C	69
40001_VP_0541	3	CN	19/06/2019	13:50	105	1115.83	1115.83	100	2	B	210
40001_VP_0607	8	CN	21/06/2019	12:00	90	1371.08	1371.08	100	1	B	90
40001_VP_0608_b	8	CN	21/06/2019	12:11	45	795.17	795.17	100	2	C	90
40001_VP_0611	8	CN	21/06/2019	12:39	60	718.15	718.15	100	1	B	60
40001_VP_0612	8	CN	21/06/2019	12:53	120	2303.76	2303.76	100	1	B	120
40001_VP_0613_a	8	CN	21/06/2019	12:53	60	686.57	686.57	100	1	B	60
40001_VP_0613_b	8	CN	21/06/2019	12:53	30	757.54	757.54	100	1	A	30
40001_VP_0614	8	CN	21/06/2019	12:59	75	1385.15	1385.15	100	9	A	675



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0619_a	8	CN	21/06/2019	14:15	15	422.57	422.57	100	1	B	15
40001_VP_0619_b	8	CN	21/06/2019	14:15	90	1949.36	1949.36	100	1	C	90
40001_VP_0621_a	8	CN	21/06/2019	14:38	90	782.25	782.25	100	2	B	180
40001_VP_0621_b	8	CN	21/06/2019	14:38	45	1801.39	1801.39	100	2	C	90
40001_VP_0622	8	CN	21/06/2019	14:38	60	265.19	265.19	100	1	B	60
40001_VP_0623_a	8	CN	21/06/2019	14:46	30	379.10	379.10	100	2	B	60
40001_VP_0623_b	8	CN	21/06/2019	14:46	75	849.35	849.35	100	2	C	150
40001_VP_0625_a	8	CN	21/06/2019	15:58	60	149.94	149.94	100	2	B	120
40001_VP_0625_b	8	CN	21/06/2019	15:58	15	148.87	148.87	100	2	A	30
40001_VP_0626	8	CN	21/06/2019	14:58	90	1965.79	1965.79	100	1	B	90
40001_VP_0548	3	CN	22/06/2019	19:09	75	1887.60	1887.60	100	5	C	375
40001_VP_0549	3	CN	22/06/2019	19:25	75	980.55	980.55	100	3	C	225
40001_VP_0550	3	CN	22/06/2019	19:33	60	497.06	497.06	100	1	B	60
40001_VP_0552	3	CN	22/06/2019	19:46	90	2159.13	2159.13	100	2	C	180
40001_VP_0555	3	CN	22/06/2019	20:02	75	1816.35	1816.35	100	2	C	150
40001_VP_0561	3	CN	22/06/2019	20:35	150	1658.30	1658.30	100	1	C	150



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0752	3	CN	22/06/2019	04:45	90	935.21	935.21	100	1	B	90
40001_VP_0755_a	3	CN	22/06/2019	05:10	30	785.56	785.56	100	1	B	30
40001_VP_0755_b	3	CN	22/06/2019	05:10	45	410.79	410.79	100	1	C	45
40001_VP_0758_a	3	CN	22/06/2019	05:24	30	744.91	744.91	100	3	B	90
40001_VP_0758_b	3	CN	22/06/2019	05:24	30	886.54	886.54	100	3	C	90
40001_VP_0758_c	3	CN	22/06/2019	05:24	30	521.61	521.61	100	3	B	90
40001_VP_0762_a	3	CN	22/06/2019	05:44	45	1229.13	1229.13	100	4	C	180
40001_VP_0765_a	3	CN	22/06/2019	05:53	30	701.65	701.65	100	1	C	30
40001_VP_0768_a	3	CN	22/06/2019	06:10	30	450.59	450.59	100	1	B	30
40001_VP_0768_b	3	CN	22/06/2019	06:10	75	372.20	372.20	100	1	C	75
40001_VP_0774_a	3	CN	22/06/2019	06:30	30	192.45	192.45	100	1	B	30
40001_VP_0774_b	3	CN	22/06/2019	06:30	45	404.53	404.53	100	1	C	45
40001_VP_0503	2	CN	23/06/2019	05:21	75	1292.90	1292.90	100	3	B	225
40001_VP_0506	2	CN	23/06/2019	05:50	90	1482.07	1482.07	100	1	B	90
40001_VP_0515_a	2	CN	23/06/2019	19:59	15	538.38	538.38	100	1	B	15
40001_VP_0515_b	2	CN	23/06/2019	19:59	45	458.62	458.62	100	1	C	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0515_c	2	CN	23/06/2019	19:59	15	396.90	396.90	100	1	B	15
40001_VP_0592	5	CN	23/06/2019	12:02	105	706.77	706.77	100	2	A	210
40001_VP_0593_a	5	CN	23/06/2019	12:09	15	814.77	814.77	100	1	A	15
40001_VP_0593_b	5	CN	23/06/2019	12:09	15	240.49	240.49	100	1	B	15
40001_VP_0593_c	5	CN	23/06/2019	12:09	30	573.82	573.82	100	1	A	30
40001_VP_0594	5	CN	23/06/2019	12:17	135	850.06	850.06	100	20	A	2700
40001_VP_0596	5	CN	23/06/2019	12:41	105	1039.94	1039.94	100	9	A	945
40001_VP_0598	5	CN	23/06/2019	12:55	75	1382.84	1382.84	100	25	A	1875
40001_VP_0599_a	5	CN	23/06/2019	13:18	15	493.28	493.28	100	3	B	45
40001_VP_0599_b	5	CN	23/06/2019	13:18	45	843.78	843.78	100	3	A	135
40001_VP_0600_a	5	CN	23/06/2019	13:28	45	687.17	687.17	100	2	C	90
40001_VP_0600_b	5	CN	23/06/2019	13:28	30	684.83	684.83	100	2	B	60
40001_VP_0600_c	5	CN	23/06/2019	13:28	30	337.68	337.68	100	2	A	60
40001_VP_0601_a	5	CN	23/06/2019	13:47	30	652.00	652.00	100	1	A	30
40001_VP_0601_b	5	CN	23/06/2019	13:47	45	464.75	464.75	100	1	B	45
40001_VP_0605_a	5	CN	23/06/2019	14:47	60	712.31	712.31	100	10	A	600



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0605_b	5	CN	23/06/2019	14:47	30	970.04	970.04	100	10	B	300
40001_VP_0606	5	CN	23/06/2019	15:58	90	1272.56	1272.56	100	1	A	90
40001_VP_0703	5	CN	24/06/2019	12:17	45	669.91	669.91	100	3	A	135
40001_VP_0705_a	5	CN	24/06/2019	12:32	60	659.43	659.43	100	10	B	600
40001_VP_0705_b	5	CN	24/06/2019	12:32	30	603.85	603.85	100	10	A	300
40001_VP_0706_a	5	CN	24/06/2019	12:55	30	219.33	219.33	100	7	B	210
40001_VP_0706_b	5	CN	24/06/2019	12:55	45	653.63	653.63	100	7	A	315
40001_VP_0709	5	CN	24/06/2019	13:09	45	646.96	646.96	100	9	A	405
40001_VP_0710	5	CN	24/06/2019	13:19	45	1079.59	1079.59	100	3	A	135
40001_VP_0716	5	CN	24/06/2019	14:10	135	576.37	576.37	100	1	A	135
40001_VP_0718	5	CN	24/06/2019	14:30	45	358.37	358.37	100	3	A	135
40001_VP_0721	5	CN	24/06/2019	14:55	75	1088.10	1088.10	100	5	A	375
40001_VP_0722_a	5	CN	24/06/2019	15:07	30	272.30	272.30	100	3	A	90
40001_VP_0722_b	5	CN	24/06/2019	15:07	30	775.42	775.42	100	3	B	90
40001_VP_0725	8	CN	06/07/2019	11:49	75	1003.87	1003.87	100	1	A	75
40001_VP_0726	8	CN	06/07/2019	12:03	45	613.64	613.64	100	2	A	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0727_a	8	CN	06/07/2019	12:26	60	731.71	731.71	100	1	B	60
40001_VP_0727_b	8	CN	06/07/2019	12:26	45	933.35	933.35	100	1	A	45
40001_VP_0728_a	8	CN	06/07/2019	12:31	105	1405.80	1405.80	100	1	B	105
40001_VP_0728_b	8	CN	06/07/2019	12:31	15	492.16	492.16	100	1	A	15
40001_VP_0729_a	8	CN	06/07/2019	12:39	15	1722.18	1722.18	100	1	B	15
40001_VP_0729_b	8	CN	06/07/2019	12:39	30	337.15	337.15	100	1	A	30
40001_VP_0730_a	8	CN	06/07/2019	12:39	15	238.30	238.30	100	1	B	15
40001_VP_0730_b	8	CN	06/07/2019	12:39	30	387.24	387.24	100	1	A	30
40001_VP_0732_a	8	CN	06/07/2019	12:57	105	445.52	445.52	100	6	B	630
40001_VP_0732_b	8	CN	06/07/2019	12:57	45	441.53	441.53	100	6	A	270
40001_VP_0735	8	CN	06/07/2019	13:18	105	2064.63	2064.63	100	4	C	420
40001_VP_0736_a	8	CN	06/07/2019	13:22	30	834.86	834.86	100	2	B	60
40001_VP_0736_b	8	CN	06/07/2019	13:22	30	293.22	293.22	100	2	A	60
40001_VP_0737	8	CN	06/07/2019	13:23	75	639.20	639.20	100	7	A	525
40001_VP_0741	8	CN	06/07/2019	13:45	45	597.87	597.87	100	1	A	45
40001_VP_0743_a	8	CN	06/07/2019	14:02	45	461.92	461.92	100	2	C	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0743_b	8	CN	06/07/2019	14:02	105	1622.29	1622.29	100	2	B	210
40001_VP_0744_a	8	CN	06/07/2019	14:11	30	1625.41	1625.41	100	2	C	60
40001_VP_0744_b	8	CN	06/07/2019	14:11	105	1662.81	1662.81	100	2	B	210
40001_VP_0745	8	CN	06/07/2019	14:11	45	764.51	764.51	100	1	A	45
40001_VP_0746_a	8	CN	06/07/2019	14:12	30	272.99	272.99	100	1	B	30
40001_VP_0746_b	8	CN	06/07/2019	14:12	105	1844.49	1844.49	100	1	A	105

B.3a VP Flight Data: Golden Eagle – Year 1 Breeding (February 2018 – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_187	3	EA	28/03/2018	12:36	75	1531.02	1531.02	100	1	B	75
BS_SW_0420_a	1	EA	03/04/2018	09:50	30	827.18	827.18	100	1	B	30
BS_SW_0420_b	1	EA	03/04/2018	09:50	45	1140.15	1140.15	100	1	C	45
BS_SW_0018_b	5	EA	10/04/2018	17:40	105	895.80	57.14	6	3	B	20
BS_SW_0020_a	5	EA	10/04/2018	18:25	75	690.23	215.05	31	1	B	23
BS_SW_0020_b	5	EA	10/04/2018	18:25	15	173.68	173.68	100	1	A	15
BS_SW_0021	5	EA	10/04/2018	18:58	30	298.73	298.73	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0054	8	EA	26/04/2018	12:35	45	184.25	184.25	100	1	A	45
BS_SW_0055_a	8	EA	26/04/2018	12:38	60	997.56	997.56	100	1	A	60
BS_SW_0055_b	8	EA	26/04/2018	12:38	135	1500.53	1500.53	100	1	B	135
BS_SW_0055_c	8	EA	26/04/2018	12:38	120	2029.36	2019.46	100	1	C	119
BS_SW_0056_a	8	EA	26/04/2018	14:40	135	3063.66	3063.66	100	1	B	135
BS_SW_0056_b	8	EA	26/04/2018	14:40	60	631.68	631.68	100	1	A	60
BS_SW_0109	2	EA	01/05/2018	07:50	45	762.86	762.86	100	1	A	45
BS_SW_0110_a	2	EA	01/05/2018	07:55	45	164.16	164.16	100	1	A	45
BS_SW_0110_b	2	EA	01/05/2018	07:55	60	583.21	583.21	100	1	B	60
BS_SW_0126	2	EA	02/05/2018	10:50	90	2910.80	2816.48	97	1	A	87
BS_SW_0127_a	2	EA	02/05/2018	11:30	45	623.67	623.67	100	1	A	45
BS_SW_0127_b	2	EA	02/05/2018	11:30	180	3297.91	3297.91	100	1	B	180
BS_SW_0128_b	2	EA	02/05/2018	12:54	90	2075.07	1398.09	67	1	C	61
BS_SW_0512	8	EA	07/05/2018	17:37	75	979.40	979.40	100	1	A	75
BS_SW_0513_a	8	EA	07/05/2018	17:46	15	188.09	188.09	100	1	A	15
BS_SW_0513_b	8	EA	07/05/2018	17:46	195	2191.67	2191.67	100	1	B	195
BS_SW_0513_c	8	EA	07/05/2018	17:46	75	1783.99	1783.99	100	1	C	75



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0518_a	1	EA	11/05/2018	12:09	75	2880.36	2880.36	100	1	C	75
BS_SW_0518_b	1	EA	11/05/2018	12:09	15	610.29	514.94	84	1	B	13
BS_SW_0159	3	EA	12/05/2018	19:13	120	1346.56	1346.56	100	1	B	120
BS_SW_0210	1	EA	24/05/2018	19:43	60	817.56	817.56	100	1	B	60
BS_SW_0211	1	EA	24/05/2018	20:07	30	335.76	335.76	100	1	A	30
BS_SW_0171_a	8	EA	10/06/2018	11:03	45	1145.99	1145.99	100	1	A	45
BS_SW_0171_b	8	EA	10/06/2018	11:03	90	2922.10	2922.10	100	1	B	90
BS_SW_0171_c	8	EA	10/06/2018	11:03	150	2670.31	2670.31	100	1	C	150
BS_SW_0304_a	1	EA	11/06/2018	11:55	30	418.04	418.04	100	1	B	30
BS_SW_0304_b	1	EA	11/06/2018	11:55	15	175.33	175.33	100	1	A	15
BS_SW_0305_a	1	EA	11/06/2018	11:56	15	282.10	282.10	100	1	A	15
BS_SW_0305_b	1	EA	11/06/2018	11:56	120	1051.55	1051.55	100	1	B	120
BS_SW_0567	8	EA	25/07/2018	14:43	15	133.34	133.34	100	1	A	15
BS_SW_0687_a	8	EA	08/08/2018	15:39	90	1060.49	1060.49	100	1	C	90
BS_SW_0696_b	3	EA	10/08/2018	16:55	30	574.60	574.60	100	1	C	30
BS_SW_0696_c	3	EA	10/08/2018	16:55	15	199.07	199.07	100	1	B	15
BS_SW_0842_a	3	EA	24/08/2018	11:20	180	1898.17	1898.17	100	1	C	180



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0842_c	3	EA	24/08/2018	11:20	90	2131.84	1986.15	93	1	C	84

B.3b VP Flight Data: Golden Eagle – Year 2 Breeding (February 2019 – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0155_a	2	EA	17/02/2019	11:09	60	370.32	370.32	100	1	A	60
40001_VP_0155_b	2	EA	17/02/2019	11:09	30	625.06	625.06	100	1	B	30
40001_VP_0155_c	2	EA	17/02/2019	11:09	45	456.71	456.71	100	1	A	45
40001_VP_0155_d	2	EA	17/02/2019	11:09	15	135.35	135.35	100	1	B	15
40001_VP_0155_e	2	EA	17/02/2019	11:09	15	889.73	889.73	100	1	A	15
40001_VP_0156_a	8	EA	17/02/2019	11:46	15	303.41	303.41	100	1	C	15
40001_VP_0156_b	8	EA	17/02/2019	11:46	195	2382.48	2382.48	100	1	B	195
40001_VP_0157_a	3	EA	18/02/2019	13:37	75	794.93	794.93	100	1	A	75
40001_VP_0159_a	3	EA	18/02/2019	14:44	75	341.70	341.70	100	1	A	75
40001_VP_0168	2	EA	21/02/2019	15:36	75	854.27	748.15	88	1	A	66
40001_VP_0188	1	EA	17/03/2019	09:29	270	3639.89	3639.89	100	1	B	270



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0195_b	3	EA	18/03/2019	13:58	30	303.18	303.18	100	1	C	30
40001_VP_0195_c	3	EA	18/03/2019	13:58	75	1596.76	1596.76	100	1	B	75
40001_VP_0195_d	3	EA	18/03/2019	13:58	210	2414.75	2414.75	100	1	C	210
40001_VP_0207_a	2	EA	21/03/2019	15:35	300	1978.86	1978.86	100	1	B	300
40001_VP_0207_b	2	EA	21/03/2019	15:35	60	462.38	462.38	100	1	C	60
40001_VP_0207_c	2	EA	21/03/2019	15:35	30	526.79	314.15	60	1	B	18
40001_VP_0212	1	EA	25/03/2019	10:14	660	17585.52	17268.32	98	1	B	648
40001_VP_0215	1	EA	25/03/2019	10:38	60	598.72	598.72	100	1	A	60
40001_VP_0216_a	1	EA	25/03/2019	11:03	375	4239.72	4239.72	100	1	B	375
40001_VP_0216_b	1	EA	25/03/2019	11:03	270	6017.96	6017.96	100	1	C	270
40001_VP_0219_a	2	EA	25/03/2019	14:10	510	5493.07	4135.30	75	1	B	384
40001_VP_0219_b	2	EA	25/03/2019	14:10	15	121.12	121.12	100	1	A	15
40001_VP_0256	8	EA	12/04/2019	12:10	120	1421.15	1421.15	100	1	C	120
40001_VP_0274_a	4	EA	14/04/2019	10:50	45	296.78	296.78	100	1	C	45
40001_VP_0274_b	4	EA	14/04/2019	10:50	105	767.61	767.61	100	1	B	105
40001_VP_0274_c	4	EA	14/04/2019	10:50	30	391.74	391.74	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0394	1	EA	08/05/2019	09:36	75	583.17	583.17	100	1	A	75
40001_VP_0395_a	1	EA	08/05/2019	09:39	240	3467.19	2501.50	72	1	A	173
40001_VP_0414_a	8	EA	09/05/2019	19:00	225	1465.58	1465.58	100	1	B	225
40001_VP_0414_b	8	EA	09/05/2019	19:00	150	1948.86	1948.86	100	1	C	150
40001_VP_0415	8	EA	09/05/2019	19:04	150	2072.95	2072.95	100	1	C	150
40001_VP_0428_a	8	EA	09/05/2019	15:36	135	1652.79	1020.44	62	1	C	83
40001_VP_0428_b	8	EA	09/05/2019	15:36	120	2595.83	2595.83	100	1	B	120
40001_VP_0445	3	EA	11/05/2019	17:47	75	1307.98	1307.98	100	1	A	75
40001_VP_0789_a	4	EA	17/06/2019	15:05	30	269.42	269.42	100	1	C	30
40001_VP_0659_b	14	EA	21/06/2019	06:28	15	168.93	168.93	100	1	C	15
40001_VP_0659_c	14	EA	21/06/2019	06:28	30	243.17	147.77	61	1	B	18
40001_VP_0547_b	3	EA	22/06/2019	19:09	60	766.33	766.33	100	1	C	60
40001_VP_0547_c	3	EA	22/06/2019	19:09	60	520.21	520.21	100	1	B	60
40001_VP_0704_b	5	EA	24/06/2019	12:23	180	2898.21	602.68	21	1	C	37
40001_VP_0704_c	5	EA	24/06/2019	12:23	45	1161.14	1056.20	91	1	B	41
40001_VP_0704_d	5	EA	24/06/2019	12:23	180	437.26	437.26	100	1	C	180



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0704_f	5	EA	24/06/2019	12:23	75	416.59	416.59	100	1	C	75
40001_VP_0704_g	5	EA	24/06/2019	12:23	45	739.80	739.80	100	1	B	45
40001_VP_0749	8	EA	06/07/2019	14:36	60	759.42	495.98	65	1	C	39
40001_VP_0471_a	14	EA	14/07/2019	13:00	45	2059.26	2059.26	100	1	C	45
40001_VP_0471_b	14	EA	14/07/2019	13:00	90	1334.49	1083.59	81	1	B	73
40001_VP_0471_c	14	EA	14/07/2019	13:00	30	194.76	39.49	20	1	A	6
40001_VP_0473_a	14	EA	14/07/2019	13:56	105	3152.06	3062.72	97	1	B	102
40001_VP_0473_b	14	EA	14/07/2019	13:56	180	2981.70	715.63	24	1	C	43
40001_VP_0479	5	EA	25/07/2019	11:07	60	1093.16	1093.16	100	1	C	60
40001_VP_1044	5	EA	13/08/2019	14:27	270	2677.31	1934.40	72	1	C	195
40001_VP_1045	5	EA	13/08/2019	16:49	150	3328.58	3328.58	100	1	C	150
40001_VP_1048	5	EA	13/08/2019	18:34	120	1580.17	1580.17	100	1	B	120
40001_VP_1055_a	2	EA	14/08/2019	12:33	45	565.60	565.60	100	1	B	45
40001_VP_1055_b	2	EA	14/08/2019	12:33	120	327.23	327.23	100	1	C	120
40001_VP_1056	14	EA	15/08/2019	09:00	300	3234.08	3234.08	100	2	C	600
40001_VP_1067_a	4	EA	21/08/2019	18:11	15	352.45	352.45	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1067_b	4	EA	21/08/2019	18:11	75	1571.07	1571.07	100	1	B	75
40001_VP_1067_c	4	EA	21/08/2019	18:11	30	253.54	253.54	100	1	A	30
40001_VP_1082_a	2	EA	22/08/2019	18:38	60	368.99	368.99	100	1	B	60
40001_VP_1082_b	2	EA	22/08/2019	18:38	15	83.53	83.53	100	1	A	15
40001_VP_1083_a	2	EA	22/08/2019	18:40	15	197.06	197.06	100	1	A	15
40001_VP_1083_b	2	EA	22/08/2019	18:40	150	638.91	638.91	100	1	B	150
40001_VP_1119	14	EA	25/08/2019	12:08	270	2989.20	1496.64	50	1	B	135

B.4a VP Flight Data: Golden Eagle – Year 1 Non-breeding (September 2017 – January 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_047	3	EA	14/10/2017	11:51	30	276.74	276.74	100	1	A	30
SW_048	3	EA	14/10/2017	12:04	90	917.54	917.54	100	1	B	90
SW_050	2	EA	16/10/2017	12:15	210	2003.72	1394.00	70	1	B	146
SW_059	1	EA	21/10/2017	13:10	375	2437.25	2437.25	100	1	C	375
SW_001	5	EA	30/10/2017	11:18	36	983.76	983.76	100	1	B	36



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_021_a	2	EA	02/11/2017	13:22	15	252.92	252.92	100	1	A	15
SW_021_b	2	EA	02/11/2017	13:22	225	1920.99	594.91	31	1	B	70
SW_074	2	EA	25/11/2017	13:45	45	637.54	237.08	37	1	B	17
SW_075_a	2	EA	25/11/2017	13:52	165	37.16	37.16	100	1	B	165
SW_075_b	2	EA	25/11/2017	13:52	15	3027.56	3027.56	100	1	A	15
SW_124	5	EA	14/01/2018	11:41	45	1248.29	1248.29	100	1	B	45
SW_108	5	EA	15/01/2018	13:15	15	263.96	263.96	100	1	B	15

B.4b VP Flight Data: Golden Eagle – Year 2 Non-breeding (September 2018 – January 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1187_a	1	EA	13/09/2018	12:51	120	1306.17	1306.17	100	1	B	120
BS_SW_1187_b	1	EA	13/09/2018	12:51	60	685.61	673.84	98	1	A	59
BS_SW_1196_a	3	EA	13/09/2018	17:10	30	252.51	252.51	100	1	A	30
BS_SW_1196_b	3	EA	13/09/2018	17:10	30	181.21	181.21	100	1	B	30
BS_SW_1196_c	3	EA	13/09/2018	17:10	15	129.47	87.95	68	1	A	10



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1223	1	EA	21/09/2018	11:03	15	836.36	455.53	54	1	A	8
BS_SW_1224_a	1	EA	21/09/2018	11:20	30	649.67	37.57	6	1	A	2
BS_SW_1224_b	1	EA	21/09/2018	11:20	180	3807.84	3807.84	100	1	B	180
BS_SW_1224_c	1	EA	21/09/2018	11:20	255	3035.80	3035.80	100	1	C	255
40001_VP_0011_a	2	EA	26/10/2018	08:57	15	212.94	212.94	100	1	A	15
40001_VP_0011_b	2	EA	26/10/2018	08:57	30	649.90	649.90	100	1	B	30
40001_VP_0011_c	2	EA	26/10/2018	08:57	30	391.96	391.96	100	1	A	30
40001_VP_0012	2	EA	26/10/2018	09:00	15	464.44	464.44	100	1	A	15
40001_VP_0015_a	8	EA	31/10/2018	12:16	30	1163.51	1163.51	100	1	B	30
40001_VP_0015_b	8	EA	31/10/2018	12:16	15	318.74	318.74	100	1	A	15
40001_VP_0029	8	EA	03/11/2018	13:56	210	608.55	61.46	10	1	B	21
40001_VP_0032	4	EA	06/11/2018	10:58	30	677.52	677.52	100	1	A	30
40001_VP_0033_a	4	EA	06/11/2018	11:07	45	225.64	225.64	100	1	A	45
40001_VP_0033_b	4	EA	06/11/2018	11:07	210	1423.74	662.78	47	1	B	98
40001_VP_0036	3	EA	06/11/2018	13:58	855	2847.30	1166.51	41	2	B	701
40001_VP_0073	3	EA	18/11/2018	14:22	210	3205.54	3205.54	100	1	B	210



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0094_a	2	EA	05/12/2018	09:16	30	439.97	439.97	100	1	A	30
40001_VP_0094_b	2	EA	05/12/2018	09:16	45	2290.33	2290.33	100	1	B	45
40001_VP_0094_c	2	EA	05/12/2018	09:16	30	242.62	242.62	100	1	A	30
40001_VP_0095	2	EA	05/12/2018	10:14	5	294.92	294.92	100	1	A	5
40001_VP_0096	2	EA	05/12/2018	12:05	30	1112.33	1102.92	99	1	A	30
40001_VP_0113	1	EA	19/12/2018	09:28	405	3175.07	3175.07	100	1	A	405
40001_VP_0120	5	EA	19/12/2018	12:13	45	1339.13	657.13	49	1	B	22
40001_VP_0128	8	EA	30/01/2019	13:04	70	1572.22	1572.22	100	1	B	70
40001_VP_0130_a	8	EA	31/01/2019	10:01	135	3093.63	3093.63	100	1	B	135
40001_VP_0130_b	8	EA	31/01/2019	10:01	20	330.17	330.17	100	1	B	20
40001_VP_0131	8	EA	31/01/2019	10:43	35	977.70	977.70	100	1	A	35
40001_VP_0132	8	EA	31/01/2019	10:43	35	939.89	939.89	100	1	A	35
40001_VP_0134	1	EA	25/01/2019	14:46	135	2838.00	2161.94	76	1	B	103
40001_VP_0139	2	EA	30/01/2019	10:46	270	6552.11	6552.11	100	1	B	270
40001_VP_0141	1	EA	31/01/2019	10:10	255	3536.58	2162.64	61	1	B	156
40001_VP_0142	1	EA	31/01/2019	10:20	165	1772.41	1772.41	100	1	B	165



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0143	1	EA	31/01/2019	11:14	135	4205.80	4205.80	100	2	B	270
40001_VP_0148_a	8	EA	17/01/2019	14:49	90	2672.27	1471.71	55	1	B	50

B.5a VP Flight Data: Golden Plover – Year 1 Breeding (March – July 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_180	1	GP	18/03/2018	13:30	30	582.82	326.23	56	5	A	84
BS_SW_0418	1	GP	03/04/2018	08:32	30	419.52	112.71	27	1	A	8
BS_SW_0425_a	2	GP	08/04/2018	09:22	30	266.55	266.55	100	1	A	30
BS_SW_0425_b	2	GP	08/04/2018	09:22	15	261.21	261.21	100	1	B	15
BS_SW_0425_c	2	GP	08/04/2018	09:22	15	434.22	434.22	100	1	A	15
BS_SW_0108_a	2	GP	01/05/2018	07:28	45	252.17	252.17	100	1	B	45
BS_SW_0108_b	2	GP	01/05/2018	07:28	90	359.49	359.49	100	1	C	90
BS_SW_0108_c	2	GP	01/05/2018	07:28	30	585.43	585.43	100	1	B	30
BS_SW_0108_d	2	GP	01/05/2018	07:28	15	188.80	188.80	100	1	A	15
BS_SW_0217	1	GP	24/05/2018	20:45	30	1228.02	876.03	71	1	B	21



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0218	1	GP	24/05/2018	20:46	30	724.04	724.04	100	1	B	30
BS_SW_0219	1	GP	24/05/2018	20:55	30	725.99	487.87	67	1	B	20
BS_SW_0168_a	2	GP	07/06/2018	16:25	45	487.58	114.04	23	1	B	11
BS_SW_0168_b	2	GP	07/06/2018	16:25	30	246.62	246.62	100	1	A	30
BS_SW_0175	8	GP	10/06/2018	13:29	60	1287.57	1287.57	100	2	B	120
BS_SW_0308	1	GP	11/06/2018	07:29	30	333.14	333.14	100	1	A	30

B.5b VP Flight Data: Golden Plover – Year 2 Breeding (March – July 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0209	1	GP	25/03/2019	09:36	15	624.55	523.35	84	2	A	25
40001_VP_0211	1	GP	25/03/2019	10:07	105	3301.29	3301.29	100	5	B	525
40001_VP_0214_a	1	GP	25/03/2019	10:37	15	263.48	263.48	100	1	A	15
40001_VP_0214_b	1	GP	25/03/2019	10:37	30	2001.32	2001.32	100	1	B	30
40001_VP_0214_c	1	GP	25/03/2019	10:37	15	230.70	230.70	100	1	A	15
40001_VP_0224	8	GP	26/03/2019	12:26	15	349.95	349.95	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0226	1	GP	27/03/2019	12:43	15	345.85	114.17	33	1	A	5
40001_VP_0351_a	4	GP	22/04/2019	18:50	45	884.93	884.01	100	1	A	45
40001_VP_0351_b	4	GP	22/04/2019	18:50	60	1258.67	1258.67	100	1	B	60
40001_VP_0352_a	4	GP	22/04/2019	18:50	45	986.29	986.29	100	1	A	45
40001_VP_0352_b	4	GP	22/04/2019	18:50	90	1222.79	1222.79	100	1	B	90
40001_VP_0353	4	GP	22/04/2019	18:51	60	1396.38	1396.38	100	2	B	120
40001_VP_0356	4	GP	22/04/2019	19:28	165	3794.60	3794.60	100	19	B	3135
40001_VP_0314	1	GP	15/05/2019	18:37	15	402.49	402.49	100	3	A	45
40001_VP_0316	1	GP	15/05/2019	18:56	30	278.27	278.27	100	1	A	30
40001_VP_0317	1	GP	15/05/2019	19:08	15	186.98	186.98	100	1	A	15
40001_VP_0336	1	GP	05/06/2019	07:25	15	201.12	201.12	100	1	A	15
40001_VP_0337	1	GP	05/06/2019	07:48	15	248.52	248.52	100	1	A	15
40001_VP_0338	1	GP	05/06/2019	08:14	15	239.84	239.84	100	1	A	15
40001_VP_0646	14	GP	20/06/2019	13:05	165	1976.51	1976.51	100	1	B	165
40001_VP_0669	14	GP	21/06/2019	07:04	45	621.79	140.40	23	1	A	10



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0519_a	2	GP	23/06/2019	21:44	30	1771.85	625.00	35	2	B	21
40001_VP_0810	5	GP	25/06/2019	09:05	30	1034.96	1034.96	100	3	B	90
40001_VP_0674	14	GP	03/07/2019	14:41	45	925.91	459.66	50	2	A	45
40001_VP_0675	14	GP	03/07/2019	14:49	75	1127.89	347.87	31	2	A	46
40001_VP_0680	14	GP	03/07/2019	15:35	75	866.01	48.71	6	2	A	8
40001_VP_0682	14	GP	03/07/2019	15:44	30	622.45	219.15	35	1	A	11
40001_VP_0819	2	GP	09/07/2019	20:20	45	2049.78	1634.15	80	3	B	108
40001_VP_0481	14	GP	27/07/2019	15:04	30	712.09	482.00	68	7	A	142
40001_VP_0824	14	GP	28/07/2019	14:05	30	1133.97	476.94	42	3	B	38

B.6a VP Flight Data: Great Skua – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0007_a	3	NX	10/04/2018	13:45	135	2051.91	2051.91	100	1	B	135
BS_SW_0007_b	3	NX	10/04/2018	13:45	45	533.31	533.31	100	1	C	45
BS_SW_0026	3	NX	25/04/2018	17:30	30	255.35	255.35	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0027_a	3	NX	25/04/2018	17:37	45	442.69	442.69	100	1	A	45
BS_SW_0027_b	3	NX	25/04/2018	17:37	105	1195.36	1195.36	100	1	B	105
BS_SW_0030_a	3	NX	25/04/2018	18:02	30	651.80	651.80	100	1	A	30
BS_SW_0030_b	3	NX	25/04/2018	18:02	45	744.10	744.10	100	1	B	45
BS_SW_0035	3	NX	25/04/2018	18:50	60	633.07	633.07	100	1	A	60
BS_SW_0036_a	3	NX	25/04/2018	19:03	30	430.87	430.87	100	1	A	30
BS_SW_0036_b	3	NX	25/04/2018	19:03	105	229.60	229.60	100	1	B	105
BS_SW_0036_c	3	NX	25/04/2018	19:03	30	526.84	526.84	100	1	C	30
BS_SW_0037	3	NX	25/04/2018	19:03	75	735.34	735.34	100	2	A	150
BS_SW_0043_a	3	NX	25/04/2018	19:25	30	260.91	260.91	100	1	A	30
BS_SW_0043_b	3	NX	25/04/2018	19:25	45	205.81	205.81	100	1	B	45
BS_SW_0043_c	3	NX	25/04/2018	19:25	15	86.83	86.83	100	1	A	15
BS_SW_0044	3	NX	25/04/2018	19:56	75	588.44	588.44	100	2	A	150
BS_SW_0053	8	NX	26/04/2018	12:34	30	693.81	693.81	100	1	A	30
BS_SW_0064_a	5	NX	27/04/2018	08:45	45	408.03	408.03	100	1	A	45
BS_SW_0064_b	5	NX	27/04/2018	08:45	60	1200.29	1200.29	100	1	B	60
BS_SW_0065	5	NX	27/04/2018	08:46	45	621.54	621.54	100	1	B	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0070_a	4	NX	27/04/2018	12:25	105	970.59	970.59	100	1	B	105
BS_SW_0070_b	4	NX	27/04/2018	12:25	15	78.67	78.67	100	1	A	15
BS_SW_0072_a	4	NX	27/04/2018	13:15	135	1511.82	1511.82	100	2	B	270
BS_SW_0072_b	4	NX	27/04/2018	13:15	90	1164.84	1164.84	100	2	C	180
BS_SW_0073	4	NX	27/04/2018	14:55	75	1240.95	1240.95	100	1	B	75
BS_SW_0085	3	NX	30/04/2018	06:42	30	409.62	409.62	100	1	A	30
BS_SW_0086	3	NX	30/04/2018	06:55	60	788.31	788.31	100	2	A	120
BS_SW_0089	3	NX	30/04/2018	07:28	45	752.75	752.75	100	3	A	135
BS_SW_0091	3	NX	30/04/2018	07:46	75	1308.62	1308.62	100	4	A	300
BS_SW_0099	3	NX	30/04/2018	09:01	30	304.56	304.56	100	1	A	30
BS_SW_0101	4	NX	30/04/2018	17:01	15	363.60	363.60	100	1	A	15
BS_SW_0102	4	NX	30/04/2018	17:22	15	276.39	276.39	100	1	A	15
BS_SW_0104_a	4	NX	30/04/2018	17:50	45	482.74	482.74	100	2	A	90
BS_SW_0104_b	4	NX	30/04/2018	17:50	60	1792.92	1792.92	100	2	B	120
BS_SW_0104_c	4	NX	30/04/2018	17:50	15	289.84	289.84	100	2	A	30
BS_SW_0105_a	4	NX	30/04/2018	18:16	30	917.78	917.78	100	2	A	60
BS_SW_0105_b	4	NX	30/04/2018	18:16	60	221.04	221.04	100	2	B	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0105_c	4	NX	30/04/2018	18:16	30	872.16	872.16	100	2	A	60
BS_SW_0107	4	NX	30/04/2018	19:35	30	275.70	275.70	100	1	A	30
BS_SW_0995	4	NX	30/04/2018	18:35	30	453.66	453.66	100	1	A	30
BS_SW_0130	8	NX	03/05/2018	14:10	45	800.81	800.81	100	1	A	45
BS_SW_0131	8	NX	03/05/2018	14:16	45	863.42	863.42	100	1	A	45
BS_SW_0132_a	8	NX	03/05/2018	14:25	105	3082.79	3082.79	100	1	A	105
BS_SW_0132_b	8	NX	03/05/2018	14:25	15	352.12	352.12	100	1	B	15
BS_SW_0132_c	8	NX	03/05/2018	14:25	15	279.08	279.08	100	1	A	15
BS_SW_0133	8	NX	03/05/2018	14:35	30	717.51	717.51	100	1	A	30
BS_SW_0134	8	NX	03/05/2018	14:36	30	373.19	373.19	100	1	A	30
BS_SW_0524	4	NX	05/05/2018	18:39	30	731.33	731.33	100	1	A	30
BS_SW_0525	4	NX	05/05/2018	18:51	45	1185.71	1185.71	100	1	B	45
BS_SW_0526	4	NX	05/05/2018	18:51	30	1155.20	1155.20	100	1	A	30
BS_SW_0533	3	NX	06/05/2018	18:54	30	944.60	944.60	100	2	B	60
BS_SW_0142	3	NX	12/05/2018	16:52	30	415.09	415.09	100	1	B	30
BS_SW_0143	3	NX	12/05/2018	16:53	30	159.57	159.57	100	1	A	30
BS_SW_0144_a	3	NX	12/05/2018	17:32	75	1540.27	1540.27	100	1	B	75



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0144_b	3	NX	12/05/2018	17:32	15	310.52	310.52	100	1	C	15
BS_SW_0145	3	NX	12/05/2018	17:41	15	213.15	213.15	100	1	A	15
BS_SW_0147	3	NX	12/05/2018	17:58	15	271.40	271.40	100	2	A	30
BS_SW_0148	3	NX	12/05/2018	18:03	15	163.83	163.83	100	1	A	15
BS_SW_0149	3	NX	12/05/2018	18:07	45	657.24	657.24	100	1	A	45
BS_SW_0150	3	NX	12/05/2018	18:08	15	191.81	191.81	100	1	A	15
BS_SW_0157	3	NX	12/05/2018	18:51	30	593.98	593.98	100	1	B	30
BS_SW_0158	3	NX	12/05/2018	19:00	30	281.24	281.24	100	1	A	30
BS_SW_0509	4	NX	22/05/2018	07:39	30	1001.51	1001.51	100	1	B	30
BS_SW_0510	4	NX	22/05/2018	07:44	45	752.98	752.98	100	1	A	45
BS_SW_0180_a	3	NX	24/05/2018	05:25	90	2358.80	2358.80	100	1	B	90
BS_SW_0180_b	3	NX	24/05/2018	05:25	15	306.19	306.19	100	1	A	15
BS_SW_0181_a	3	NX	24/05/2018	05:25	15	165.26	165.26	100	1	A	15
BS_SW_0181_b	3	NX	24/05/2018	05:25	30	1860.51	1860.51	100	1	B	30
BS_SW_0181_c	3	NX	24/05/2018	05:25	15	525.98	525.98	100	1	A	15
BS_SW_0182_a	3	NX	24/05/2018	05:26	15	1617.80	1617.80	100	1	A	15
BS_SW_0182_b	3	NX	24/05/2018	05:26	15	469.14	469.14	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0183	3	NX	24/05/2018	05:28	15	616.74	616.74	100	1	A	15
BS_SW_0185	3	NX	24/05/2018	05:34	45	989.91	989.91	100	3	A	135
BS_SW_0186	3	NX	24/05/2018	05:36	45	735.21	735.21	100	1	A	45
BS_SW_0188_a	3	NX	24/05/2018	05:40	15	568.95	568.95	100	1	A	15
BS_SW_0188_b	3	NX	24/05/2018	05:40	15	512.57	512.57	100	1	B	15
BS_SW_0190	3	NX	24/05/2018	05:43	15	732.48	732.48	100	1	B	15
BS_SW_0191	3	NX	24/05/2018	05:43	15	516.39	516.39	100	1	A	15
BS_SW_0194	3	NX	24/05/2018	06:16	30	1170.78	1170.78	100	1	A	30
BS_SW_0197	3	NX	24/05/2018	06:40	60	1698.33	1698.33	100	2	A	120
BS_SW_0198	3	NX	24/05/2018	06:45	75	351.43	351.43	100	2	A	150
BS_SW_0199	3	NX	24/05/2018	06:45	60	367.56	367.56	100	2	A	120
BS_SW_0200	3	NX	24/05/2018	06:45	60	201.12	201.12	100	2	A	120
BS_SW_0201	3	NX	24/05/2018	06:45	45	1283.76	1283.76	100	7	A	315
BS_SW_0202	3	NX	24/05/2018	06:46	15	1222.28	1222.28	100	1	A	15
BS_SW_0204_a	3	NX	24/05/2018	07:31	30	868.51	868.51	100	1	B	30
BS_SW_0204_b	3	NX	24/05/2018	07:31	15	177.66	177.66	100	1	A	15
BS_SW_0206_a	3	NX	24/05/2018	08:04	30	447.92	447.92	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0206_b	3	NX	24/05/2018	08:04	15	582.59	582.59	100	1	B	15
BS_SW_0207	1	NX	24/05/2018	19:32	30	657.08	619.84	94	1	B	28
BS_SW_0212_a	1	NX	24/05/2018	20:21	15	159.19	159.19	100	1	A	15
BS_SW_0212_b	1	NX	24/05/2018	20:21	30	326.26	326.26	100	1	B	30
BS_SW_0216	1	NX	24/05/2018	21:26	15	264.70	264.70	100	1	A	15
BS_SW_0167	2	NX	07/06/2018	16:10	60	2132.52	1199.25	56	1	C	34
BS_SW_0170_a	2	NX	07/06/2018	17:10	120	3570.45	3570.45	100	3	C	360
BS_SW_0174_a	8	NX	10/06/2018	13:15	135	2365.03	2365.03	100	1	B	135
BS_SW_0174_b	8	NX	10/06/2018	13:15	30	344.65	344.65	100	1	A	30
BS_SW_0178_a	8	NX	10/06/2018	13:42	135	2054.95	2054.95	100	1	B	135
BS_SW_0178_b	8	NX	10/06/2018	13:42	15	317.64	317.64	100	1	A	15
BS_SW_0309	1	NX	11/06/2018	08:02	60	1478.83	1478.83	100	1	B	60
BS_SW_0354	3	NX	18/06/2018	12:53	15	281.81	281.81	100	1	A	15
BS_SW_0355	3	NX	18/06/2018	12:59	30	481.24	481.24	100	1	A	30
BS_SW_0356_a	3	NX	18/06/2018	12:59	30	493.61	493.61	100	1	A	30
BS_SW_0356_b	3	NX	18/06/2018	12:59	30	479.18	479.18	100	1	B	30
BS_SW_0276_a	5	NX	21/06/2018	12:44	45	997.51	997.51	100	1	C	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0276_b	5	NX	21/06/2018	12:44	15	193.52	193.52	100	1	B	15
BS_SW_0283_a	8	NX	23/06/2018	19:10	60	1390.57	1390.57	100	5	B	300
BS_SW_0283_b	8	NX	23/06/2018	19:10	15	495.09	495.09	100	5	A	75
BS_SW_0284	8	NX	23/06/2018	19:18	120	1977.37	1977.37	100	2	A	240
BS_SW_0287	8	NX	23/06/2018	19:57	210	1915.43	1915.43	100	1	A	210
BS_SW_0370	1	NX	26/06/2018	18:00	30	1048.24	861.81	82	2	A	49
BS_SW_0299	8	NX	27/06/2018	05:30	45	1536.18	1536.18	100	1	A	45
BS_SW_0380	3	NX	27/06/2018	15:59	15	168.49	168.49	100	1	A	15
BS_SW_0381_a	3	NX	27/06/2018	16:09	15	613.99	613.99	100	1	B	15
BS_SW_0381_b	3	NX	27/06/2018	16:09	15	104.12	104.12	100	1	A	15
BS_SW_0382_a	3	NX	27/06/2018	16:37	15	134.65	134.65	100	3	A	45
BS_SW_0382_b	3	NX	27/06/2018	16:37	30	492.83	492.83	100	3	B	90
BS_SW_0382_c	3	NX	27/06/2018	16:37	15	126.34	126.34	100	3	A	45
BS_SW_0383_a	3	NX	27/06/2018	16:41	15	847.95	847.95	100	1	A	15
BS_SW_0383_b	3	NX	27/06/2018	16:41	45	1524.64	1524.64	100	1	B	45
BS_SW_0383_c	3	NX	27/06/2018	16:41	90	2215.13	2215.13	100	1	C	90
BS_SW_0386	3	NX	27/06/2018	16:46	15	196.03	196.03	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0387_a	3	NX	27/06/2018	17:17	15	561.28	561.28	100	1	A	15
BS_SW_0387_b	3	NX	27/06/2018	17:17	30	403.48	403.48	100	1	B	30
BS_SW_0388_a	3	NX	27/06/2018	17:36	15	544.06	544.06	100	1	C	15
BS_SW_0388_b	3	NX	27/06/2018	17:36	45	1827.74	1827.74	100	1	B	45
BS_SW_0389	3	NX	27/06/2018	17:56	60	1587.14	1587.14	100	1	A	60
BS_SW_0391	3	NX	27/06/2018	18:12	30	582.65	582.65	100	1	A	30
BS_SW_0392_a	3	NX	27/06/2018	18:13	15	121.37	121.37	100	2	A	30
BS_SW_0392_b	3	NX	27/06/2018	18:13	30	693.13	693.13	100	2	B	60
BS_SW_0392_c	3	NX	27/06/2018	18:13	15	555.66	555.66	100	2	C	30
BS_SW_0392_d	3	NX	27/06/2018	18:13	15	61.69	61.69	100	2	B	30
BS_SW_0392_e	3	NX	27/06/2018	18:13	15	76.04	76.04	100	2	A	30
BS_SW_0394	3	NX	27/06/2018	18:31	30	656.18	656.18	100	2	A	60
BS_SW_0395	3	NX	27/06/2018	18:36	15	380.19	380.19	100	1	A	15
BS_SW_0396	4	NX	29/06/2018	12:49	45	1960.22	1960.22	100	1	B	45
BS_SW_0397	4	NX	29/06/2018	13:08	30	881.29	881.29	100	1	C	30
BS_SW_0398_a	4	NX	29/06/2018	13:12	15	620.04	620.04	100	1	B	15
BS_SW_0398_b	4	NX	29/06/2018	13:12	15	269.24	269.24	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0399	4	NX	29/06/2018	13:42	45	2236.60	2236.60	100	1	B	45
BS_SW_0400_a	4	NX	29/06/2018	14:16	45	584.88	584.88	100	1	B	45
BS_SW_0400_b	4	NX	29/06/2018	14:16	15	602.58	602.58	100	1	A	15
BS_SW_0402	4	NX	29/06/2018	14:32	90	2016.07	2016.07	100	1	B	90
BS_SW_0403_a	4	NX	29/06/2018	14:43	15	190.97	190.97	100	2	B	30
BS_SW_0403_b	4	NX	29/06/2018	14:43	15	98.59	98.59	100	2	A	30
BS_SW_0403_c	4	NX	29/06/2018	14:43	15	181.85	181.85	100	2	B	30
BS_SW_0403_d	4	NX	29/06/2018	14:43	60	1216.42	1216.42	100	2	C	120
BS_SW_0403_f	4	NX	29/06/2018	14:43	120	418.69	418.69	100	2	C	240
BS_SW_0406_a	4	NX	29/06/2018	15:33	30	208.03	208.03	100	1	A	30
BS_SW_0406_b	4	NX	29/06/2018	15:33	45	444.20	444.20	100	1	B	45
BS_SW_0316	3	NX	30/06/2018	07:51	60	339.59	339.59	100	2	A	120
BS_SW_0321_a	3	NX	30/06/2018	08:32	75	1004.20	1004.20	100	1	B	75
BS_SW_0321_b	3	NX	30/06/2018	08:32	105	682.23	682.23	100	1	C	105
BS_SW_0323_a	3	NX	30/06/2018	08:52	60	932.90	932.90	100	1	A	60
BS_SW_0323_b	3	NX	30/06/2018	08:52	60	689.28	689.28	100	1	B	60
BS_SW_0323_c	3	NX	30/06/2018	08:52	15	133.99	133.99	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0324	3	NX	30/06/2018	08:59	30	238.36	238.36	100	1	A	30
BS_SW_0325	3	NX	30/06/2018	09:21	60	527.36	527.36	100	1	A	60
BS_SW_0327_a	3	NX	30/06/2018	09:48	30	363.11	363.11	100	1	A	30
BS_SW_0327_b	3	NX	30/06/2018	09:48	30	215.34	215.34	100	1	B	30
BS_SW_0328	3	NX	30/06/2018	09:53	60	828.10	828.10	100	1	A	60
BS_SW_0329	3	NX	30/06/2018	09:54	135	1635.98	1635.98	100	1	B	135
BS_SW_0330_a	3	NX	30/06/2018	09:59	30	226.78	226.78	100	3	B	90
BS_SW_0330_b	3	NX	30/06/2018	09:59	30	383.42	383.42	100	3	A	90
BS_SW_0331	3	NX	30/06/2018	10:02	75	747.31	747.31	100	2	A	150
BS_SW_0408	3	NX	05/07/2018	14:18	45	1418.47	1418.47	100	1	B	45
BS_SW_0409	3	NX	05/07/2018	14:20	60	1005.50	1005.50	100	1	A	60
BS_SW_0410	3	NX	05/07/2018	14:34	70	1134.70	1134.70	100	1	A	70
BS_SW_0411_a	3	NX	05/07/2018	14:48	45	1190.31	1190.31	100	2	C	90
BS_SW_0411_b	3	NX	05/07/2018	14:48	30	580.66	580.66	100	2	B	60
BS_SW_0411_c	3	NX	05/07/2018	14:48	45	813.41	813.41	100	2	C	90
BS_SW_0412	3	NX	05/07/2018	14:49	45	631.52	631.52	100	1	B	45
BS_SW_0413_a	3	NX	05/07/2018	15:17	15	157.52	157.52	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0413_b	3	NX	05/07/2018	15:17	45	655.25	655.25	100	2	B	90
BS_SW_0413_c	3	NX	05/07/2018	15:17	15	118.72	118.72	100	2	A	30
BS_SW_0414_a	3	NX	05/07/2018	15:22	30	275.85	275.85	100	1	A	30
BS_SW_0414_b	3	NX	05/07/2018	15:22	60	2370.30	2370.30	100	1	B	60
BS_SW_0415_a	3	NX	05/07/2018	15:41	150	4006.09	4006.09	100	1	A	150
BS_SW_0415_b	3	NX	05/07/2018	15:41	15	1175.17	1175.17	100	1	B	15
BS_SW_0416	3	NX	05/07/2018	16:28	90	1299.12	1299.12	100	1	B	90
BS_SW_0430	5	NX	09/07/2018	14:18	45	916.73	916.73	100	1	B	45
BS_SW_0456	5	NX	15/07/2018	10:31	45	1009.26	1009.26	100	1	A	45
BS_SW_0460_a	5	NX	15/07/2018	11:43	30	245.03	245.03	100	3	B	90
BS_SW_0460_b	5	NX	15/07/2018	11:43	15	287.71	287.71	100	3	A	45
BS_SW_0460_c	5	NX	15/07/2018	11:43	30	626.67	626.67	100	3	B	90
BS_SW_0466	8	NX	16/07/2018	09:57	105	1168.53	1168.53	100	1	A	105
BS_SW_0471_a	8	NX	16/07/2018	10:32	30	576.71	576.71	100	1	C	30
BS_SW_0475	8	NX	16/07/2018	10:52	15	564.53	564.53	100	1	A	15
BS_SW_0476	8	NX	16/07/2018	11:11	15	228.84	228.84	100	1	A	15
BS_SW_0486	4	NX	17/07/2018	10:04	30	452.67	452.67	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0487	4	NX	17/07/2018	10:06	90	1666.41	1666.41	100	2	A	180
BS_SW_0488	4	NX	17/07/2018	10:15	60	1335.94	1335.94	100	1	B	60
BS_SW_0490	4	NX	17/07/2018	11:22	45	1398.80	1398.80	100	1	A	45
BS_SW_0491_a	4	NX	17/07/2018	11:34	90	972.67	972.67	100	1	C	90
BS_SW_0491_b	4	NX	17/07/2018	11:34	15	312.11	312.11	100	1	B	15
BS_SW_0491_c	4	NX	17/07/2018	11:34	15	238.39	238.39	100	1	A	15
BS_SW_0494_a	4	NX	17/07/2018	12:18	15	220.97	220.97	100	1	A	15
BS_SW_0494_b	4	NX	17/07/2018	12:18	15	334.37	334.37	100	1	B	15
BS_SW_0494_c	4	NX	17/07/2018	12:18	15	541.35	541.35	100	1	A	15
BS_SW_0494_d	4	NX	17/07/2018	12:18	15	652.69	652.69	100	1	B	15
BS_SW_0562_a	8	NX	25/07/2018	14:03	15	173.99	173.99	100	3	B	45
BS_SW_0569_a	8	NX	25/07/2018	14:58	30	773.24	773.24	100	1	B	30
BS_SW_0569_b	8	NX	25/07/2018	14:58	15	505.03	505.03	100	1	A	15
BS_SW_0575	8	NX	25/07/2018	16:24	60	1500.07	1500.07	100	1	B	60
BS_SW_0576_a	3	NX	25/07/2018	17:58	60	592.20	592.20	100	1	B	60
BS_SW_0576_b	3	NX	25/07/2018	17:58	15	470.44	470.44	100	1	A	15
BS_SW_0577_a	3	NX	25/07/2018	18:28	60	328.80	328.80	100	2	B	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0577_b	3	NX	25/07/2018	18:28	15	457.92	457.92	100	2	A	30
BS_SW_0578	3	NX	25/07/2018	18:29	30	349.00	349.00	100	1	A	30
BS_SW_0579	3	NX	25/07/2018	18:34	30	685.78	685.78	100	1	A	30
BS_SW_0580	3	NX	25/07/2018	18:55	45	1395.93	1395.93	100	1	B	45
BS_SW_0582_a	3	NX	25/07/2018	19:13	30	561.29	561.29	100	1	A	30
BS_SW_0582_b	3	NX	25/07/2018	19:13	30	1005.23	1005.23	100	1	B	30
BS_SW_0582_c	3	NX	25/07/2018	19:13	30	261.06	261.06	100	1	A	30
BS_SW_0549_a	5	NX	26/07/2018	10:19	75	2242.53	2242.53	100	2	B	150
BS_SW_0549_b	5	NX	26/07/2018	10:19	90	484.23	484.23	100	2	A	180
BS_SW_0553	4	NX	26/07/2018	09:34	45	1302.04	1302.04	100	1	B	45
BS_SW_0557_a	4	NX	26/07/2018	10:33	45	1008.85	1008.85	100	1	B	45
BS_SW_0557_b	4	NX	26/07/2018	10:33	15	248.05	248.05	100	1	A	15
BS_SW_0558	4	NX	26/07/2018	10:57	45	857.08	857.08	100	1	B	45
BS_SW_0559_a	4	NX	26/07/2018	11:38	15	343.76	343.76	100	1	A	15
BS_SW_0559_b	4	NX	26/07/2018	11:38	15	322.91	322.91	100	1	B	15
BS_SW_0559_c	4	NX	26/07/2018	11:38	15	379.06	379.06	100	1	A	15
BS_SW_0591_a	4	NX	27/07/2018	13:24	15	220.50	220.50	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0591_b	4	NX	27/07/2018	13:24	45	1038.18	1038.18	100	1	B	45
BS_SW_0594_a	4	NX	27/07/2018	13:34	30	952.46	952.46	100	1	B	30
BS_SW_0594_b	4	NX	27/07/2018	13:34	15	219.76	219.76	100	1	A	15
BS_SW_0594_c	4	NX	27/07/2018	13:34	15	346.32	346.32	100	1	B	15
BS_SW_0596_a	4	NX	27/07/2018	13:36	15	150.29	150.29	100	1	A	15
BS_SW_0596_b	4	NX	27/07/2018	13:36	15	176.75	176.75	100	1	B	15
BS_SW_0596_c	4	NX	27/07/2018	13:36	15	346.56	346.56	100	1	A	15
BS_SW_0596_d	4	NX	27/07/2018	13:36	15	192.74	192.74	100	1	B	15
BS_SW_0597_a	4	NX	27/07/2018	13:44	15	321.71	321.71	100	1	B	15
BS_SW_0597_b	4	NX	27/07/2018	13:44	60	1473.27	1473.27	100	1	C	60
BS_SW_0599_a	4	NX	27/07/2018	14:38	30	372.96	372.96	100	1	B	30
BS_SW_0599_b	4	NX	27/07/2018	14:38	15	172.88	172.88	100	1	A	15
BS_SW_0602_a	4	NX	27/07/2018	15:02	75	1202.64	1202.64	100	1	B	75
BS_SW_0602_b	4	NX	27/07/2018	15:02	15	312.42	312.42	100	1	A	15
BS_SW_0604_a	4	NX	27/07/2018	15:43	15	363.19	363.19	100	4	B	60
BS_SW_0604_b	4	NX	27/07/2018	15:43	15	306.08	306.08	100	4	A	60
BS_SW_0604_c	4	NX	27/07/2018	15:43	15	247.03	247.03	100	4	B	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0604_d	4	NX	27/07/2018	15:43	15	251.61	251.61	100	4	A	60
BS_SW_0604_e	4	NX	27/07/2018	15:43	15	62.24	62.24	100	4	B	60
BS_SW_0604_f	4	NX	27/07/2018	15:43	15	66.33	66.33	100	4	A	60
BS_SW_0604_g	4	NX	27/07/2018	15:43	15	60.45	60.45	100	4	B	60
BS_SW_0604_h	4	NX	27/07/2018	15:43	15	237.15	237.15	100	4	A	60
BS_SW_0604_i	4	NX	27/07/2018	15:43	15	555.12	555.12	100	4	B	60
BS_SW_0604_j	4	NX	27/07/2018	15:43	15	514.66	514.66	100	4	A	60
BS_SW_0605_a	4	NX	28/07/2018	14:50	60	1056.39	1056.39	100	1	B	60
BS_SW_0605_b	4	NX	28/07/2018	14:50	15	281.34	281.34	100	1	A	15
BS_SW_0606_a	4	NX	28/07/2018	15:06	60	631.25	631.25	100	1	B	60
BS_SW_0606_b	4	NX	28/07/2018	15:06	30	318.62	318.62	100	1	A	30
BS_SW_0610	4	NX	28/07/2018	15:56	30	574.81	574.81	100	4	B	120
BS_SW_0613_a	4	NX	28/07/2018	16:33	30	965.85	965.85	100	1	B	30
BS_SW_0613_b	4	NX	28/07/2018	16:33	15	381.56	381.56	100	1	A	15
BS_SW_0614_a	4	NX	28/07/2018	16:50	15	133.94	133.94	100	4	A	60
BS_SW_0614_b	4	NX	28/07/2018	16:50	45	1831.22	1831.22	100	4	B	180
BS_SW_0614_c	4	NX	28/07/2018	16:50	15	220.30	220.30	100	4	A	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0615_a	4	NX	28/07/2018	16:52	15	192.85	192.85	100	1	A	15
BS_SW_0615_b	4	NX	28/07/2018	16:52	15	492.23	492.23	100	1	B	15
BS_SW_0615_c	4	NX	28/07/2018	16:52	30	326.98	326.98	100	1	A	30
BS_SW_0617_a	4	NX	28/07/2018	17:15	60	1585.52	1585.52	100	1	B	60
BS_SW_0617_b	4	NX	28/07/2018	17:15	30	239.45	239.45	100	1	A	30
BS_SW_0618_a	4	NX	28/07/2018	17:20	15	143.92	143.92	100	3	A	45
BS_SW_0618_b	4	NX	28/07/2018	17:20	60	509.93	509.93	100	3	B	180
BS_SW_0619_a	4	NX	28/07/2018	17:23	30	336.46	336.46	100	1	B	30
BS_SW_0619_b	4	NX	28/07/2018	17:23	15	84.32	84.32	100	1	A	15
BS_SW_0623	4	NX	28/07/2018	17:45	45	631.31	631.31	100	1	A	45
BS_SW_0624_a	8	NX	30/07/2018	16:05	60	1332.08	1332.08	100	2	B	120
BS_SW_0624_b	8	NX	30/07/2018	16:05	15	392.96	392.96	100	2	A	30
BS_SW_0627_a	8	NX	30/07/2018	16:50	60	1249.83	1249.83	100	1	B	60
BS_SW_0627_b	8	NX	30/07/2018	16:50	15	237.77	237.77	100	1	A	15
BS_SW_0630_a	8	NX	30/07/2018	17:55	60	1112.57	1112.57	100	1	B	60
BS_SW_0630_b	8	NX	30/07/2018	17:55	15	173.41	173.41	100	1	A	15
BS_SW_0632_a	8	NX	30/07/2018	18:10	15	637.89	637.89	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0632_b	8	NX	30/07/2018	18:10	45	807.28	807.28	100	2	B	90
BS_SW_0634_a	8	NX	30/07/2018	18:29	45	575.70	575.70	100	1	A	45
BS_SW_0634_b	8	NX	30/07/2018	18:29	30	302.31	302.31	100	1	B	30
BS_SW_0992	8	NX	30/07/2018	18:16	30	946.67	946.67	100	2	A	60
BS_SW_0644	1	NX	31/07/2018	08:51	45	1939.67	454.85	23	2	A	21
BS_SW_0650	3	NX	01/08/2018	08:02	30	275.76	275.76	100	1	A	30
BS_SW_0652	3	NX	01/08/2018	08:29	30	577.35	577.35	100	1	A	30
BS_SW_0653	3	NX	01/08/2018	08:35	30	422.11	422.11	100	1	A	30
BS_SW_0654	3	NX	01/08/2018	08:45	45	552.63	552.63	100	1	A	45
BS_SW_0657_a	3	NX	01/08/2018	09:31	60	1757.97	1757.97	100	3	B	180
BS_SW_0657_b	3	NX	01/08/2018	09:31	45	536.18	536.18	100	3	A	135
BS_SW_0658	3	NX	01/08/2018	09:41	60	1900.42	1900.42	100	2	A	120
BS_SW_0659	3	NX	01/08/2018	09:42	30	342.27	342.27	100	2	A	60
BS_SW_0663	3	NX	01/08/2018	10:11	60	728.86	728.86	100	2	A	120
BS_SW_0665	3	NX	01/08/2018	10:58	30	307.03	307.03	100	1	A	30
BS_SW_0674	2	NX	08/08/2018	14:14	75	889.20	889.20	100	1	B	75
BS_SW_0675	2	NX	08/08/2018	14:43	45	1868.86	1852.25	99	1	B	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0677	2	NX	08/08/2018	16:01	15	265.91	265.91	100	1	B	15
BS_SW_0678	2	NX	08/08/2018	16:04	60	1310.40	777.88	59	1	A	36
BS_SW_0679	8	NX	08/08/2018	13:15	15	157.07	157.07	100	1	A	15
BS_SW_0976	8	NX	08/08/2018	13:46	30	346.27	346.27	100	1	A	30
BS_SW_0688_a	3	NX	10/08/2018	14:46	15	272.67	272.67	100	2	C	30
BS_SW_0688_b	3	NX	10/08/2018	14:46	120	1908.44	1908.44	100	2	B	240
BS_SW_0689_a	3	NX	10/08/2018	15:03	240	4609.27	4609.27	100	1	B	240
BS_SW_0689_b	3	NX	10/08/2018	15:03	45	1598.95	1598.95	100	1	A	45
BS_SW_0693	3	NX	10/08/2018	16:02	15	142.82	142.82	100	1	A	15
BS_SW_0694	3	NX	10/08/2018	16:17	15	171.78	171.78	100	1	A	15
BS_SW_0695	3	NX	10/08/2018	16:48	45	776.66	776.66	100	1	A	45
BS_SW_0697	3	NX	10/08/2018	17:04	15	293.47	293.47	100	1	A	15
BS_SW_0698_a	3	NX	10/08/2018	17:11	15	202.55	202.55	100	1	A	15
BS_SW_0698_b	3	NX	10/08/2018	17:11	30	1045.22	1045.22	100	1	B	30
BS_SW_0700_a	3	NX	10/08/2018	17:16	150	1645.43	1645.43	100	2	B	300
BS_SW_0700_b	3	NX	10/08/2018	17:16	60	1230.61	1230.61	100	2	A	120
BS_SW_0701	3	NX	10/08/2018	17:30	30	940.34	940.34	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0702	3	NX	10/08/2018	17:40	45	922.01	922.01	100	1	A	45
BS_SW_0707	1	NX	12/08/2018	10:05	30	609.54	188.11	31	1	A	9
BS_SW_0708	1	NX	12/08/2018	10:09	15	150.82	150.82	100	1	A	15
BS_SW_0712	1	NX	12/08/2018	10:48	15	321.59	321.59	100	1	A	15
BS_SW_0714	1	NX	12/08/2018	11:17	45	756.67	5.82	1	1	A	0
BS_SW_0718_a	1	NX	12/08/2018	11:37	15	305.95	198.16	65	1	C	10
BS_SW_0718_b	1	NX	12/08/2018	11:37	45	648.22	648.22	100	1	B	45
BS_SW_0718_c	1	NX	12/08/2018	11:37	15	192.35	192.35	100	1	A	15
BS_SW_0719_a	1	NX	12/08/2018	11:46	75	2003.63	2003.63	100	1	B	75
BS_SW_0719_b	1	NX	12/08/2018	11:46	30	323.53	323.53	100	1	A	30
BS_SW_0720	1	NX	12/08/2018	12:04	45	662.33	662.33	100	1	A	45
BS_SW_0722_a	1	NX	12/08/2018	13:29	90	1723.12	1723.12	100	1	C	90
BS_SW_0722_b	1	NX	12/08/2018	13:29	45	560.48	560.48	100	1	B	45
BS_SW_0722_c	1	NX	12/08/2018	13:29	30	344.65	344.65	100	1	A	30
BS_SW_0723_a	1	NX	12/08/2018	13:49	45	766.91	757.21	99	1	B	44
BS_SW_0723_b	1	NX	12/08/2018	13:49	15	258.94	258.94	100	1	A	15
BS_SW_0724_a	1	NX	12/08/2018	13:50	30	423.78	423.78	100	1	B	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0724_b	1	NX	12/08/2018	13:50	15	165.44	165.44	100	1	A	15
BS_SW_0728	1	NX	12/08/2018	14:53	105	2506.59	2506.59	100	1	B	105
BS_SW_0729_a	1	NX	12/08/2018	14:53	15	262.73	262.73	100	1	B	15
BS_SW_0729_b	1	NX	12/08/2018	14:53	15	268.26	268.26	100	1	A	15
BS_SW_0731_a	1	NX	12/08/2018	15:13	30	486.85	380.25	78	1	B	23
BS_SW_0731_b	1	NX	12/08/2018	15:13	75	1118.02	1118.02	100	1	C	75
BS_SW_0736_a	8	NX	13/08/2018	18:11	15	191.43	191.43	100	1	A	15
BS_SW_0736_b	8	NX	13/08/2018	18:11	30	321.69	321.69	100	1	B	30
BS_SW_0736_c	8	NX	13/08/2018	18:11	15	214.04	214.04	100	1	A	15
BS_SW_0738_a	8	NX	13/08/2018	18:20	60	601.18	601.18	100	1	C	60
BS_SW_0738_b	8	NX	13/08/2018	18:20	30	505.87	505.87	100	1	B	30
BS_SW_0738_c	8	NX	13/08/2018	18:20	15	448.26	448.26	100	1	A	15
BS_SW_0740_a	8	NX	13/08/2018	18:45	60	767.07	767.07	100	1	B	60
BS_SW_0740_b	8	NX	13/08/2018	18:45	15	162.11	162.11	100	1	A	15
BS_SW_0752_a	4	NX	13/08/2018	14:05	45	780.54	780.54	100	1	B	45
BS_SW_0752_b	4	NX	13/08/2018	14:05	15	424.99	424.99	100	1	A	15
BS_SW_0753_a	4	NX	13/08/2018	14:10	15	241.41	241.41	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0753_b	4	NX	13/08/2018	14:10	30	697.99	697.99	100	2	B	60
BS_SW_0753_c	4	NX	13/08/2018	14:10	15	218.18	218.18	100	2	A	30
BS_SW_0755	4	NX	13/08/2018	14:22	225	3527.35	3527.35	100	4	B	900
BS_SW_0757	4	NX	13/08/2018	14:30	30	395.29	395.29	100	2	A	60
BS_SW_0760	4	NX	13/08/2018	14:53	30	899.09	899.09	100	2	A	60
BS_SW_0761_a	4	NX	13/08/2018	14:56	45	597.78	597.78	100	1	A	45
BS_SW_0761_b	4	NX	13/08/2018	14:56	45	799.68	799.68	100	1	B	45
BS_SW_0761_c	4	NX	13/08/2018	14:56	60	1332.48	1332.48	100	1	A	60
BS_SW_0762	4	NX	13/08/2018	14:58	30	540.16	540.16	100	2	A	60
BS_SW_0763_a	4	NX	13/08/2018	15:10	45	880.46	880.46	100	1	B	45
BS_SW_0763_b	4	NX	13/08/2018	15:10	45	1011.34	1011.34	100	1	A	45
BS_SW_0763_c	4	NX	13/08/2018	15:10	60	944.47	944.47	100	1	B	60
BS_SW_0763_d	4	NX	13/08/2018	15:10	90	2009.18	2009.18	100	1	C	90
BS_SW_0764	4	NX	13/08/2018	15:30	30	562.61	562.61	100	1	B	30
BS_SW_0769	4	NX	13/08/2018	16:23	30	605.97	605.97	100	1	A	30
BS_SW_0771	4	NX	13/08/2018	16:40	30	409.44	409.44	100	1	B	30
BS_SW_0774	4	NX	14/08/2018	10:22	15	260.00	260.00	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0777	4	NX	14/08/2018	10:45	30	489.50	489.50	100	1	A	30
BS_SW_0778	4	NX	14/08/2018	10:47	15	170.90	170.90	100	1	A	15
BS_SW_0779	4	NX	14/08/2018	10:47	30	1097.89	1097.89	100	1	B	30
BS_SW_0780_a	4	NX	14/08/2018	11:19	30	430.11	430.11	100	1	B	30
BS_SW_0780_b	4	NX	14/08/2018	11:19	15	498.65	498.65	100	1	A	15
BS_SW_0780_c	4	NX	14/08/2018	11:19	30	546.02	546.02	100	1	B	30
BS_SW_0781	4	NX	14/08/2018	11:21	45	1293.28	1293.28	100	3	B	135
BS_SW_0782_a	4	NX	14/08/2018	11:27	15	387.89	387.89	100	2	B	30
BS_SW_0782_b	4	NX	14/08/2018	11:27	15	295.45	295.45	100	2	A	30
BS_SW_0783	4	NX	14/08/2018	11:38	210	2745.28	2745.28	100	2	B	420
BS_SW_0785	4	NX	14/08/2018	11:50	60	1034.78	1034.78	100	1	A	60
BS_SW_0786	4	NX	14/08/2018	11:57	30	792.27	792.27	100	1	A	30
BS_SW_0787	4	NX	14/08/2018	12:01	45	392.43	392.43	100	1	A	45
BS_SW_0789	4	NX	14/08/2018	12:08	30	591.64	591.64	100	1	A	30
BS_SW_0791	4	NX	14/08/2018	12:14	45	375.33	375.33	100	2	A	90
BS_SW_0795_a	4	NX	14/08/2018	12:44	15	375.52	375.52	100	1	B	15
BS_SW_0795_b	4	NX	14/08/2018	12:44	15	327.33	327.33	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0796	4	NX	14/08/2018	12:48	105	2005.96	2005.96	100	2	B	210
BS_SW_0798_a	4	NX	14/08/2018	12:57	45	542.24	542.24	100	1	A	45
BS_SW_0798_b	4	NX	14/08/2018	12:57	15	620.47	620.47	100	1	B	15
BS_SW_0798_c	4	NX	14/08/2018	12:57	30	678.98	678.98	100	1	A	30
BS_SW_0804	8	NX	15/08/2018	11:40	15	313.12	313.12	100	1	A	15
BS_SW_0809	8	NX	15/08/2018	12:16	30	567.02	567.02	100	1	A	30
BS_SW_0810_a	2	NX	15/08/2018	10:22	60	978.74	978.74	100	1	C	60
BS_SW_0810_b	2	NX	15/08/2018	10:22	30	337.28	337.28	100	1	B	30
BS_SW_0810_c	2	NX	15/08/2018	10:22	30	859.03	859.03	100	1	A	30
BS_SW_0810_d	2	NX	15/08/2018	10:22	30	521.57	521.57	100	1	B	30
BS_SW_0810_e	2	NX	15/08/2018	10:22	90	1318.41	1318.41	100	1	C	90
BS_SW_0810_f	2	NX	15/08/2018	10:22	45	691.79	610.76	88	1	B	40
BS_SW_0811_a	2	NX	15/08/2018	11:26	30	769.42	769.42	100	2	C	60
BS_SW_0811_b	2	NX	15/08/2018	11:26	15	573.14	573.14	100	2	B	30
BS_SW_0811_c	2	NX	15/08/2018	11:26	30	917.56	917.56	100	2	C	60
BS_SW_0811_d	2	NX	15/08/2018	11:26	15	775.41	775.41	100	2	B	30
BS_SW_0813	2	NX	15/08/2018	12:06	45	902.76	902.76	100	2	B	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0817	3	NX	17/08/2018	07:25	30	569.67	569.67	100	1	A	30
BS_SW_0818	3	NX	17/08/2018	07:48	30	588.58	588.58	100	2	A	60
BS_SW_0819	3	NX	17/08/2018	08:15	75	1264.77	1264.77	100	1	A	75
BS_SW_0820	3	NX	17/08/2018	08:27	30	654.30	654.30	100	1	A	30
BS_SW_0821	3	NX	17/08/2018	08:37	60	1174.08	1174.08	100	1	A	60
BS_SW_0822_a	3	NX	17/08/2018	09:04	60	1045.79	1045.79	100	2	C	120
BS_SW_0822_b	3	NX	17/08/2018	09:04	45	769.69	769.69	100	2	B	90
BS_SW_0823	3	NX	17/08/2018	09:36	60	850.36	850.36	100	1	A	60
BS_SW_0276_c	5	NX	21/08/2018	12:44	15	293.72	293.72	100	1	A	15
BS_SW_0825_a	5	NX	22/08/2018	14:20	135	1779.58	1779.58	100	2	B	270
BS_SW_0825_b	5	NX	22/08/2018	14:20	15	69.31	69.31	100	2	A	30
BS_SW_0826_a	5	NX	22/08/2018	14:28	120	1790.86	1790.86	100	4	B	480
BS_SW_0826_b	5	NX	22/08/2018	14:28	75	2349.63	2349.63	100	4	C	300
BS_SW_0827_a	5	NX	22/08/2018	14:32	30	352.21	352.21	100	2	B	60
BS_SW_0827_b	5	NX	22/08/2018	14:32	45	465.06	465.06	100	2	A	90
BS_SW_0828_a	5	NX	22/08/2018	14:45	60	903.10	903.10	100	2	B	120
BS_SW_0828_b	5	NX	22/08/2018	14:45	45	871.67	871.67	100	2	A	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0840	3	NX	24/08/2018	10:32	45	722.79	722.79	100	1	A	45
BS_SW_0841	3	NX	24/08/2018	10:55	60	655.89	655.89	100	2	A	120
BS_SW_0844	3	NX	24/08/2018	11:41	75	1127.67	1127.67	100	1	A	75
BS_SW_0845_a	3	NX	24/08/2018	12:14	45	708.93	708.93	100	2	A	90
BS_SW_0845_b	3	NX	24/08/2018	12:14	30	464.15	464.15	100	2	B	60
BS_SW_0845_c	3	NX	24/08/2018	12:14	30	245.45	245.45	100	2	A	60
BS_SW_0846_a	3	NX	24/08/2018	12:48	15	247.07	247.07	100	1	A	15
BS_SW_0846_b	3	NX	24/08/2018	12:48	120	998.08	998.08	100	1	B	120
BS_SW_0846_c	3	NX	24/08/2018	12:48	15	100.72	100.72	100	1	A	15
BS_SW_0847_a	3	NX	24/08/2018	12:57	15	108.25	108.25	100	1	A	15
BS_SW_0847_b	3	NX	24/08/2018	12:57	30	490.01	490.01	100	1	B	30
BS_SW_0847_c	3	NX	24/08/2018	12:57	30	92.30	92.30	100	1	A	30
BS_SW_0850_a	4	NX	25/08/2018	19:15	30	260.75	260.75	100	1	A	30
BS_SW_0850_b	4	NX	25/08/2018	19:15	30	603.46	603.46	100	1	B	30
BS_SW_0850_c	4	NX	25/08/2018	19:15	15	127.80	127.80	100	1	A	15
BS_SW_0400_c	4	NX	0218-06-29	14:16	45	617.25	617.25	100	1	B	45



B.6b VP Flight Data: Great Skua – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0247_a	8	NX	12/04/2019	09:48	75	2054.74	2054.74	100	1	B	75
40001_VP_0247_b	8	NX	12/04/2019	09:48	15	318.00	318.00	100	1	A	15
40001_VP_0250	8	NX	12/04/2019	10:17	75	2617.12	2617.12	100	2	C	150
40001_VP_0253_a	8	NX	12/04/2019	10:58	60	1513.93	1513.93	100	2	B	120
40001_VP_0253_b	8	NX	12/04/2019	10:58	75	452.15	452.15	100	2	C	150
40001_VP_0255_a	8	NX	12/04/2019	12:02	105	1479.73	1479.73	100	2	C	210
40001_VP_0255_b	8	NX	12/04/2019	12:02	30	175.06	175.06	100	2	B	60
40001_VP_0257	8	NX	12/04/2019	12:15	105	1969.80	1969.80	100	1	C	105
40001_VP_0260_a	2	NX	12/04/2019	11:10	45	731.56	731.56	100	2	B	90
40001_VP_0260_b	2	NX	12/04/2019	11:10	15	606.61	606.61	100	2	C	30
40001_VP_0268	4	NX	14/04/2019	09:01	30	769.59	769.59	100	1	B	30
40001_VP_0269_a	4	NX	14/04/2019	09:11	15	360.03	360.03	100	1	B	15
40001_VP_0269_b	4	NX	14/04/2019	09:11	15	186.10	186.10	100	1	A	15
40001_VP_0269_c	4	NX	14/04/2019	09:11	15	277.46	277.46	100	1	B	15
40001_VP_0273_a	4	NX	14/04/2019	09:48	135	3405.00	3405.00	100	2	B	270



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0273_b	4	NX	14/04/2019	09:48	15	117.64	117.64	100	2	A	30
40001_VP_0279	4	NX	14/04/2019	11:58	30	338.97	338.97	100	1	A	30
40001_VP_0281_a	4	NX	14/04/2019	12:36	45	319.21	319.21	100	1	B	45
40001_VP_0281_b	4	NX	14/04/2019	12:36	15	172.41	94.74	55	1	A	8
40001_VP_0282_a	4	NX	14/04/2019	13:06	45	640.96	640.96	100	1	B	45
40001_VP_0282_b	4	NX	14/04/2019	13:06	30	247.80	247.80	100	1	A	30
40001_VP_0283_a	4	NX	14/04/2019	13:55	60	1247.87	1247.87	100	1	B	60
40001_VP_0283_b	4	NX	14/04/2019	13:55	120	1985.59	1985.59	100	1	C	120
40001_VP_0284_a	4	NX	14/04/2019	14:15	135	2190.05	2190.05	100	1	B	135
40001_VP_0284_b	4	NX	14/04/2019	14:15	30	136.78	136.78	100	1	A	30
40001_VP_0298_a	3	NX	15/04/2019	17:45	30	936.58	936.58	100	1	A	30
40001_VP_0298_b	3	NX	15/04/2019	17:45	15	252.08	252.08	100	1	B	15
40001_VP_0298_c	3	NX	15/04/2019	17:45	15	120.10	120.10	100	1	A	15
40001_VP_0299_a	3	NX	15/04/2019	17:52	30	370.02	370.02	100	2	B	60
40001_VP_0299_b	3	NX	15/04/2019	17:52	30	745.38	745.38	100	2	A	60
40001_VP_0299_c	3	NX	15/04/2019	17:52	15	364.51	364.51	100	2	B	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0300_a	3	NX	15/04/2019	18:27	15	953.50	953.50	100	2	B	30
40001_VP_0300_b	3	NX	15/04/2019	18:27	30	194.45	194.45	100	2	A	60
40001_VP_0301	3	NX	15/04/2019	18:31	30	652.01	652.01	100	2	A	60
40001_VP_0302_a	3	NX	15/04/2019	18:57	60	1043.32	1043.32	100	2	A	120
40001_VP_0302_b	3	NX	15/04/2019	18:57	15	457.53	457.53	100	2	B	30
40001_VP_0302_c	3	NX	15/04/2019	18:57	15	305.44	305.44	100	2	A	30
40001_VP_0302_d	3	NX	15/04/2019	18:57	15	406.35	406.35	100	2	B	30
40001_VP_0302_e	3	NX	15/04/2019	18:57	30	560.64	560.64	100	2	A	60
40001_VP_0308	8	NX	16/04/2019	14:10	75	1233.36	1233.36	100	1	B	75
40001_VP_0350	4	NX	22/04/2019	18:47	60	1241.22	1241.22	100	1	A	60
40001_VP_0357	4	NX	22/04/2019	19:40	30	267.80	267.80	100	1	A	30
40001_VP_0358	4	NX	22/04/2019	19:44	120	1987.04	1987.04	100	1	A	120
40001_VP_0359	3	NX	24/04/2019	14:39	45	718.26	718.26	100	2	A	90
40001_VP_0360	3	NX	24/04/2019	14:48	75	1236.28	1236.28	100	5	A	375
40001_VP_0361	3	NX	24/04/2019	14:54	105	3169.17	3169.17	100	1	B	105
40001_VP_0362	3	NX	24/04/2019	15:14	15	225.11	225.11	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0363	3	NX	24/04/2019	15:14	75	1248.02	1248.02	100	1	A	75
40001_VP_0364	3	NX	24/04/2019	15:27	105	1993.01	1993.01	100	1	A	105
40001_VP_0365	3	NX	24/04/2019	15:52	90	1020.35	1020.35	100	1	A	90
40001_VP_0366	3	NX	24/04/2019	15:54	15	114.26	114.26	100	1	A	15
40001_VP_0367	3	NX	24/04/2019	15:59	15	192.11	192.11	100	1	A	15
40001_VP_0368	3	NX	24/04/2019	16:16	15	438.03	438.03	100	1	A	15
40001_VP_0369	3	NX	24/04/2019	16:16	30	545.64	545.64	100	1	A	30
40001_VP_0370_a	3	NX	24/04/2019	16:35	30	860.46	860.46	100	1	B	30
40001_VP_0370_b	3	NX	24/04/2019	16:35	15	508.14	508.14	100	1	A	15
40001_VP_0371	3	NX	24/04/2019	16:41	75	1470.62	1470.62	100	1	A	75
40001_VP_0372	3	NX	24/04/2019	16:41	150	2386.67	2386.67	100	1	A	150
40001_VP_0374	3	NX	24/04/2019	16:52	45	1377.16	1377.16	100	1	B	45
40001_VP_0375	3	NX	24/04/2019	16:57	150	2905.06	2905.06	100	1	A	150
40001_VP_0376_a	3	NX	24/04/2019	17:03	105	2199.40	2199.40	100	1	B	105
40001_VP_0376_b	3	NX	24/04/2019	17:03	30	508.41	508.41	100	2	A	60
40001_VP_0378	3	NX	07/05/2019	09:22	30	398.46	398.46	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0381	3	NX	07/05/2019	09:46	110	438.48	438.48	100	1	B	110
40001_VP_0383	3	NX	07/05/2019	10:03	15	309.37	309.37	100	1	A	15
40001_VP_0384	3	NX	07/05/2019	10:21	30	425.87	425.87	100	1	A	30
40001_VP_0386	3	NX	07/05/2019	10:50	345	2274.16	2274.16	100	1	B	345
40001_VP_0387_a	3	NX	07/05/2019	11:03	45	630.53	630.53	100	1	A	45
40001_VP_0387_b	3	NX	07/05/2019	11:03	45	515.77	515.77	100	1	B	45
40001_VP_0389_a	3	NX	07/05/2019	11:26	405	2306.34	2306.34	100	1	B	405
40001_VP_0389_b	3	NX	07/05/2019	11:26	60	1761.24	1761.24	100	1	C	60
40001_VP_0390	3	NX	07/05/2019	11:54	30	389.72	389.72	100	1	A	30
40001_VP_0391	3	NX	07/05/2019	11:58	45	750.06	750.06	100	1	A	45
40001_VP_0398	1	NX	08/05/2019	11:22	105	2829.49	2829.49	100	1	A	105
40001_VP_0399	1	NX	08/05/2019	14:06	60	1172.52	871.36	74	1	A	45
40001_VP_0400_a	1	NX	08/05/2019	14:29	45	500.57	500.57	100	1	B	45
40001_VP_0400_b	1	NX	08/05/2019	14:29	60	481.12	481.12	100	1	A	60
40001_VP_0400_c	1	NX	08/05/2019	14:29	30	590.95	590.95	100	1	B	30
40001_VP_0400_d	1	NX	08/05/2019	14:29	45	393.08	393.08	100	1	A	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0401_a	1	NX	08/05/2019	14:29	60	583.02	583.02	100	2	A	120
40001_VP_0401_b	1	NX	08/05/2019	14:29	45	409.93	409.93	100	2	B	90
40001_VP_0401_c	1	NX	08/05/2019	14:29	45	558.96	558.96	100	2	A	90
40001_VP_0402	8	NX	09/05/2019	17:10	15	393.01	393.01	100	2	A	30
40001_VP_0404_a	8	NX	09/05/2019	17:24	30	122.11	122.11	100	1	A	30
40001_VP_0404_b	8	NX	09/05/2019	17:24	15	418.95	418.95	100	1	B	15
40001_VP_0405_a	8	NX	09/05/2019	17:33	15	715.20	715.20	100	2	A	30
40001_VP_0405_b	8	NX	09/05/2019	17:33	30	647.95	647.95	100	2	B	60
40001_VP_0406_a	8	NX	09/05/2019	17:36	150	4093.09	4093.09	100	1	B	150
40001_VP_0406_b	8	NX	09/05/2019	17:36	90	494.69	494.69	100	1	A	90
40001_VP_0407	8	NX	09/05/2019	17:50	90	2059.27	2059.27	100	1	A	90
40001_VP_0408	8	NX	09/05/2019	17:51	30	727.27	727.27	100	1	A	30
40001_VP_0409	8	NX	09/05/2019	17:54	165	2181.37	2181.37	100	2	B	330
40001_VP_0410	8	NX	09/05/2019	17:58	195	1498.46	1498.46	100	2	B	390
40001_VP_0411_a	8	NX	09/05/2019	18:08	90	985.87	985.87	100	2	B	180
40001_VP_0411_b	8	NX	09/05/2019	18:08	60	172.86	172.86	100	2	A	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0417_a	8	NX	09/05/2019	19:25	30	302.96	302.96	100	1	A	30
40001_VP_0417_b	8	NX	09/05/2019	19:25	90	674.26	674.26	100	1	B	90
40001_VP_0417_c	8	NX	09/05/2019	19:25	30	406.29	406.29	100	1	A	30
40001_VP_0418	8	NX	09/05/2019	19:38	90	1847.30	1847.30	100	1	A	90
40001_VP_0419	8	NX	09/05/2019	19:38	150	1663.11	1663.11	100	1	A	150
40001_VP_0425_a	8	NX	09/05/2019	15:50	315	5199.44	5199.44	100	1	B	315
40001_VP_0425_b	8	NX	09/05/2019	15:50	135	2390.59	2390.59	100	1	C	135
40001_VP_0425_c	8	NX	09/05/2019	15:50	150	4471.02	4471.02	100	1	B	150
40001_VP_0425_d	8	NX	09/05/2019	15:50	180	1207.61	1207.61	100	1	C	180
40001_VP_0426_a	8	NX	09/05/2019	15:57	120	1892.87	1892.87	100	1	B	120
40001_VP_0426_b	8	NX	09/05/2019	16:57	165	852.55	852.55	100	1	C	165
40001_VP_0429	8	NX	09/05/2019	15:51	60	871.66	871.66	100	1	A	60
40001_VP_0431_a	8	NX	09/05/2019	16:21	15	32.57	32.57	100	2	A	30
40001_VP_0431_b	8	NX	09/05/2019	16:21	135	2165.03	2165.03	100	2	B	270
40001_VP_0431_c	8	NX	09/05/2019	16:21	165	1486.94	1043.49	70	2	C	232
40001_VP_0432	2	NX	10/05/2019	18:49	90	1740.95	1740.95	100	1	A	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0433_a	2	NX	10/05/2019	19:11	30	772.86	772.86	100	1	B	30
40001_VP_0433_b	2	NX	10/05/2019	19:11	30	1175.82	1175.82	100	1	C	30
40001_VP_0437	2	NX	10/05/2019	20:20	60	798.72	798.72	100	1	A	60
40001_VP_0438	2	NX	10/05/2019	20:28	60	1547.22	882.46	57	1	B	34
40001_VP_0439	3	NX	11/05/2019	17:17	30	500.50	500.50	100	1	A	30
40001_VP_0440	3	NX	11/05/2019	17:26	15	236.18	236.18	100	1	A	15
40001_VP_0441	3	NX	11/05/2019	17:27	45	726.76	726.76	100	1	A	45
40001_VP_0443	3	NX	11/05/2019	17:38	75	725.19	725.19	100	2	A	150
40001_VP_0444	3	NX	11/05/2019	17:38	120	1739.76	1739.76	100	2	A	240
40001_VP_0446	3	NX	11/05/2019	17:52	60	804.95	804.95	100	2	A	120
40001_VP_0447	3	NX	11/05/2019	18:12	75	1553.82	1553.82	100	1	A	75
40001_VP_0449	3	NX	11/05/2019	18:39	45	804.35	804.35	100	2	A	90
40001_VP_0450	3	NX	11/05/2019	18:39	120	2470.99	2470.99	100	1	A	120
40001_VP_0451	3	NX	11/05/2019	18:45	105	742.79	742.79	100	2	A	210
40001_VP_0452	3	NX	11/05/2019	18:45	75	972.53	972.53	100	1	A	75
40001_VP_0453	3	NX	11/05/2019	18:48	135	1382.37	1382.37	100	1	A	135



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0454	3	NX	11/05/2019	19:15	30	264.74	264.74	100	1	A	30
40001_VP_0455_a	3	NX	11/05/2019	19:37	90	379.29	379.29	100	1	A	90
40001_VP_0455_b	3	NX	11/05/2019	19:37	30	824.23	824.23	100	1	B	30
40001_VP_0455_c	3	NX	11/05/2019	19:37	45	193.21	193.21	100	1	A	45
40001_VP_0456_a	3	NX	11/05/2019	19:37	90	447.89	447.89	100	1	A	90
40001_VP_0456_b	3	NX	11/05/2019	19:37	45	846.02	846.02	100	1	B	45
40001_VP_0309	4	NX	13/05/2019	18:34	60	1160.05	1160.05	100	1	A	60
40001_VP_0310	4	NX	13/05/2019	18:36	105	1076.17	1076.17	100	2	A	210
40001_VP_0311	4	NX	13/05/2019	19:37	30	481.73	481.73	100	2	A	60
40001_VP_0322	3	NX	17/05/2019	07:49	15	186.50	186.50	100	1	A	15
40001_VP_0323	3	NX	17/05/2019	07:54	15	232.87	232.87	100	1	A	15
40001_VP_0324	3	NX	17/05/2019	07:58	15	178.35	178.35	100	1	A	15
40001_VP_0327	3	NX	17/05/2019	08:40	30	336.93	336.93	100	1	A	30
40001_VP_0330	3	NX	17/05/2019	09:10	30	677.48	677.48	100	1	B	30
40001_VP_0691	5	NX	03/06/2019	19:02	45	699.58	699.58	100	2	A	90
40001_VP_0694	5	NX	03/06/2019	19:38	150	6818.95	5329.81	78	2	B	234



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0342	4	NX	06/06/2019	18:09	15	419.57	419.57	100	1	A	15
40001_VP_0343	4	NX	06/06/2019	19:06	30	1008.19	1008.19	100	1	A	30
40001_VP_0344	4	NX	06/06/2019	19:09	15	550.53	550.53	100	1	A	15
40001_VP_0701	8	NX	09/06/2019	09:55	45	1025.13	944.01	92	1	A	41
40001_VP_0345_a	4	NX	10/06/2019	08:06	15	296.65	296.65	100	1	B	15
40001_VP_0345_b	4	NX	10/06/2019	08:06	15	376.05	376.05	100	1	A	15
40001_VP_0345_c	4	NX	10/06/2019	08:06	15	911.21	911.21	100	1	B	15
40001_VP_0346	4	NX	10/06/2019	10:22	15	1197.81	1197.81	100	1	A	15
40001_VP_0788_a	4	NX	17/06/2019	15:00	15	243.28	243.28	100	1	A	15
40001_VP_0788_b	4	NX	17/06/2019	15:00	15	623.52	623.52	100	1	B	15
40001_VP_0788_c	4	NX	17/06/2019	15:00	15	53.64	53.64	100	1	A	15
40001_VP_0790_a	4	NX	17/06/2019	15:09	45	360.23	360.23	100	1	B	45
40001_VP_0790_b	4	NX	17/06/2019	15:09	30	751.21	751.21	100	1	A	30
40001_VP_0790_c	4	NX	17/06/2019	15:09	30	479.85	479.85	100	1	B	30
40001_VP_0791_a	4	NX	17/06/2019	15:11	30	403.76	403.76	100	1	B	30
40001_VP_0791_b	4	NX	17/06/2019	15:11	15	666.83	666.83	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0791_c	4	NX	17/06/2019	15:11	15	303.41	303.41	100	1	B	15
40001_VP_0792_a	4	NX	17/06/2019	15:27	30	354.48	354.48	100	1	A	30
40001_VP_0792_b	4	NX	17/06/2019	15:27	60	352.08	352.08	100	1	B	60
40001_VP_0792_c	4	NX	17/06/2019	15:27	30	375.44	375.44	100	1	A	30
40001_VP_0793_a	4	NX	17/06/2019	16:09	45	395.59	395.59	100	1	B	45
40001_VP_0793_b	4	NX	17/06/2019	16:09	60	1748.92	1748.92	100	1	C	60
40001_VP_0794_a	4	NX	17/06/2019	16:14	30	255.37	255.37	100	2	A	60
40001_VP_0794_b	4	NX	17/06/2019	16:14	30	337.14	337.14	100	2	B	60
40001_VP_0794_c	4	NX	17/06/2019	16:14	30	836.63	836.63	100	2	A	60
40001_VP_0795_a	4	NX	17/06/2019	16:29	60	527.92	527.92	100	2	B	120
40001_VP_0795_b	4	NX	17/06/2019	16:29	30	506.86	506.86	100	2	A	60
40001_VP_0796_a	4	NX	17/06/2019	16:36	30	268.75	268.75	100	1	B	30
40001_VP_0796_b	4	NX	17/06/2019	16:36	165	1163.03	1163.03	100	1	C	165
40001_VP_0797_b	4	NX	17/06/2019	16:37	90	311.46	311.46	100	1	C	90
40001_VP_0799_a	4	NX	17/06/2019	17:00	60	305.44	305.44	100	1	B	60
40001_VP_0799_b	4	NX	17/06/2019	17:00	30	337.07	337.07	100	1	A	30

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0800_a	4	NX	17/06/2019	17:12	15	219.36	219.36	100	1	A	15
40001_VP_0800_b	4	NX	17/06/2019	17:12	60	532.78	532.78	100	1	B	60
40001_VP_0800_c	4	NX	17/06/2019	17:12	75	293.19	293.19	100	1	A	75
40001_VP_0801_a	4	NX	17/06/2019	17:22	60	424.57	424.57	100	1	B	60
40001_VP_0801_b	4	NX	17/06/2019	17:22	105	1076.53	1076.53	100	1	C	105
40001_VP_0802	4	NX	17/06/2019	17:22	180	1617.46	1617.46	100	1	B	180
40001_VP_0628_a	14	NX	18/06/2019	17:38	15	88.15	53.41	61	1	B	9
40001_VP_0628_b	14	NX	18/06/2019	17:38	120	773.67	773.67	100	1	A	120
40001_VP_0628_c	14	NX	18/06/2019	17:38	45	708.80	708.80	100	1	B	45
40001_VP_0628_d	14	NX	18/06/2019	17:38	45	231.08	231.08	100	1	A	45
40001_VP_0636_a	14	NX	18/06/2019	12:30	60	572.23	572.23	100	3	B	180
40001_VP_0636_b	14	NX	18/06/2019	12:30	30	571.60	571.60	100	3	A	90
40001_VP_0637_a	14	NX	18/06/2019	12:42	30	703.37	703.37	100	2	B	60
40001_VP_0637_b	14	NX	18/06/2019	12:42	15	97.64	97.64	100	2	A	30
40001_VP_0638_a	14	NX	18/06/2019	12:43	30	854.92	854.92	100	1	B	30
40001_VP_0638_b	14	NX	18/06/2019	12:43	30	170.59	170.59	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0639_a	14	NX	18/06/2019	14:08	60	2075.07	2075.07	100	1	B	60
40001_VP_0639_b	14	NX	18/06/2019	14:08	30	126.75	126.75	100	1	A	30
40001_VP_0641_a	14	NX	18/06/2019	14:45	90	1031.95	1031.95	100	1	B	90
40001_VP_0641_b	14	NX	18/06/2019	14:45	60	547.80	547.80	100	1	A	60
40001_VP_0642_a	14	NX	18/06/2019	15:15	60	936.97	936.97	100	1	B	60
40001_VP_0642_b	14	NX	18/06/2019	15:15	30	266.74	266.74	100	1	A	30
40001_VP_0642_c	14	NX	18/06/2019	15:15	60	530.32	530.32	100	1	B	60
40001_VP_0642_d	14	NX	18/06/2019	15:15	15	320.80	320.80	100	1	C	15
40001_VP_0642_e	14	NX	18/06/2019	15:15	60	956.18	956.18	100	1	B	60
40001_VP_0642_f	14	NX	18/06/2019	15:15	15	185.09	185.09	100	1	A	15
40001_VP_0520	3	NX	19/06/2019	11:15	45	604.15	604.15	100	1	A	45
40001_VP_0522	3	NX	19/06/2019	11:19	75	980.44	980.44	100	2	A	150
40001_VP_0523_a	3	NX	19/06/2019	11:24	45	1121.53	1121.53	100	1	B	45
40001_VP_0523_b	3	NX	19/06/2019	11:24	60	715.76	715.76	100	1	A	60
40001_VP_0524_a	3	NX	19/06/2019	11:29	30	407.60	407.60	100	1	B	30
40001_VP_0524_b	3	NX	19/06/2019	11:29	30	438.67	438.67	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0524_c	3	NX	19/06/2019	11:29	30	459.19	459.19	100	1	B	30
40001_VP_0524_d	3	NX	19/06/2019	11:29	15	423.75	423.75	100	1	A	15
40001_VP_0525_a	3	NX	19/06/2019	11:29	45	984.11	984.11	100	1	B	45
40001_VP_0525_b	3	NX	19/06/2019	11:29	30	342.64	342.64	100	1	A	30
40001_VP_0526	3	NX	19/06/2019	11:40	60	1796.82	1796.82	100	1	B	60
40001_VP_0527_a	3	NX	19/06/2019	11:45	165	2315.51	2315.51	100	1	B	165
40001_VP_0527_b	3	NX	19/06/2019	11:45	15	69.95	69.95	100	1	A	15
40001_VP_0528_a	3	NX	19/06/2019	11:45	135	2461.88	2461.88	100	1	B	135
40001_VP_0528_b	3	NX	19/06/2019	11:45	45	196.33	196.33	100	1	A	45
40001_VP_0529	3	NX	19/06/2019	11:49	60	1248.21	1248.21	100	1	A	60
40001_VP_0531_a	3	NX	19/06/2019	12:00	60	1787.15	1787.15	100	1	B	60
40001_VP_0531_b	3	NX	19/06/2019	12:00	30	100.19	100.19	100	1	A	30
40001_VP_0532_a	3	NX	19/06/2019	12:01	45	590.20	590.20	100	1	A	45
40001_VP_0532_b	3	NX	19/06/2019	12:01	15	99.80	99.80	100	1	B	15
40001_VP_0532_c	3	NX	19/06/2019	12:01	15	118.76	118.76	100	1	A	15
40001_VP_0533_a	3	NX	19/06/2019	12:10	30	1039.78	1039.78	100	1	C	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0533_b	3	NX	19/06/2019	12:10	45	221.53	221.53	100	1	B	45
40001_VP_0534	3	NX	19/06/2019	12:24	120	1728.46	1728.46	100	2	B	240
40001_VP_0535_a	3	NX	19/06/2019	12:30	45	665.70	665.70	100	1	B	45
40001_VP_0535_b	3	NX	19/06/2019	12:30	30	1244.49	1244.49	100	1	A	30
40001_VP_0536	3	NX	19/06/2019	12:48	60	1034.23	1034.23	100	1	B	60
40001_VP_0537_a	3	NX	19/06/2019	12:55	30	498.36	498.36	100	2	B	60
40001_VP_0537_b	3	NX	19/06/2019	12:55	45	1146.11	1146.11	100	2	A	90
40001_VP_0538_a	3	NX	19/06/2019	13:05	60	562.93	562.93	100	1	A	60
40001_VP_0538_b	3	NX	19/06/2019	13:05	30	1073.72	1073.72	100	1	B	30
40001_VP_0538_c	3	NX	19/06/2019	13:05	15	286.90	286.90	100	1	A	15
40001_VP_0540_a	3	NX	19/06/2019	13:32	45	475.87	475.87	100	1	A	45
40001_VP_0540_b	3	NX	19/06/2019	13:32	30	560.87	560.87	100	1	B	30
40001_VP_0542_a	3	NX	19/06/2019	13:50	15	276.54	276.54	100	3	B	45
40001_VP_0542_b	3	NX	19/06/2019	13:50	30	764.27	764.27	100	3	A	90
40001_VP_0543	3	NX	19/06/2019	13:57	45	361.51	361.51	100	1	A	45
40001_VP_0578_a	4	NX	19/06/2019	05:45	60	435.17	435.17	100	1	B	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0578_a	4	NX	19/06/2019	05:45	60	988.67	988.67	100	1	B	60
40001_VP_0578_b	4	NX	19/06/2019	05:45	30	235.21	235.21	100	1	A	30
40001_VP_0578_c	4	NX	19/06/2019	05:45	60	544.99	544.99	100	1	B	60
40001_VP_0584_a	4	NX	19/06/2019	07:10	45	534.37	534.37	100	1	A	45
40001_VP_0584_b	4	NX	19/06/2019	07:10	30	343.91	343.91	100	1	B	30
40001_VP_0584_c	4	NX	19/06/2019	07:10	15	129.60	129.60	100	1	A	15
40001_VP_0585_a	4	NX	19/06/2019	07:12	45	672.82	672.82	100	1	A	45
40001_VP_0585_b	4	NX	19/06/2019	07:12	15	203.10	203.10	100	1	B	15
40001_VP_0585_c	4	NX	19/06/2019	07:12	30	192.92	192.92	100	1	A	30
40001_VP_0587_a	4	NX	19/06/2019	07:38	15	333.18	333.18	100	1	B	15
40001_VP_0587_b	4	NX	19/06/2019	07:38	30	300.19	300.19	100	1	A	30
40001_VP_0587_c	4	NX	19/06/2019	07:38	30	223.61	223.61	100	1	B	30
40001_VP_0588_a	4	NX	19/06/2019	07:40	30	447.12	447.12	100	1	B	30
40001_VP_0588_b	4	NX	19/06/2019	07:40	30	561.94	561.94	100	1	A	30
40001_VP_0589_a	4	NX	19/06/2019	07:45	90	801.91	801.91	100	1	B	90
40001_VP_0589_b	4	NX	19/06/2019	07:45	30	1358.01	1358.01	100	1	C	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0589_c	4	NX	19/06/2019	07:45	15	588.69	588.69	100	1	B	15
40001_VP_0589_d	4	NX	19/06/2019	07:45	30	192.25	192.25	100	1	A	30
40001_VP_0643_a	14	NX	20/06/2019	12:48	60	1750.81	1294.19	74	1	B	44
40001_VP_0643_b	14	NX	20/06/2019	12:48	30	153.57	153.57	100	1	A	30
40001_VP_0644_a	14	NX	20/06/2019	12:58	30	1727.23	1727.23	100	1	B	30
40001_VP_0644_b	14	NX	20/06/2019	12:58	30	312.56	312.56	100	1	A	30
40001_VP_0645_a	14	NX	20/06/2019	12:58	75	1594.17	1594.17	100	1	B	75
40001_VP_0645_b	14	NX	20/06/2019	12:58	45	491.32	491.32	100	1	A	45
40001_VP_0647_b	14	NX	20/06/2019	13:25	15	285.20	164.48	58	1	A	9
40001_VP_0647_c	14	NX	20/06/2019	13:25	30	1423.93	1423.93	100	1	B	30
40001_VP_0647_d	14	NX	20/06/2019	13:25	30	127.91	127.91	100	1	A	30
40001_VP_0648_a	14	NX	20/06/2019	13:45	45	1026.97	1026.97	100	1	B	45
40001_VP_0648_b	14	NX	20/06/2019	13:45	15	391.85	391.85	100	1	A	15
40001_VP_0649_a	14	NX	20/06/2019	13:50	15	862.75	862.75	100	1	B	15
40001_VP_0649_b	14	NX	20/06/2019	13:50	15	370.24	370.24	100	1	A	15
40001_VP_0649_c	14	NX	20/06/2019	13:50	15	432.21	432.21	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0650_a	14	NX	20/06/2019	13:50	15	95.65	95.65	100	1	B	15
40001_VP_0650_b	14	NX	20/06/2019	13:50	15	382.77	382.77	100	1	A	15
40001_VP_0650_c	14	NX	20/06/2019	13:50	60	1058.83	1058.83	100	1	B	60
40001_VP_0650_d	14	NX	20/06/2019	13:50	60	960.80	960.80	100	1	A	60
40001_VP_0650_e	14	NX	20/06/2019	13:50	60	994.96	994.96	100	1	B	60
40001_VP_0650_f	14	NX	20/06/2019	13:50	45	222.28	222.28	100	1	A	45
40001_VP_0651_a	14	NX	20/06/2019	14:20	30	696.91	696.91	100	1	B	30
40001_VP_0651_b	14	NX	20/06/2019	14:20	60	382.67	382.67	100	1	A	60
40001_VP_0620_a	8	NX	21/06/2019	14:20	30	332.22	332.22	100	2	A	60
40001_VP_0620_b	8	NX	21/06/2019	14:20	30	794.93	794.93	100	2	B	60
40001_VP_0620_c	8	NX	21/06/2019	14:20	30	355.69	355.69	100	2	A	60
40001_VP_0620_d	8	NX	21/06/2019	14:20	75	1267.98	1267.98	100	2	B	150
40001_VP_0620_e	8	NX	21/06/2019	14:20	15	419.33	419.33	100	2	A	30
40001_VP_0657	14	NX	21/06/2019	05:59	45	1464.14	1194.30	82	1	B	37
40001_VP_0665_a	14	NX	21/06/2019	07:45	30	1136.28	1136.28	100	4	B	120
40001_VP_0665_b	14	NX	21/06/2019	07:45	30	955.68	955.68	100	4	C	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0665_c	14	NX	21/06/2019	07:45	45	612.89	612.89	100	4	B	180
40001_VP_0544	3	NX	22/06/2019	19:00	30	353.07	353.07	100	1	A	30
40001_VP_0545_a	3	NX	22/06/2019	19:00	45	1171.42	1171.42	100	1	B	45
40001_VP_0545_b	3	NX	22/06/2019	19:00	30	376.62	376.62	100	1	A	30
40001_VP_0546_a	3	NX	22/06/2019	19:03	75	1719.60	1719.60	100	1	C	75
40001_VP_0556_a	3	NX	22/06/2019	20:05	30	492.76	492.76	100	1	B	30
40001_VP_0556_b	3	NX	22/06/2019	20:05	75	1006.48	1006.48	100	1	A	75
40001_VP_0557	3	NX	22/06/2019	20:05	60	1098.00	1098.00	100	1	A	60
40001_VP_0559_a	3	NX	22/06/2019	20:25	30	593.75	593.75	100	2	B	60
40001_VP_0559_b	3	NX	22/06/2019	20:25	15	103.78	103.78	100	2	A	30
40001_VP_0563	3	NX	22/06/2019	20:53	30	329.93	329.93	100	1	A	30
40001_VP_0564	3	NX	22/06/2019	21:11	30	742.32	742.32	100	1	A	30
40001_VP_0565_a	3	NX	22/06/2019	21:13	30	730.69	730.69	100	1	A	30
40001_VP_0565_b	3	NX	22/06/2019	21:13	30	751.63	751.63	100	1	B	30
40001_VP_0567	3	NX	22/06/2019	21:23	90	1951.88	1951.88	100	1	A	90
40001_VP_0568	3	NX	22/06/2019	21:26	60	922.54	922.54	100	2	A	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0569_a	3	NX	22/06/2019	21:29	30	523.72	523.72	100	2	A	60
40001_VP_0569_b	3	NX	22/06/2019	21:29	30	1219.27	1219.27	100	2	B	60
40001_VP_0569_c	3	NX	22/06/2019	21:29	45	622.86	622.86	100	2	A	90
40001_VP_0570_a	3	NX	22/06/2019	21:29	30	551.33	551.33	100	1	A	30
40001_VP_0570_b	3	NX	22/06/2019	21:29	60	961.30	961.30	100	1	B	60
40001_VP_0571	3	NX	22/06/2019	21:45	15	288.09	288.09	100	1	A	15
40001_VP_0572_a	3	NX	22/06/2019	21:58	45	1301.88	1301.88	100	1	B	45
40001_VP_0572_b	3	NX	22/06/2019	21:58	15	196.33	196.33	100	1	A	15
40001_VP_0751	3	NX	22/06/2019	04:45	30	546.63	546.63	100	1	A	30
40001_VP_0754_a	3	NX	22/06/2019	04:47	30	865.05	865.05	100	1	B	30
40001_VP_0754_b	3	NX	22/06/2019	04:47	30	385.81	385.81	100	1	A	30
40001_VP_0756	3	NX	22/06/2019	05:15	75	1112.54	1112.54	100	1	A	75
40001_VP_0757_a	3	NX	22/06/2019	05:16	75	1402.45	1402.45	100	1	B	75
40001_VP_0757_b	3	NX	22/06/2019	05:16	15	638.74	638.74	100	1	C	15
40001_VP_0759	3	NX	22/06/2019	05:30	15	130.40	130.40	100	1	A	15
40001_VP_0761_a	3	NX	22/06/2019	05:35	30	724.32	724.32	100	1	B	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0761_b	3	NX	22/06/2019	05:35	30	619.85	619.85	100	1	C	30
40001_VP_0761_c	3	NX	22/06/2019	05:35	60	1001.25	1001.25	100	1	B	60
40001_VP_0763_a	3	NX	22/06/2019	05:45	45	1392.38	1392.38	100	1	B	45
40001_VP_0763_b	3	NX	22/06/2019	05:45	15	224.37	224.37	100	1	A	15
40001_VP_0764_a	3	NX	22/06/2019	05:49	30	300.86	300.86	100	1	A	30
40001_VP_0764_b	3	NX	22/06/2019	05:49	30	361.55	361.55	100	1	B	30
40001_VP_0766_a	3	NX	22/06/2019	05:59	15	243.17	243.17	100	2	B	30
40001_VP_0766_b	3	NX	22/06/2019	05:59	60	694.72	694.72	100	2	A	120
40001_VP_0769_a	3	NX	22/06/2019	06:18	30	474.83	474.83	100	1	B	30
40001_VP_0769_b	3	NX	22/06/2019	06:18	30	616.83	616.83	100	1	C	30
40001_VP_0770_a	3	NX	22/06/2019	06:21	60	236.94	236.94	100	1	B	60
40001_VP_0770_b	3	NX	22/06/2019	06:21	15	264.22	264.22	100	1	C	15
40001_VP_0770_c	3	NX	22/06/2019	06:21	30	225.60	225.60	100	1	B	30
40001_VP_0770_d	3	NX	22/06/2019	06:21	15	520.08	520.08	100	1	A	15
40001_VP_0771_a	3	NX	22/06/2019	06:27	45	982.25	982.25	100	2	B	90
40001_VP_0771_b	3	NX	22/06/2019	06:27	30	827.84	827.84	100	2	C	60

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0771_c	3	NX	22/06/2019	06:27	75	356.21	356.21	100	2	B	150
40001_VP_0772_a	3	NX	22/06/2019	06:28	45	292.57	292.57	100	2	A	90
40001_VP_0772_b	3	NX	22/06/2019	06:28	15	79.66	79.66	100	2	B	30
40001_VP_0772_c	3	NX	22/06/2019	06:28	15	192.16	192.16	100	2	A	30
40001_VP_0773_a	3	NX	22/06/2019	06:28	30	300.95	300.95	100	1	A	30
40001_VP_0773_b	3	NX	22/06/2019	06:28	120	699.81	699.81	100	1	B	120
40001_VP_0773_d	3	NX	22/06/2019	06:28	15	775.44	775.44	100	1	B	15
40001_VP_0775	3	NX	22/06/2019	06:36	30	387.37	387.37	100	1	A	30
40001_VP_0776	3	NX	22/06/2019	06:48	75	1491.84	1491.84	100	1	B	75
40001_VP_0778	3	NX	22/06/2019	06:56	75	1139.20	1139.20	100	1	B	75
40001_VP_0779_a	3	NX	22/06/2019	07:05	60	1387.40	1387.40	100	1	B	60
40001_VP_0779_b	3	NX	22/06/2019	07:05	30	391.32	391.32	100	1	A	30
40001_VP_0781_a	3	NX	22/06/2019	07:20	30	413.88	413.88	100	1	B	30
40001_VP_0781_b	3	NX	22/06/2019	07:20	30	338.90	338.90	100	1	A	30
40001_VP_0781_c	3	NX	22/06/2019	07:20	30	713.28	713.28	100	1	B	30
40001_VP_0781_d	3	NX	22/06/2019	07:20	15	179.61	179.61	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0782	3	NX	22/06/2019	07:20	45	418.45	418.45	100	1	B	45
40001_VP_0783_a	3	NX	22/06/2019	07:21	45	1615.03	1615.03	100	1	B	45
40001_VP_0783_b	3	NX	22/06/2019	07:21	15	264.30	264.30	100	1	A	15
40001_VP_0784_a	3	NX	22/06/2019	07:21	90	1650.23	1650.23	100	2	B	180
40001_VP_0784_b	3	NX	22/06/2019	07:21	45	468.59	468.59	100	2	A	90
40001_VP_0784_c	3	NX	22/06/2019	07:21	30	479.48	479.48	100	2	B	60
40001_VP_0784_d	3	NX	22/06/2019	07:21	15	251.45	251.45	100	2	A	30
40001_VP_0785_a	3	NX	22/06/2019	07:30	30	490.53	490.53	100	1	B	30
40001_VP_0785_b	3	NX	22/06/2019	07:30	60	796.31	796.31	100	1	A	60
40001_VP_0786_a	3	NX	22/06/2019	07:36	120	1980.65	1980.65	100	2	B	240
40001_VP_0786_b	3	NX	22/06/2019	07:36	30	219.45	219.45	100	2	A	60
40001_VP_0786_c	3	NX	22/06/2019	07:36	150	643.93	643.93	100	2	B	300
40001_VP_0786_d	3	NX	22/06/2019	07:36	15	676.78	676.78	100	2	A	30
40001_VP_0787_a	3	NX	22/06/2019	07:43	30	1312.01	1312.01	100	1	B	30
40001_VP_0787_b	3	NX	22/06/2019	07:43	30	178.92	178.92	100	1	A	30
40001_VP_0787_c	3	NX	22/06/2019	07:43	15	188.02	188.02	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0787_d	3	NX	22/06/2019	07:43	15	825.49	825.49	100	1	A	15
40001_VP_0787_e	3	NX	22/06/2019	07:43	15	332.71	332.71	100	1	B	15
40001_VP_0787_f	3	NX	22/06/2019	07:43	30	300.28	300.28	100	1	A	30
40001_VP_0514_a	2	NX	23/06/2019	19:46	45	1424.61	1424.61	100	1	B	45
40001_VP_0514_b	2	NX	23/06/2019	19:46	45	351.82	351.82	100	1	A	45
40001_VP_0591_a	5	NX	23/06/2019	12:02	60	2601.07	2601.07	100	4	B	240
40001_VP_0591_b	5	NX	23/06/2019	12:02	60	1773.05	1773.05	100	4	C	240
40001_VP_0597_a	5	NX	23/06/2019	12:51	45	815.70	668.02	82	1	B	37
40001_VP_0597_b	5	NX	23/06/2019	12:51	15	391.63	391.63	100	1	A	15
40001_VP_0597_c	5	NX	23/06/2019	12:51	30	411.26	307.46	75	1	B	22
40001_VP_0597_d	5	NX	23/06/2019	12:51	15	727.34	727.34	100	1	A	15
40001_VP_0707	5	NX	24/06/2019	12:56	60	914.51	914.51	100	1	B	60
40001_VP_0708_a	5	NX	24/06/2019	13:02	15	342.18	342.18	100	3	B	45
40001_VP_0708_b	5	NX	24/06/2019	13:02	45	291.08	291.08	100	3	A	135
40001_VP_0708_c	5	NX	24/06/2019	13:02	165	1190.52	1190.52	100	3	B	495
40001_VP_0708_d	5	NX	24/06/2019	13:02	30	315.01	315.01	100	3	A	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0708_e	5	NX	24/06/2019	13:02	30	1281.37	1281.37	100	3	B	90
40001_VP_0708_f	5	NX	24/06/2019	13:02	30	975.14	975.14	100	3	A	90
40001_VP_0711_a	5	NX	24/06/2019	13:34	45	275.95	275.95	100	1	B	45
40001_VP_0711_b	5	NX	24/06/2019	13:34	30	557.67	557.67	100	1	A	30
40001_VP_0711_c	5	NX	24/06/2019	13:34	30	411.80	411.80	100	1	B	30
40001_VP_0711_d	5	NX	24/06/2019	13:34	15	221.23	221.23	100	1	A	15
40001_VP_0712_a	5	NX	24/06/2019	13:34	30	149.39	149.39	100	1	B	30
40001_VP_0712_b	5	NX	24/06/2019	13:34	45	405.70	405.70	100	1	A	45
40001_VP_0713_a	5	NX	24/06/2019	13:42	30	372.29	372.29	100	1	B	30
40001_VP_0713_b	5	NX	24/06/2019	13:42	30	232.57	232.57	100	1	A	30
40001_VP_0717_a	5	NX	24/06/2019	14:13	30	282.02	282.02	100	1	B	30
40001_VP_0717_b	5	NX	24/06/2019	14:13	15	98.02	98.02	100	1	A	15
40001_VP_0671_a	14	NX	03/07/2019	14:31	135	1707.02	1707.02	100	1	A	135
40001_VP_0671_b	14	NX	03/07/2019	14:31	30	200.45	200.45	100	1	B	30
40001_VP_0671_c	14	NX	03/07/2019	14:31	15	890.60	890.60	100	1	A	15
40001_VP_0671_d	14	NX	03/07/2019	14:31	15	688.77	688.77	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0671_e	14	NX	03/07/2019	14:31	15	601.19	601.19	100	1	A	15
40001_VP_0671_f	14	NX	03/07/2019	14:31	15	478.14	478.14	100	1	B	15
40001_VP_0671_g	14	NX	03/07/2019	14:31	15	777.98	777.98	100	1	A	15
40001_VP_0672_a	14	NX	03/07/2019	14:37	90	544.78	544.78	100	1	A	90
40001_VP_0672_b	14	NX	03/07/2019	14:37	30	612.58	612.58	100	1	B	30
40001_VP_0672_c	14	NX	03/07/2019	14:37	15	466.90	466.90	100	1	A	15
40001_VP_0672_d	14	NX	03/07/2019	14:37	15	1151.20	1151.20	100	1	B	15
40001_VP_0672_e	14	NX	03/07/2019	14:37	15	289.51	289.51	100	1	A	15
40001_VP_0676_a	14	NX	03/07/2019	14:54	45	957.55	957.55	100	1	C	45
40001_VP_0676_b	14	NX	03/07/2019	14:54	15	227.05	227.05	100	1	B	15
40001_VP_0677_a	14	NX	03/07/2019	14:47	45	2162.59	2162.59	100	1	C	45
40001_VP_0677_b	14	NX	03/07/2019	14:47	60	506.91	506.91	100	1	B	60
40001_VP_0677_c	14	NX	03/07/2019	14:47	15	336.20	336.20	100	1	A	15
40001_VP_0677_d	14	NX	03/07/2019	14:47	30	860.90	860.90	100	1	B	30
40001_VP_0678	14	NX	03/07/2019	15:21	45	1521.66	1521.66	100	2	B	90
40001_VP_0683_a	14	NX	03/07/2019	15:57	60	832.59	23.68	3	1	A	2



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0683_b	14	NX	03/07/2019	15:57	30	715.92	584.80	82	1	B	25
40001_VP_0683_c	14	NX	03/07/2019	15:57	60	473.36	473.36	100	1	A	60
40001_VP_0684_a	14	NX	03/07/2019	16:03	30	701.61	688.07	98	1	A	29
40001_VP_0684_b	14	NX	03/07/2019	16:03	45	696.64	696.64	100	1	B	45
40001_VP_0685_a	14	NX	03/07/2019	16:07	45	528.39	274.00	52	2	A	47
40001_VP_0686	14	NX	03/07/2019	16:12	75	1554.14	1554.14	100	1	A	75
40001_VP_0687_a	14	NX	03/07/2019	16:33	45	718.56	718.56	100	1	A	45
40001_VP_0687_b	14	NX	03/07/2019	16:33	60	1700.67	1700.67	100	1	B	60
40001_VP_0687_c	14	NX	03/07/2019	16:33	45	475.25	475.25	100	1	A	45
40001_VP_0687_d	14	NX	03/07/2019	16:33	75	628.73	628.73	100	1	B	75
40001_VP_0687_e	14	NX	03/07/2019	16:33	60	828.10	828.10	100	1	A	60
40001_VP_0688	14	NX	03/07/2019	16:35	45	978.96	911.25	93	1	A	42
40001_VP_0690_a	14	NX	03/07/2019	17:01	45	1234.75	1234.75	100	1	C	45
40001_VP_0690_b	14	NX	03/07/2019	17:01	30	933.74	933.74	100	1	B	30
40001_VP_0738	8	NX	06/07/2019	13:32	180	1632.12	1632.12	100	1	B	180
40001_VP_0748_b	8	NX	06/07/2019	14:35	45	754.63	754.63	100	1	C	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0748_c	8	NX	06/07/2019	14:35	30	313.54	313.54	100	1	B	30
40001_VP_0869_a	14	NX	10/07/2019	16:08	285	3033.46	1851.56	61	1	B	174
40001_VP_0869_b	14	NX	10/07/2019	16:08	15	246.46	246.46	100	1	A	15
40001_VP_0470_a	14	NX	14/07/2019	12:45	105	2121.12	2121.12	100	1	B	105
40001_VP_0470_b	14	NX	14/07/2019	12:45	90	2004.65	2004.65	100	1	C	90
40001_VP_0472_a	14	NX	14/07/2019	13:10	45	1057.36	549.88	52	1	B	23
40001_VP_0472_b	14	NX	14/07/2019	13:10	15	153.81	153.81	100	1	A	15
40001_VP_0820_a	3	NX	14/07/2019	18:20	30	610.12	610.12	100	2	A	60
40001_VP_0820_b	3	NX	14/07/2019	18:20	15	76.33	76.33	100	2	B	30
40001_VP_0820_c	3	NX	14/07/2019	18:20	30	147.11	147.11	100	2	A	60
40001_VP_0821	3	NX	14/07/2019	18:30	105	1241.15	1241.15	100	2	A	210
40001_VP_0822	3	NX	14/07/2019	20:05	75	934.68	934.68	100	1	B	75
40001_VP_0823	3	NX	14/07/2019	20:35	60	985.10	985.10	100	1	A	60
40001_VP_0874_a	4	NX	14/07/2019	11:42	150	3974.26	3974.26	100	1	B	150
40001_VP_0874_b	4	NX	14/07/2019	11:42	135	3162.27	3162.27	100	1	C	135
40001_VP_0875_a	4	NX	14/07/2019	12:02	255	4081.55	4081.55	100	1	B	255



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0875_b	4	NX	14/07/2019	12:02	210	3200.24	3200.24	100	1	C	210
40001_VP_0875_c	4	NX	14/07/2019	12:02	45	328.94	328.94	100	1	B	45
40001_VP_0875_d	4	NX	14/07/2019	12:02	15	147.00	147.00	100	1	A	15
40001_VP_0876	4	NX	14/07/2019	12:28	45	1020.79	1020.79	100	1	A	45
40001_VP_0877_a	4	NX	14/07/2019	12:44	270	2917.88	2917.88	100	1	B	270
40001_VP_0877_b	4	NX	14/07/2019	12:44	270	3283.94	3283.94	100	1	C	270
40001_VP_0877_c	4	NX	14/07/2019	12:44	90	1392.53	1392.53	100	1	B	90
40001_VP_0878_a	4	NX	14/07/2019	13:08	255	3874.47	3874.47	100	1	B	255
40001_VP_0878_b	4	NX	14/07/2019	13:08	390	2411.47	2411.47	100	1	C	390
40001_VP_0878_c	4	NX	14/07/2019	13:08	90	1319.31	1319.31	100	1	B	90
40001_VP_0878_d	4	NX	14/07/2019	13:08	15	63.60	63.60	100	1	A	15
40001_VP_1046_a	5	NX	13/08/2019	17:51	30	554.41	554.41	100	1	A	30
40001_VP_1046_b	5	NX	13/08/2019	17:51	15	227.47	227.47	100	1	B	15
40001_VP_1046_c	5	NX	13/08/2019	17:51	30	599.85	599.85	100	1	A	30
40001_VP_1047_a	5	NX	13/08/2019	17:56	15	231.49	231.49	100	2	A	30
40001_VP_1047_b	5	NX	13/08/2019	17:56	60	1096.60	1096.60	100	2	B	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1049_a	5	NX	13/08/2019	19:02	30	554.06	554.06	100	2	A	60
40001_VP_1049_b	5	NX	13/08/2019	19:02	45	886.19	886.19	100	2	B	90
40001_VP_1049_c	5	NX	13/08/2019	19:02	15	200.57	200.57	100	2	A	30
40001_VP_1050_a	5	NX	13/08/2019	19:15	15	310.76	310.76	100	1	A	15
40001_VP_1050_b	5	NX	13/08/2019	19:15	15	578.30	578.30	100	1	B	15
40001_VP_1050_c	5	NX	13/08/2019	19:15	15	208.70	208.70	100	1	A	15
40001_VP_1053_a	2	NX	14/08/2019	10:53	15	428.63	428.63	100	2	B	30
40001_VP_1053_b	2	NX	14/08/2019	10:53	15	972.36	972.36	100	2	A	30
40001_VP_1053_c	2	NX	14/08/2019	10:53	30	645.99	645.99	100	2	B	60
40001_VP_1041_a	4	NX	15/08/2019	12:17	15	327.43	327.43	100	1	A	15
40001_VP_1041_b	4	NX	15/08/2019	12:17	15	298.54	298.54	100	1	B	15
40001_VP_1041_c	4	NX	15/08/2019	12:17	15	208.73	208.73	100	1	A	15
40001_VP_1042_a	4	NX	15/08/2019	12:51	15	206.82	206.82	100	1	A	15
40001_VP_1042_b	4	NX	15/08/2019	12:51	30	415.77	415.77	100	1	B	30
40001_VP_1042_c	4	NX	15/08/2019	12:51	15	197.33	197.33	100	1	A	15
40001_VP_1058_a	3	NX	16/08/2019	14:27	30	509.50	509.50	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1058_b	3	NX	16/08/2019	14:27	15	244.34	244.34	100	1	B	15
40001_VP_1058_c	3	NX	16/08/2019	14:27	15	275.92	275.92	100	1	A	15
40001_VP_1059_a	3	NX	16/08/2019	14:56	30	410.92	410.92	100	1	A	30
40001_VP_1059_b	3	NX	16/08/2019	14:56	15	131.30	131.30	100	1	B	15
40001_VP_1060	3	NX	16/08/2019	15:09	75	1166.21	1166.21	100	1	A	75
40001_VP_1061_a	3	NX	16/08/2019	15:13	30	258.87	258.87	100	2	A	60
40001_VP_1061_b	3	NX	16/08/2019	15:13	45	1247.50	1247.50	100	2	B	90
40001_VP_1062	3	NX	16/08/2019	17:10	90	1586.33	1586.33	100	1	B	90
40001_VP_1068	4	NX	21/08/2019	18:57	60	732.67	732.67	100	1	A	60
40001_VP_1069_a	4	NX	21/08/2019	19:46	15	393.38	393.38	100	1	A	15
40001_VP_1069_b	4	NX	21/08/2019	19:46	45	707.52	707.52	100	1	B	45
40001_VP_1069_c	4	NX	21/08/2019	19:46	30	426.31	426.31	100	1	A	30
40001_VP_1077	5	NX	22/08/2019	11:35	30	662.73	662.73	100	1	A	30
40001_VP_1092	3	NX	24/08/2019	09:03	45	1259.84	1259.84	100	2	A	90
40001_VP_1093	3	NX	24/08/2019	09:35	30	718.79	718.79	100	1	A	30
40001_VP_1094_a	3	NX	24/08/2019	10:00	15	218.99	218.99	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1094_b	3	NX	24/08/2019	10:00	60	335.25	335.25	100	1	A	60
40001_VP_1095	3	NX	24/08/2019	10:12	75	1902.46	1902.46	100	1	A	75
40001_VP_1096	3	NX	24/08/2019	10:25	180	2562.58	2562.58	100	1	A	180
40001_VP_1097	3	NX	24/08/2019	10:25	60	972.61	972.61	100	2	A	120
40001_VP_1100	3	NX	24/08/2019	11:09	165	1405.35	1405.35	100	1	A	165
40001_VP_1101	3	NX	24/08/2019	11:19	30	729.08	729.08	100	1	A	30
40001_VP_1102	3	NX	24/08/2019	11:28	165	1352.00	1352.00	100	1	A	165
40001_VP_1103	3	NX	24/08/2019	11:28	120	1254.97	1254.97	100	1	A	120
40001_VP_1104	3	NX	24/08/2019	11:42	105	782.17	782.17	100	1	A	105

B.7a VP Flight Data: Greenshank – Year 1 Breeding (March – July 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_162	8	GK	15/03/2018	08:20	45	1086.44	1086.44	100	1	B	45
BS_SW_0066_a	5	GK	27/04/2018	08:58	15	207.05	207.05	100	1	A	15
BS_SW_0066_b	5	GK	27/04/2018	08:58	45	1236.65	1236.65	100	1	B	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0068	5	GK	27/04/2018	09:11	45	541.72	541.72	100	1	B	45
BS_SW_0082	2	GK	28/04/2018	17:34	90	2523.20	2519.80	100	1	B	90
BS_SW_0119_a	5	GK	02/05/2018	07:23	60	295.63	295.63	100	1	B	60
BS_SW_0119_b	5	GK	02/05/2018	07:23	15	113.54	113.54	100	1	A	15
BS_SW_0123	5	GK	02/05/2018	08:18	45	819.91	819.91	100	2	B	90
BS_SW_0208	1	GK	24/05/2018	19:35	30	893.74	695.13	78	2	B	47
BS_SW_0166	2	GK	07/06/2018	15:04	75	2120.83	2023.93	95	1	C	72
BS_SW_0431	5	GK	09/07/2018	14:26	15	399.27	399.27	100	1	B	15

B.7b VP Flight Data: Greenshank – Year 2 Breeding (March – July 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0806	3	GK	12/06/2019	11:20	75	919.06	919.06	100	1	A	75
40001_VP_0804_a	4	GK	17/06/2019	17:50	45	333.76	333.76	100	1	B	45
40001_VP_0804_b	4	GK	17/06/2019	17:50	15	117.35	117.35	100	1	A	15
40001_VP_0818_a	2	GK	09/07/2019	20:05	15	816.85	298.18	37	2	B	11
40001_VP_0818_b	2	GK	09/07/2019	20:05	15	191.69	191.69	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0827	4	GK	10/07/2019	07:45	45	1549.52	1549.52	100	1	B	45
40001_VP_0828	4	GK	11/07/2019	20:00	30	937.18	937.18	100	1	B	30

B.8a VP Flight Data: Greylag Goose – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0427	5	GJ	04/04/2018	11:56	30	610.68	610.68	100	1	A	30
BS_SW_0029	3	GJ	25/04/2018	17:39	60	2021.84	2021.84	100	3	A	180
BS_SW_0032	3	GJ	25/04/2018	18:20	45	934.94	934.94	100	3	A	135
BS_SW_0039	3	GJ	25/04/2018	19:06	75	690.27	690.27	100	5	A	375
BS_SW_0045_a	3	GJ	25/04/2018	20:11	45	220.16	220.16	100	4	A	180
BS_SW_0045_b	3	GJ	25/04/2018	20:11	30	589.85	589.85	100	4	B	120
BS_SW_0045_c	3	GJ	25/04/2018	20:11	15	316.31	316.31	100	4	A	60
BS_SW_0058	5	GJ	27/04/2018	06:40	60	471.96	471.96	100	2	A	120
BS_SW_0063	5	GJ	27/04/2018	08:25	60	918.04	918.04	100	6	A	360
BS_SW_0067_a	5	GJ	27/04/2018	09:00	30	263.49	263.49	100	1	A	30
BS_SW_0067_b	5	GJ	27/04/2018	09:00	30	201.73	201.73	100	1	B	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0084	3	GJ	30/04/2018	06:10	45	1327.17	1327.17	100	2	A	90
BS_SW_0088_a	3	GJ	30/04/2018	07:03	30	529.00	529.00	100	1	B	30
BS_SW_0088_b	3	GJ	30/04/2018	07:03	15	350.30	350.30	100	1	A	15
BS_SW_0093	3	GJ	30/04/2018	08:09	60	1249.16	1249.16	100	3	B	180
BS_SW_0100	3	GJ	30/04/2018	09:04	60	1336.88	1336.88	100	3	A	180
BS_SW_0103	4	GJ	30/04/2018	17:24	15	350.27	350.27	100	2	A	30
BS_SW_0106	4	GJ	30/04/2018	18:50	60	603.99	603.99	100	3	A	180
BS_SW_0113	5	GJ	02/05/2018	06:05	30	313.73	313.73	100	3	A	90
BS_SW_0114_a	5	GJ	02/05/2018	06:06	30	271.54	271.54	100	1	B	30
BS_SW_0114_b	5	GJ	02/05/2018	06:06	15	153.13	153.13	100	1	A	15
BS_SW_0115	5	GJ	02/05/2018	06:15	60	1322.75	1322.75	100	2	A	120
BS_SW_0116	5	GJ	02/05/2018	06:46	30	479.01	479.01	100	1	A	30
BS_SW_0117	5	GJ	02/05/2018	06:48	45	389.13	389.13	100	2	A	90
BS_SW_0118	5	GJ	02/05/2018	07:22	60	1102.85	1102.85	100	2	A	120
BS_SW_0121	5	GJ	02/05/2018	07:58	60	808.92	808.92	100	5	A	300
BS_SW_0122	5	GJ	02/05/2018	08:10	45	761.34	761.34	100	3	A	135
BS_SW_0125	5	GJ	02/05/2018	08:35	45	862.58	862.58	100	3	A	135



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0523	4	GJ	05/05/2018	18:35	60	709.27	709.27	100	4	A	240
BS_SW_0514	8	GJ	07/05/2018	18:08	45	912.37	912.37	100	2	A	90
BS_SW_0516	1	GJ	11/05/2018	09:36	30	677.85	677.85	100	4	B	120
BS_SW_0146	3	GJ	12/05/2018	17:50	15	248.38	248.38	100	4	B	60
BS_SW_0151	3	GJ	12/05/2018	18:09	90	1795.67	1795.67	100	1	A	90
BS_SW_0152	3	GJ	12/05/2018	18:18	60	753.33	753.33	100	1	A	60
BS_SW_0153	3	GJ	12/05/2018	18:22	60	1257.85	1257.85	100	2	A	120
BS_SW_0155	3	GJ	12/05/2018	18:46	15	315.85	315.85	100	1	B	15
BS_SW_0156	3	GJ	12/05/2018	18:47	15	192.93	192.93	100	1	A	15
BS_SW_0507	4	GJ	22/05/2018	06:52	30	556.69	556.69	100	2	A	60
BS_SW_0508	4	GJ	22/05/2018	07:01	30	659.31	659.31	100	3	A	90
BS_SW_0184	3	GJ	24/05/2018	05:29	30	880.89	880.89	100	2	A	60
BS_SW_0189	3	GJ	24/05/2018	05:41	15	673.40	673.40	100	2	A	30
BS_SW_0193	3	GJ	24/05/2018	05:53	30	701.35	701.35	100	2	A	60
BS_SW_0195	3	GJ	24/05/2018	06:17	30	463.36	463.36	100	1	A	30
BS_SW_0203	3	GJ	24/05/2018	07:24	30	294.23	294.23	100	2	A	60
BS_SW_0205	3	GJ	24/05/2018	07:25	30	683.47	683.47	100	2	A	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0335	5	GJ	29/06/2018	17:44	30	1314.78	1314.78	100	4	A	120
BS_SW_0581	3	GJ	25/07/2018	19:09	120	2256.16	2256.16	100	7	B	840
BS_SW_0608_a	4	GJ	28/07/2018	15:10	30	258.73	258.73	100	7	A	210
BS_SW_0608_b	4	GJ	28/07/2018	15:10	45	958.30	958.30	100	7	B	315
BS_SW_0608_c	4	GJ	28/07/2018	15:10	15	352.65	352.65	100	7	A	105
BS_SW_0759	4	GJ	13/08/2018	14:40	15	288.59	288.59	100	6	A	90
BS_SW_0788_a	4	GJ	14/08/2018	12:04	15	169.85	169.85	100	2	A	30
BS_SW_0788_b	4	GJ	14/08/2018	12:04	15	226.06	226.06	100	2	B	30
BS_SW_0790	4	GJ	14/08/2018	12:11	15	525.40	525.40	100	5	A	75
BS_SW_0793	4	GJ	14/08/2018	12:19	30	488.65	488.65	100	7	A	210
BS_SW_0799	4	GJ	14/08/2018	12:59	15	433.76	433.76	100	4	B	60

B.8b VP Flight Data: Greylag Goose – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0248_a	8	GJ	12/04/2019	10:02	45	1225.58	1225.58	100	1	B	45
40001_VP_0248_b	8	GJ	12/04/2019	10:02	15	374.21	374.21	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0249	8	GJ	12/04/2019	10:16	30	531.79	531.79	100	8	A	240
40001_VP_0266	4	GJ	14/04/2019	08:27	30	525.97	525.97	100	2	A	60
40001_VP_0267	4	GJ	14/04/2019	08:48	15	543.18	543.18	100	2	A	30
40001_VP_0270_a	4	GJ	14/04/2019	09:11	15	262.89	262.89	100	2	A	30
40001_VP_0270_b	4	GJ	14/04/2019	09:11	45	704.30	704.30	100	2	B	90
40001_VP_0271_a	4	GJ	14/04/2019	09:20	30	432.99	432.99	100	1	A	30
40001_VP_0271_b	4	GJ	14/04/2019	09:20	45	1203.96	1203.96	100	1	B	45
40001_VP_0272	4	GJ	14/04/2019	09:38	75	1193.06	1130.01	95	1	B	71
40001_VP_0275	4	GJ	14/04/2019	11:06	60	1217.79	1217.79	100	2	B	120
40001_VP_0280	4	GJ	14/04/2019	12:20	30	738.96	738.96	100	2	A	60
40001_VP_0285	4	GJ	14/04/2019	14:18	30	546.03	546.03	100	3	A	90
40001_VP_0291	5	GJ	14/04/2019	08:48	45	608.68	608.68	100	1	B	45
40001_VP_0294	5	GJ	14/04/2019	10:02	45	657.31	657.31	100	2	B	90
40001_VP_0295	5	GJ	14/04/2019	10:50	45	795.94	795.94	100	3	A	135
40001_VP_0304	3	GJ	15/04/2019	19:14	30	409.04	409.04	100	3	A	90
40001_VP_0354	4	GJ	22/04/2019	19:04	60	1255.67	1255.67	100	2	A	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0355	4	GJ	22/04/2019	19:05	75	1438.98	1143.88	79	2	A	119
40001_VP_0373	3	GJ	24/04/2019	16:48	15	499.68	499.68	100	2	A	30
40001_VP_0377	3	GJ	07/05/2019	09:03	30	456.79	456.79	100	1	A	30
40001_VP_0380	3	GJ	07/05/2019	09:49	15	1242.68	1242.68	100	2	A	30
40001_VP_0396_a	1	GJ	08/05/2019	10:06	15	337.50	337.50	100	1	A	15
40001_VP_0396_b	1	GJ	08/05/2019	10:06	90	1406.60	994.15	71	1	B	64
40001_VP_0457	3	GJ	11/05/2019	19:47	135	2116.22	2116.22	100	2	A	270
40001_VP_0460	5	GJ	11/05/2019	07:53	15	767.63	767.63	100	2	A	30
40001_VP_0315	1	GJ	15/05/2019	18:50	45	860.00	770.94	90	1	A	40
40001_VP_0318_a	1	GJ	15/05/2019	19:28	30	1025.45	1025.45	100	2	A	60
40001_VP_0318_b	1	GJ	15/05/2019	19:28	30	275.30	4.74	2	2	B	1
40001_VP_0320	1	GJ	15/05/2019	20:35	30	868.45	860.29	99	2	B	59
40001_VP_0325_a	3	GJ	17/05/2019	08:04	30	530.35	530.35	100	2	A	60
40001_VP_0325_b	3	GJ	17/05/2019	08:04	45	1099.80	1099.80	100	2	B	90
40001_VP_0326	3	GJ	17/05/2019	08:14	75	1322.44	1322.44	100	2	A	150
40001_VP_0328	3	GJ	17/05/2019	08:43	15	409.53	409.53	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0332_a	8	GJ	02/06/2019	20:41	30	592.59	592.59	100	2	B	60
40001_VP_0332_b	8	GJ	02/06/2019	20:41	30	435.59	435.59	100	2	A	60
40001_VP_0699	8	GJ	09/06/2019	08:01	45	911.06	604.70	66	2	A	60
40001_VP_0805	4	GJ	17/06/2019	17:55	180	1902.62	1902.62	100	7	B	1260
40001_VP_0633	14	GJ	18/06/2019	18:33	90	2893.97	1216.26	42	5	C	189
40001_VP_0590	4	GJ	19/06/2019	07:48	105	1813.39	1813.39	100	5	B	525
40001_VP_0760	3	GJ	22/06/2019	05:35	180	2619.99	2619.99	100	14	B	2520
40001_VP_1043	4	GJ	15/08/2019	13:13	45	615.16	615.16	100	24	B	1080
40001_VP_1066	4	GJ	21/08/2019	17:29	135	2382.79	2382.79	100	6	A	810

B.9a VP Flight Data: Greylag Goose – Year 1 Non-Breeding (September 2017 – March 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_049_a	5	GJ	14/10/2017	16:55	60	911.33	911.33	100	8	C	480
SW_049_b	5	GJ	14/10/2017	16:55	45	860.82	515.34	60	8	B	216
SW_064	3	GJ	26/10/2017	15:37	90	1280.30	1280.30	100	8	B	720



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_066	3	GJ	26/10/2017	16:43	105	1270.20	1270.20	100	3	C	315
SW_009_a	4	GJ	01/11/2017	08:17	30	910.47	910.47	100	9	A	270
SW_009_b	4	GJ	01/11/2017	08:17	12	162.59	162.59	100	9	B	108
SW_010_a	4	GJ	01/11/2017	08:18	30	583.05	583.05	100	7	B	210
SW_010_b	4	GJ	01/11/2017	08:18	63	1774.01	1774.01	100	7	A	441
SW_014	8	GJ	02/11/2017	08:40	96	1869.07	1869.07	100	6	D	576
SW_019	8	GJ	02/11/2017	10:51	46	1085.72	1085.72	100	1	B	46
SW_023_a	3	GJ	03/11/2017	11:23	15	771.20	771.20	100	39	A	585
SW_023_b	3	GJ	03/11/2017	11:23	54	1436.15	1436.15	100	39	B	2106
SW_028_a	5	GJ	14/11/2017	08:46	15	240.31	240.31	100	62	A	930
SW_028_b	5	GJ	14/11/2017	08:46	14	309.85	309.85	100	62	B	868
SW_029_a	8	GJ	14/11/2017	14:20	10	89.05	89.05	100	8	B	80
SW_029_b	8	GJ	14/11/2017	14:20	25	182.47	182.47	100	8	A	200
SW_033	4	GJ	16/11/2017	10:30	45	1523.46	1523.46	100	2	B	90
SW_034	3	GJ	16/11/2017	13:55	85	1735.75	1735.75	100	3	B	255
SW_035	3	GJ	16/11/2017	14:10	90	1722.65	1722.65	100	3	A	270
SW_036	3	GJ	16/11/2017	14:11	90	1734.95	1734.95	100	9	A	810



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_037	3	GJ	16/11/2017	14:30	90	1747.26	1747.26	100	14	A	1260
SW_038	3	GJ	16/11/2017	14:35	60	1427.41	1427.41	100	15	A	900
SW_040	3	GJ	16/11/2017	16:00	50	1048.54	1048.54	100	8	A	400
SW_095	4	GJ	13/12/2017	15:35	105	1987.09	1987.09	100	5	A	525
SW_096_a	4	GJ	13/12/2017	15:51	45	1036.78	1036.78	100	4	B	180
SW_096_b	4	GJ	13/12/2017	15:51	45	834.40	834.40	100	4	A	180
SW_097	4	GJ	15/12/2017	11:27	45	1136.00	1136.00	100	4	B	180
SW_078	8	GJ	20/12/2017	09:15	30	871.22	871.22	100	5	A	150
SW_090	4	GJ	22/12/2017	09:05	25	1819.47	1819.47	100	3	A	75
SW_091	4	GJ	22/12/2017	10:40	20	575.54	575.54	100	6	A	120
SW_120	4	GJ	09/01/2018	10:24	30	815.60	815.60	100	2	A	60
SW_119	3	GJ	19/01/2018	11:06	75	781.68	781.68	100	33	A	2475
SW_176_a	4	GJ	26/02/2018	16:08	15	386.37	386.37	100	2	A	30
SW_176_b	4	GJ	26/02/2018	16:08	30	286.01	286.01	100	2	B	60
SW_149	3	GJ	13/03/2018	07:45	45	1453.84	1453.84	100	5	A	225
SW_150	3	GJ	13/03/2018	08:30	30	531.59	531.59	100	3	A	90
SW_151	3	GJ	13/03/2018	09:25	60	1703.17	1703.17	100	15	B	900



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_152	3	GJ	13/03/2018	09:40	30	614.84	614.84	100	3	A	90
SW_153	3	GJ	13/03/2018	10:00	30	778.58	778.58	100	2	A	60
SW_154	3	GJ	13/03/2018	10:15	45	1046.94	1046.94	100	4	A	180
SW_159_a	1	GJ	14/03/2018	11:12	30	604.56	604.56	100	2	A	60
SW_159_b	1	GJ	14/03/2018	11:12	60	848.37	848.37	100	2	B	120
SW_181	4	GJ	19/03/2018	16:34	45	1686.01	1686.01	100	5	B	225
SW_185	4	GJ	25/03/2018	08:02	75	1114.60	1114.60	100	7	B	525
SW_186	5	GJ	26/03/2018	17:29	30	604.37	604.37	100	2	A	60
SW_188_a	3	GJ	28/03/2018	18:14	75	597.99	597.99	100	3	A	225
SW_188_b	3	GJ	28/03/2018	18:14	30	1074.27	1074.27	100	3	B	90
SW_189	3	GJ	28/03/2018	18:21	30	720.88	720.88	100	2	A	60

B.9b VP Flight Data: Greylag Goose – Year 2 Non-breeding (September 2018 – March 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1222_a	1	GJ	21/09/2018	11:02	15	437.13	437.13	100	2	B	30
BS_SW_1222_b	1	GJ	21/09/2018	11:02	15	236.40	236.40	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1225	1	GJ	21/09/2018	11:30	15	753.79	511.50	68	1	A	10
BS_SW_1232	4	GJ	22/09/2018	17:01	60	2545.34	2545.34	100	53	A	3180
BS_SW_1233	4	GJ	22/09/2018	17:11	45	2374.21	2374.21	100	22	A	990
BS_SW_1241	4	GJ	24/09/2018	14:05	30	1265.27	1265.27	100	3	A	90
40001_VP_0006	4	GJ	25/10/2018	09:06	90	3123.79	3123.79	100	2	B	180
40001_VP_0007	4	GJ	25/10/2018	09:13	45	1499.96	1499.96	100	7	A	315
40001_VP_0009_a	4	GJ	25/10/2018	09:58	30	811.22	811.22	100	6	B	180
40001_VP_0009_b	4	GJ	25/10/2018	09:58	15	377.17	377.17	100	6	A	90
40001_VP_0010_a	4	GJ	25/10/2018	10:09	30	796.01	796.01	100	3	B	90
40001_VP_0010_b	4	GJ	25/10/2018	10:09	15	238.20	198.52	83	3	A	38
40001_VP_0020	5	GJ	02/11/2018	09:18	405	3048.61	1588.88	52	9	B	1900
40001_VP_0145	5	GJ	15/01/2019	09:40	30	1472.56	1472.56	100	6	B	180
40001_VP_0162_a	5	GJ	19/02/2019	08:21	285	3555.65	2852.53	80	4	B	915
40001_VP_0163_a	5	GJ	19/02/2019	08:29	165	3241.84	2196.03	68	2	A	224
40001_VP_0167	4	GJ	20/02/2019	13:41	60	1371.28	864.27	63	1	B	38
40001_VP_0185_a	4	GJ	16/03/2019	11:38	30	840.71	840.71	100	21	A	630



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0185_b	4	GJ	16/03/2019	11:38	15	250.49	250.49	100	21	B	315
40001_VP_0192_a	5	GJ	18/03/2019	09:46	60	1017.58	1017.58	100	2	A	120
40001_VP_0192_b	5	GJ	18/03/2019	09:46	30	317.75	317.75	100	2	B	60
40001_VP_0197	4	GJ	20/03/2019	11:13	105	1195.02	1195.02	100	2	B	210
40001_VP_0198_a	4	GJ	20/03/2019	12:24	30	404.75	404.75	100	2	A	60
40001_VP_0198_b	4	GJ	20/03/2019	12:24	30	321.14	321.14	100	2	B	60
40001_VP_0198_c	4	GJ	20/03/2019	12:24	15	285.72	285.72	100	2	A	30
40001_VP_0202	8	GJ	21/03/2019	08:32	30	706.02	706.02	100	1	A	30
40001_VP_0204	8	GJ	21/03/2019	09:38	30	1429.83	1429.83	100	1	A	30
40001_VP_0205	8	GJ	21/03/2019	09:38	45	1064.95	1064.95	100	2	A	90
40001_VP_0218	2	GJ	25/03/2019	13:53	90	1725.16	1725.16	100	32	C	2880
40001_VP_0222	8	GJ	26/03/2019	10:49	60	3609.52	3609.52	100	1	B	60

B.10a VP Flight Data: Hen harrier – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0417_a	4	HH	04/04/2018	07:33	60	170.97	170.97	100	1	A	60
BS_SW_0417_b	4	HH	04/04/2018	07:33	15	139.88	139.88	100	1	B	15
BS_SW_0417_c	4	HH	04/04/2018	07:33	75	50.41	50.41	100	1	A	75
BS_SW_0417_d	4	HH	04/04/2018	07:33	30	504.89	504.89	100	1	B	30
BS_SW_0417_e	4	HH	04/04/2018	07:33	30	167.42	167.42	100	1	A	30
BS_SW_0428_a	5	HH	04/04/2018	14:41	30	1326.64	1326.64	100	1	B	30
BS_SW_0428_b	5	HH	04/04/2018	14:41	15	264.63	264.63	100	1	A	15
BS_SW_0426	8	HH	05/04/2018	18:05	150	2038.06	2038.06	100	1	A	150
BS_SW_0001	3	HH	10/04/2018	12:58	105	1151.35	1151.35	100	1	A	105
BS_SW_0002_a	3	HH	10/04/2018	13:03	45	463.22	463.22	100	1	A	45
BS_SW_0002_b	3	HH	10/04/2018	13:03	30	121.98	121.98	100	1	B	30
BS_SW_0002_c	3	HH	10/04/2018	13:03	30	601.84	601.84	100	1	A	30
BS_SW_0003_a	3	HH	10/04/2018	13:10	15	146.02	146.02	100	2	A	30
BS_SW_0003_b	3	HH	10/04/2018	13:10	165	575.29	575.29	100	2	B	330
BS_SW_0003_c	3	HH	10/04/2018	13:10	45	157.80	157.80	100	2	C	90
BS_SW_0003_d	3	HH	10/04/2018	13:10	45	566.97	566.97	100	2	B	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0003_e	3	HH	10/04/2018	13:10	15	34.26	34.26	100	2	A	30
BS_SW_0005_a	3	HH	10/04/2018	13:35	30	123.15	123.15	100	1	A	30
BS_SW_0005_b	3	HH	10/04/2018	13:35	90	1126.69	1126.69	100	1	B	90
BS_SW_0005_c	3	HH	10/04/2018	13:35	30	248.55	248.55	100	1	A	30
BS_SW_0006	3	HH	10/04/2018	13:40	105	728.83	728.83	100	2	A	210
BS_SW_0008_a	3	HH	10/04/2018	14:00	90	280.80	280.80	100	2	A	180
BS_SW_0008_b	3	HH	10/04/2018	14:00	30	106.66	106.66	100	2	B	60
BS_SW_0008_c	3	HH	10/04/2018	14:00	60	486.10	486.10	100	2	A	120
BS_SW_0009	3	HH	10/04/2018	14:15	165	1922.42	1922.42	100	1	B	165
BS_SW_0010	3	HH	10/04/2018	14:30	45	192.91	192.91	100	1	A	45
BS_SW_0011_a	3	HH	10/04/2018	14:55	45	214.89	214.89	100	1	C	45
BS_SW_0011_b	3	HH	10/04/2018	14:55	45	698.70	698.70	100	1	B	45
BS_SW_0011_c	3	HH	10/04/2018	14:55	15	127.99	127.99	100	1	C	15
BS_SW_0011_d	3	HH	10/04/2018	14:55	90	3028.75	3028.75	100	1	B	90
BS_SW_0011_e	3	HH	10/04/2018	14:55	30	788.38	788.38	100	1	A	30
BS_SW_0012_a	3	HH	10/04/2018	15:40	30	206.85	206.85	100	1	A	30
BS_SW_0012_b	3	HH	10/04/2018	15:40	90	1541.18	1541.18	100	1	B	90



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0012_c	3	HH	10/04/2018	15:40	15	273.76	273.76	100	1	A	15
BS_SW_0013_a	3	HH	10/04/2018	15:42	60	1293.34	1293.34	100	1	A	60
BS_SW_0013_b	3	HH	10/04/2018	15:42	45	465.72	465.72	100	1	B	45
BS_SW_0014_a	3	HH	10/04/2018	15:45	75	832.37	832.37	100	1	A	75
BS_SW_0014_b	3	HH	10/04/2018	15:45	45	830.43	830.43	100	1	B	45
BS_SW_0014_c	3	HH	10/04/2018	15:45	120	1611.91	1611.91	100	1	A	120
BS_SW_0017	5	HH	10/04/2018	17:35	105	1138.56	1138.56	100	1	A	105
BS_SW_0028	3	HH	25/04/2018	17:38	165	664.15	664.15	100	2	A	330
BS_SW_0033_a	3	HH	25/04/2018	18:40	135	1125.06	1125.06	100	1	A	135
BS_SW_0033_b	3	HH	25/04/2018	18:40	45	265.51	265.51	100	1	B	45
BS_SW_0033_c	3	HH	25/04/2018	18:40	120	304.89	304.89	100	1	A	120
BS_SW_0034	3	HH	25/04/2018	18:41	360	771.87	771.87	100	1	A	360
BS_SW_0038	3	HH	25/04/2018	19:05	105	423.52	423.52	100	1	A	105
BS_SW_0040_a	3	HH	25/04/2018	19:16	30	165.91	165.91	100	2	A	60
BS_SW_0040_b	3	HH	25/04/2018	19:16	115	1410.10	1410.10	100	2	B	230
BS_SW_0041	3	HH	25/04/2018	19:18	45	265.91	265.91	100	1	A	45
BS_SW_0042	3	HH	25/04/2018	19:18	45	632.04	632.04	100	1	A	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0059_a	5	HH	27/04/2018	07:28	15	212.59	212.59	100	1	A	15
BS_SW_0059_b	5	HH	27/04/2018	07:28	45	561.03	561.03	100	1	B	45
BS_SW_0059_c	5	HH	27/04/2018	07:28	30	270.33	270.33	100	1	C	30
BS_SW_0060_a	5	HH	27/04/2018	07:44	30	204.71	204.71	100	1	A	30
BS_SW_0060_b	5	HH	27/04/2018	07:44	30	296.46	296.46	100	1	B	30
BS_SW_0060_c	5	HH	27/04/2018	07:44	15	247.66	247.66	100	1	C	15
BS_SW_0061_a	5	HH	27/04/2018	08:04	45	611.95	611.95	100	1	A	45
BS_SW_0061_b	5	HH	27/04/2018	08:04	15	585.05	585.05	100	1	B	15
BS_SW_0061_c	5	HH	27/04/2018	08:04	30	368.38	368.38	100	1	A	30
BS_SW_0062_a	5	HH	27/04/2018	08:15	30	213.67	213.67	100	1	A	30
BS_SW_0062_b	5	HH	27/04/2018	08:15	30	120.23	120.23	100	1	B	30
BS_SW_0062_c	5	HH	27/04/2018	08:15	15	177.62	177.62	100	1	A	15
BS_SW_0069_a	5	HH	27/04/2018	08:04	15	260.48	260.48	100	1	A	15
BS_SW_0069_b	5	HH	27/04/2018	08:04	15	239.62	239.62	100	1	B	15
BS_SW_0069_c	5	HH	27/04/2018	08:04	30	242.39	242.39	100	1	A	30
BS_SW_0071	4	HH	27/04/2018	12:40	30	266.72	266.72	100	1	A	30
BS_SW_0313	8	HH	29/04/2018	08:28	135	793.01	793.01	100	1	A	135



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0314	8	HH	29/04/2018	08:34	45	327.83	327.83	100	1	A	45
BS_SW_0090	3	HH	30/04/2018	07:34	75	707.89	707.89	100	1	A	75
BS_SW_0092	3	HH	30/04/2018	07:51	30	304.87	304.87	100	1	A	30
BS_SW_0094_a	3	HH	30/04/2018	08:25	120	2238.50	2238.50	100	1	B	120
BS_SW_0094_b	3	HH	30/04/2018	08:25	45	1795.09	1795.09	100	1	A	45
BS_SW_0095	3	HH	30/04/2018	08:25	210	2887.15	2887.15	100	1	B	210
BS_SW_0096	3	HH	30/04/2018	08:45	120	1504.34	1504.34	100	1	B	120
BS_SW_0097_a	3	HH	30/04/2018	08:49	30	501.54	501.54	100	1	B	30
BS_SW_0097_b	3	HH	30/04/2018	08:49	135	1267.27	1267.27	100	1	A	135
BS_SW_0098	3	HH	30/04/2018	09:00	60	714.09	714.09	100	1	A	60
BS_SW_0120	5	HH	02/05/2018	07:34	45	384.93	384.93	100	1	A	45
BS_SW_0124_a	5	HH	02/05/2018	08:30	30	286.19	286.19	100	1	A	30
BS_SW_0124_b	5	HH	02/05/2018	08:30	180	3535.83	3535.83	100	1	B	180
BS_SW_0124_c	5	HH	02/05/2018	08:30	30	324.94	324.94	100	1	A	30
BS_SW_0527	4	HH	05/05/2018	19:23	255	1649.45	1649.45	100	1	A	255
BS_SW_0540	8	HH	07/05/2018	06:37	150	643.00	643.00	100	1	A	150
BS_SW_0541	8	HH	07/05/2018	06:51	30	361.46	361.46	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0139_a	3	HH	12/05/2018	16:32	45	476.15	476.15	100	1	B	45
BS_SW_0139_b	3	HH	12/05/2018	16:32	60	255.62	255.62	100	1	C	60
BS_SW_0140	3	HH	12/05/2018	16:37	60	890.61	890.61	100	1	A	60
BS_SW_0141	3	HH	12/05/2018	16:39	75	877.62	877.62	100	1	A	75
BS_SW_0502	5	HH	13/05/2018	16:36	150	855.21	855.21	100	1	A	150
BS_SW_0503	5	HH	13/05/2018	16:55	45	527.68	527.68	100	1	A	45
BS_SW_0511	4	HH	22/05/2018	08:13	75	1117.80	1117.80	100	1	A	75
BS_SW_0176_a	8	HH	10/06/2018	13:30	135	4267.33	4267.33	100	1	C	135
BS_SW_0177_a	8	HH	10/06/2018	13:34	75	534.85	534.85	100	1	B	75
BS_SW_0177_b	8	HH	10/06/2018	13:34	180	3579.57	3579.57	100	1	C	180
BS_SW_0364	2	HH	17/06/2018	20:48	210	1533.71	222.76	15	1	A	31
BS_SW_0357	3	HH	18/06/2018	13:17	15	262.24	262.24	100	1	A	15
BS_SW_0358	3	HH	18/06/2018	14:10	60	690.41	690.41	100	1	A	60
BS_SW_0359_a	3	HH	18/06/2018	15:09	45	966.73	966.73	100	1	B	45
BS_SW_0359_b	3	HH	18/06/2018	15:09	15	177.23	177.23	100	1	A	15
BS_SW_0363	4	HH	18/06/2018	20:11	315	2667.35	2667.35	100	1	A	315
BS_SW_0271	5	HH	21/06/2018	10:21	120	1210.92	1210.92	100	1	A	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0272_a	5	HH	21/06/2018	10:42	30	470.68	470.68	100	1	B	30
BS_SW_0272_b	5	HH	21/06/2018	10:42	90	1262.74	1262.74	100	1	A	90
BS_SW_0273	5	HH	21/06/2018	10:58	15	218.57	218.57	100	1	A	15
BS_SW_0286	8	HH	23/06/2018	19:55	105	526.59	526.59	100	1	A	105
BS_SW_0288_a	8	HH	23/06/2018	20:00	15	132.71	132.71	100	1	A	15
BS_SW_0288_b	8	HH	23/06/2018	20:00	30	217.26	217.26	100	1	B	30
BS_SW_0288_c	8	HH	23/06/2018	20:00	30	284.11	284.11	100	1	A	30
BS_SW_0292_a	8	HH	23/06/2018	21:28	45	1262.33	1262.33	100	1	B	45
BS_SW_0292_b	8	HH	23/06/2018	21:28	45	606.55	606.55	100	1	A	45
BS_SW_0293	8	HH	23/06/2018	21:31	30	187.11	187.11	100	1	A	30
BS_SW_0297	8	HH	23/06/2018	21:43	105	1133.17	1133.17	100	1	A	105
BS_SW_0301	8	HH	27/06/2018	06:25	30	413.48	413.48	100	1	A	30
BS_SW_0302_a	8	HH	27/06/2018	06:30	45	1613.78	1613.78	100	1	B	45
BS_SW_0302_b	8	HH	27/06/2018	06:30	30	269.59	269.59	100	1	A	30
BS_SW_0384	3	HH	27/06/2018	16:42	45	1623.85	1623.85	100	1	C	45
BS_SW_0393_a	3	HH	27/06/2018	18:23	45	1776.06	1776.06	100	1	C	45
BS_SW_0393_b	3	HH	27/06/2018	18:23	15	308.10	308.10	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0317	3	HH	30/06/2018	08:17	30	65.70	65.70	100	1	A	30
BS_SW_0318	3	HH	30/06/2018	08:20	60	464.53	464.53	100	1	A	60
BS_SW_0319	3	HH	30/06/2018	08:21	15	79.35	79.35	100	1	A	15
BS_SW_0432_a	5	HH	09/07/2018	14:28	105	1329.29	1329.29	100	1	C	105
BS_SW_0432_b	5	HH	09/07/2018	14:28	15	216.19	216.19	100	1	B	15
BS_SW_0436_a	5	HH	09/07/2018	15:37	45	1426.40	1426.40	100	1	C	45
BS_SW_0436_b	5	HH	09/07/2018	15:37	30	820.98	820.98	100	1	B	30
BS_SW_0437	5	HH	09/07/2018	15:49	75	553.30	553.30	100	1	A	75
BS_SW_0442	5	HH	09/07/2018	18:24	15	447.72	447.72	100	1	A	15
BS_SW_0462	8	HH	16/07/2018	09:16	60	710.24	710.24	100	1	A	60
BS_SW_0468	8	HH	16/07/2018	10:02	135	981.55	981.55	100	1	A	135
BS_SW_0489_a	4	HH	17/07/2018	11:10	105	1852.50	1852.50	100	1	B	105
BS_SW_0489_b	4	HH	17/07/2018	11:10	15	142.32	142.32	100	1	A	15
BS_SW_0492	4	HH	17/07/2018	12:02	60	756.24	756.24	100	2	A	120
BS_SW_0493	4	HH	17/07/2018	12:03	45	715.15	715.15	100	2	A	90
BS_SW_0545	5	HH	26/07/2018	08:55	120	1168.12	1168.12	100	1	A	120
BS_SW_0628	8	HH	30/07/2018	17:11	120	2240.33	2240.33	100	1	A	120

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0664	3	HH	01/08/2018	10:31	180	3786.03	3786.03	100	1	A	180
BS_SW_0742	8	HH	13/08/2018	19:20	30	410.30	410.30	100	1	A	30
BS_SW_0747_a	8	HH	13/08/2018	20:23	90	1968.73	1921.98	98	1	A	88
BS_SW_0747_b	8	HH	13/08/2018	20:23	30	421.60	421.60	100	1	B	30
BS_SW_0747_c	8	HH	13/08/2018	20:23	180	663.95	663.95	100	1	A	180
BS_SW_0829	2	HH	23/08/2018	07:25	360	1142.71	1142.71	100	1	A	360
BS_SW_0830	2	HH	23/08/2018	07:25	360	1077.78	1077.78	100	1	A	360
BS_SW_0831_a	2	HH	23/08/2018	07:27	30	499.44	499.44	100	1	B	30
BS_SW_0831_b	2	HH	23/08/2018	07:27	210	759.27	759.27	100	1	A	210
BS_SW_0832	2	HH	23/08/2018	07:34	135	1184.30	1184.30	100	1	A	135
BS_SW_0833	2	HH	23/08/2018	07:34	135	981.78	981.78	100	1	A	135
BS_SW_0835	2	HH	23/08/2018	08:11	45	1061.46	855.66	81	1	A	36
BS_SW_0848	5	HH	24/08/2018	16:20	15	430.35	430.35	100	1	A	15

B.10b VP Flight Data: Hen Harrier – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0245_b	2	HH	12/04/2019	15:26	75	906.79	498.39	55	1	A	41
40001_VP_0251_a	8	HH	12/04/2019	10:40	120	1111.61	1111.61	100	2	B	240
40001_VP_0251_b	8	HH	12/04/2019	10:40	30	148.64	148.64	100	2	A	60
40001_VP_0252_a	8	HH	12/04/2019	10:40	105	462.86	462.86	100	1	B	105
40001_VP_0252_b	8	HH	12/04/2019	10:40	15	119.49	119.49	100	1	A	15
40001_VP_0262_a	2	HH	12/04/2019	12:25	120	1378.24	1378.24	100	1	B	120
40001_VP_0262_b	2	HH	12/04/2019	12:25	15	628.65	628.65	100	1	A	15
40001_VP_0276	4	HH	14/04/2019	09:09	45	314.15	314.15	100	1	A	45
40001_VP_0277	4	HH	14/04/2019	09:27	180	1600.27	1600.27	100	1	A	180
40001_VP_0278	4	HH	14/04/2019	11:23	60	951.24	951.24	100	1	A	60
40001_VP_0289_a	5	HH	14/04/2019	14:44	30	225.11	225.11	100	1	B	30
40001_VP_0289_b	5	HH	14/04/2019	14:44	75	1374.94	1169.25	85	1	A	64
40001_VP_0290	5	HH	14/04/2019	08:31	90	923.50	923.50	100	1	A	90
40001_VP_0293_a	5	HH	14/04/2019	09:15	45	322.41	322.41	100	1	B	45
40001_VP_0293_b	5	HH	14/04/2019	09:15	15	84.44	84.44	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0296_a	5	HH	14/04/2019	11:10	45	1145.17	1145.17	100	2	A	90
40001_VP_0296_b	5	HH	14/04/2019	11:10	45	644.18	644.18	100	2	B	90
40001_VP_0296_c	5	HH	14/04/2019	11:10	30	866.55	866.55	100	2	A	60
40001_VP_0297_a	5	HH	14/04/2019	11:12	45	510.64	510.64	100	1	B	45
40001_VP_0297_b	5	HH	14/04/2019	11:12	15	154.22	154.22	100	1	A	15
40001_VP_0307_a	8	HH	16/04/2019	13:40	60	1130.50	1130.50	100	1	A	60
40001_VP_0307_b	8	HH	16/04/2019	13:40	60	1064.47	1064.47	100	1	B	60
40001_VP_0307_c	8	HH	16/04/2019	13:40	15	171.64	171.64	100	1	A	15
40001_VP_0388	3	HH	07/05/2019	11:21	15	269.71	269.71	100	1	A	15
40001_VP_0392_a	2	HH	07/05/2019	12:38	15	115.88	7.58	7	1	A	1
40001_VP_0392_b	2	HH	07/05/2019	12:38	15	408.48	408.48	100	1	B	15
40001_VP_0392_c	2	HH	07/05/2019	12:38	135	1062.83	1062.83	100	1	A	135
40001_VP_0430	8	HH	09/05/2019	16:05	120	1222.12	1222.12	100	1	A	120
40001_VP_0448	3	HH	11/05/2019	18:38	45	321.80	321.80	100	1	A	45
40001_VP_0329_a	3	HH	17/05/2019	08:58	90	1173.64	1173.64	100	1	A	90
40001_VP_0329_b	3	HH	17/05/2019	08:58	75	482.62	482.62	100	1	B	75



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0329_c	3	HH	17/05/2019	08:58	45	764.47	764.47	100	1	A	45
40001_VP_0329_d	3	HH	17/05/2019	08:58	15	642.35	642.35	100	1	B	15
40001_VP_0329_e	3	HH	17/05/2019	08:58	15	494.32	494.32	100	1	A	15
40001_VP_0329_f	3	HH	17/05/2019	08:58	15	355.84	355.84	100	1	B	15
40001_VP_0329_g	3	HH	17/05/2019	08:58	45	651.68	651.68	100	1	A	45
40001_VP_0329_h	3	HH	17/05/2019	08:58	135	64.87	64.87	100	1	B	135
40001_VP_0331_a	3	HH	17/05/2019	09:16	30	234.42	234.42	100	1	B	30
40001_VP_0331_b	3	HH	17/05/2019	09:16	15	197.00	197.00	100	1	A	15
40001_VP_0331_c	3	HH	17/05/2019	09:16	75	1087.62	1087.62	100	1	B	75
40001_VP_0333	8	HH	02/06/2019	20:47	30	436.68	436.68	100	1	A	30
40001_VP_0334_a	8	HH	02/06/2019	20:49	60	829.10	829.10	100	2	A	120
40001_VP_0334_b	8	HH	02/06/2019	20:49	75	986.00	986.00	100	2	B	150
40001_VP_0692_a	5	HH	03/06/2019	19:16	75	1571.35	653.85	42	1	B	31
40001_VP_0692_b	5	HH	03/06/2019	19:16	45	398.27	398.27	100	1	A	45
40001_VP_0696	5	HH	03/06/2019	20:03	240	2590.12	2590.12	100	1	A	240
40001_VP_0698	5	HH	03/06/2019	20:41	210	2939.58	2935.16	100	1	A	210

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0341	1	HH	05/06/2019	09:15	75	983.07	843.98	86	1	A	64
40001_VP_0615_a	8	HH	21/06/2019	13:09	45	898.37	898.37	100	1	B	45
40001_VP_0615_b	8	HH	21/06/2019	13:09	75	662.85	662.85	100	1	A	75
40001_VP_0780_a	3	HH	22/06/2019	07:15	30	714.64	714.64	100	1	B	30
40001_VP_0780_b	3	HH	22/06/2019	07:15	30	304.81	304.81	100	1	A	30
40001_VP_0780_c	3	HH	22/06/2019	07:15	60	809.56	809.56	100	1	B	60
40001_VP_0512	2	HH	23/06/2019	19:05	225	1037.33	1037.33	100	1	A	225
40001_VP_0516	2	HH	23/06/2019	20:15	195	3855.35	3789.67	98	1	B	192
40001_VP_0517_a	2	HH	23/06/2019	20:17	30	451.03	365.63	81	1	B	24
40001_VP_0517_b	2	HH	23/06/2019	20:17	60	1322.95	1322.95	100	1	A	60
40001_VP_0602_a	5	HH	23/06/2019	13:58	75	1570.25	532.42	34	1	A	25
40001_VP_0602_b	5	HH	23/06/2019	13:58	90	1105.28	643.08	58	1	B	52
40001_VP_0602_c	5	HH	23/06/2019	13:58	60	679.79	679.79	100	1	A	60
40001_VP_0702	5	HH	24/06/2019	12:17	60	590.88	590.88	100	1	A	60
40001_VP_0715_a	5	HH	24/06/2019	13:59	195	2089.80	2089.80	100	1	B	195
40001_VP_0715_b	5	HH	24/06/2019	13:59	60	722.44	722.44	100	1	A	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0723	5	HH	24/06/2019	15:13	105	1510.20	1510.20	100	1	B	105
40001_VP_0808	5	HH	25/06/2019	08:10	90	1737.50	1737.50	100	1	A	90
40001_VP_0468	14	HH	30/06/2019	17:11	45	739.75	739.75	100	1	A	45
40001_VP_0731	8	HH	06/07/2019	12:50	135	612.35	612.35	100	1	A	135
40001_VP_0740	8	HH	06/07/2019	13:43	60	919.38	919.38	100	1	A	60
40001_VP_0747	8	HH	06/07/2019	14:25	150	1655.57	1655.57	100	1	A	150
40001_VP_0816	2	HH	08/07/2019	14:31	105	2063.00	2063.00	100	1	A	105
40001_VP_0469	14	HH	14/07/2019	12:43	75	1496.93	1166.36	78	1	B	58
40001_VP_0865	8	HH	22/07/2019	10:25	105	1099.31	1099.31	100	1	A	105
40001_VP_1063_a	5	HH	16/08/2019	20:03	30	550.73	550.73	100	1	B	30
40001_VP_1063_b	5	HH	16/08/2019	20:03	45	1043.06	1043.06	100	1	A	45
40001_VP_1074	5	HH	22/08/2019	10:55	15	549.37	549.37	100	1	A	15
40001_VP_1078	5	HH	22/08/2019	11:45	165	2898.92	2898.92	100	1	A	165
40001_VP_1084_a	2	HH	22/08/2019	19:11	45	687.24	687.24	100	1	B	45
40001_VP_1084_b	2	HH	22/08/2019	19:11	30	319.50	182.24	57	1	A	17
40001_VP_1086	5	HH	23/08/2019	15:00	255	1689.69	1689.69	100	1	A	255



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1087	5	HH	23/08/2019	15:09	225	723.06	723.06	100	1	A	225
40001_VP_1088	5	HH	23/08/2019	16:38	150	779.67	779.67	100	1	A	150
40001_VP_1091	5	HH	23/08/2019	16:41	60	339.62	339.62	100	1	A	60
40001_VP_1098	3	HH	24/08/2019	10:34	180	2576.99	2374.00	92	1	A	166
40001_VP_1099	3	HH	24/08/2019	10:35	225	2673.38	2673.38	100	1	A	225

B.11a VP Flight Data: Hen Harrier – Year 1 Non-breeding (September 2017 – March 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_042_a	4	HH	11/10/2017	10:26	60	469.60	469.60	100	1	B	60
SW_042_b	4	HH	11/10/2017	10:26	45	434.44	434.44	100	1	A	45
SW_067_a	3	HH	26/10/2017	17:06	60	476.52	476.52	100	1	A	60
SW_067_b	3	HH	26/10/2017	17:06	45	252.68	252.68	100	1	B	45
SW_003	5	HH	30/10/2017	11:38	50	1339.46	1339.46	100	1	B	50
SW_004_a	8	HH	30/10/2017	15:19	30	814.72	814.72	100	1	A	30
SW_004_b	8	HH	30/10/2017	15:19	61	1832.53	1832.53	100	1	B	61
SW_011	4	HH	01/11/2017	09:01	213	2485.16	2485.16	100	1	A	213



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_017_a	8	HH	02/11/2017	10:05	45	471.37	471.37	100	1	B	45
SW_017_b	8	HH	02/11/2017	10:05	5	116.13	116.13	100	1	A	5
SW_018	8	HH	02/11/2017	10:07	68	873.18	873.18	100	1	A	68
SW_022	2	HH	02/11/2017	14:00	75	1331.87	1266.97	95	1	B	71
SW_025	3	HH	03/11/2017	13:34	16	199.46	199.46	100	1	A	16
SW_026_a	3	HH	03/11/2017	14:03	75	1325.15	1325.15	100	1	B	75
SW_026_b	3	HH	03/11/2017	14:03	79	1007.76	1007.76	100	1	A	79
SW_039	3	HH	16/11/2017	15:50	60	1310.02	1310.02	100	1	A	60
SW_041	3	HH	16/11/2017	16:05	180	1586.23	1586.23	100	1	A	180
SW_079	8	HH	20/12/2017	10:10	30	807.89	807.89	100	1	A	30
SW_080_a	8	HH	20/12/2017	10:10	75	1126.53	1126.53	100	1	A	75
SW_080_b	8	HH	20/12/2017	10:10	40	1028.24	1028.24	100	1	B	40
SW_080_c	8	HH	20/12/2017	10:10	95	1759.59	1759.59	100	1	A	95
SW_081_a	8	HH	20/12/2017	11:40	45	415.82	415.82	100	1	A	45
SW_082_b	8	HH	20/12/2017	11:40	30	782.07	782.07	100	1	B	30
SW_082_c	8	HH	20/12/2017	11:40	30	327.78	327.78	100	1	A	30
SW_098_a	5	HH	23/12/2017	15:32	45	672.40	672.40	100	1	A	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_098_b	5	HH	23/12/2017	15:32	15	112.01	112.01	100	1	B	15
SW_098_c	5	HH	23/12/2017	15:32	75	322.92	322.92	100	1	A	75
SW_121	4	HH	09/01/2018	10:39	45	616.10	616.10	100	1	A	45
SW_109	8	HH	16/01/2018	09:40	79	1458.28	1458.28	100	1	B	79
SW_112	8	HH	16/01/2018	11:57	38	631.97	631.97	100	1	B	38
SW_113	8	HH	16/01/2018	13:08	23	696.23	696.23	100	1	B	23
SW_115_a	8	HH	16/01/2018	15:09	45	841.27	841.27	100	1	B	45
SW_115_b	8	HH	16/01/2018	15:09	154	1996.71	1996.71	100	1	A	154
SW_126	2	HH	04/02/2018	09:40	90	1328.50	1328.50	100	1	A	90
SW_142	8	HH	16/02/2018	08:50	77	876.79	876.79	100	1	A	77
SW_145	8	HH	16/02/2018	12:58	15	256.30	256.30	100	1	A	15
SW_146	8	HH	16/02/2018	13:41	90	989.36	989.36	100	1	B	90
SW_171	3	HH	17/02/2018	08:36	30	353.47	353.47	100	1	A	30
SW_160_a	5	HH	14/03/2018	16:55	180	5281.11	5281.11	100	1	A	180
SW_160_b	5	HH	14/03/2018	16:55	60	511.34	511.34	100	1	B	60
SW_160_c	5	HH	14/03/2018	16:55	195	1536.02	1536.02	100	1	A	195
SW_161_a	5	HH	14/03/2018	16:59	120	1663.85	1663.85	100	1	A	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_161_b	5	HH	14/03/2018	16:59	30	323.34	323.34	100	1	B	30
SW_161_c	5	HH	14/03/2018	16:59	30	1142.16	1142.16	100	1	A	30
SW_182_a	4	HH	19/03/2018	17:21	30	371.96	371.96	100	1	B	30
SW_182_b	4	HH	19/03/2018	17:21	30	337.37	337.37	100	1	A	30

B.11b VP Flight Data: Hen Harrier – Year 2 non-Breeding (September 2018 – March 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1179	5	HH	10/09/2018	17:43	120	898.99	898.99	100	1	A	120
BS_SW_1180	8	HH	11/09/2018	16:27	30	743.63	743.63	100	1	A	30
BS_SW_1181	8	HH	11/09/2018	17:00	75	1218.87	1218.87	100	1	A	75
BS_SW_1190_a	1	HH	13/09/2018	14:27	15	382.80	382.80	100	1	B	15
BS_SW_1190_b	1	HH	13/09/2018	14:27	75	1112.63	1112.63	100	1	A	75
BS_SW_1191	5	HH	13/09/2018	06:55	380	3403.58	3403.58	100	1	A	380
BS_SW_1192_a	5	HH	13/09/2018	07:30	210	2386.25	2386.25	100	1	A	210
BS_SW_1192_b	5	HH	13/09/2018	07:30	15	194.72	194.72	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1192_c	5	HH	13/09/2018	07:30	75	1939.67	1939.67	100	1	A	75
BS_SW_1193_a	5	HH	13/09/2018	08:55	120	1274.34	1274.34	100	1	A	120
BS_SW_1193_b	5	HH	13/09/2018	08:55	30	316.95	316.95	100	1	B	30
BS_SW_1193_c	5	HH	13/09/2018	08:55	75	1287.59	1287.59	100	1	A	75
BS_SW_1195	5	HH	13/09/2018	09:15	15	223.59	223.59	100	1	A	15
BS_SW_1197	3	HH	13/09/2018	17:12	105	1284.64	1284.64	100	1	A	105
BS_SW_1198	3	HH	13/09/2018	18:31	165	1551.47	1551.47	100	1	A	165
BS_SW_1199	3	HH	13/09/2018	18:33	195	1968.68	1968.68	100	1	A	195
BS_SW_1200	3	HH	13/09/2018	18:36	180	1576.39	1576.39	100	1	A	180
BS_SW_1201	3	HH	13/09/2018	18:39	45	454.46	454.46	100	1	A	45
BS_SW_1202	3	HH	13/09/2018	19:50	45	543.48	543.48	100	1	A	45
BS_SW_1203	3	HH	13/09/2018	19:57	180	1470.01	1470.01	100	1	A	180
BS_SW_1204	3	HH	13/09/2018	20:00	120	1322.05	1322.05	100	1	A	120
BS_SW_1234_a	4	HH	22/09/2018	17:21	30	620.82	620.82	100	1	A	30
BS_SW_1234_b	4	HH	22/09/2018	17:21	15	265.79	265.79	100	1	B	15
BS_SW_1234_c	4	HH	22/09/2018	17:21	15	216.79	216.79	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1236_a	4	HH	22/09/2018	18:05	45	672.38	672.38	100	1	B	45
BS_SW_1236_b	4	HH	22/09/2018	18:05	30	252.60	252.60	100	1	A	30
BS_SW_1237	8	HH	23/09/2018	11:24	180	2132.85	2132.85	100	1	A	180
BS_SW_1240	2	HH	23/09/2018	17:56	135	2606.91	2606.91	100	1	A	135
BS_SW_1242_a	4	HH	24/09/2018	14:25	15	167.62	167.62	100	2	B	30
BS_SW_1242_b	4	HH	24/09/2018	14:25	15	136.57	136.57	100	2	A	30
BS_SW_1242_c	4	HH	24/09/2018	14:25	15	76.79	76.79	100	2	B	30
BS_SW_1242_d	4	HH	24/09/2018	14:25	15	101.60	101.60	100	2	A	30
40001_VP_0027	8	HH	03/11/2018	13:44	135	462.82	462.82	100	1	A	135
40001_VP_0030	8	HH	03/11/2018	14:03	120	941.34	941.34	100	1	A	120
40001_VP_0031	4	HH	05/11/2018	13:35	105	1861.75	1861.75	100	1	A	105
40001_VP_0075	5	HH	19/11/2018	11:08	15	270.59	270.59	100	1	B	15
40001_VP_0076	5	HH	19/11/2018	11:09	60	926.88	926.88	100	1	B	60
40001_VP_0079	5	HH	19/11/2018	14:16	45	464.00	464.00	100	1	A	45
40001_VP_0080_a	5	HH	19/11/2018	15:59	90	744.49	744.49	100	1	B	90
40001_VP_0080_b	5	HH	19/11/2018	15:59	15	183.83	183.83	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0081	5	HH	19/11/2018	16:11	30	2669.00	829.06	31	1	B	9
40001_VP_0069	1	HH	22/11/2018	15:59	120	994.81	764.14	77	1	A	92
40001_VP_0071_a	1	HH	22/11/2018	16:08	30	379.41	379.41	100	1	A	30
40001_VP_0071_b	1	HH	22/11/2018	16:08	45	603.57	603.57	100	1	B	45
40001_VP_0071_c	1	HH	22/11/2018	16:08	285	1850.93	1850.93	100	1	A	285
40001_VP_0089	3	HH	04/12/2018	13:33	4	68.19	68.19	100	1	A	4
40001_VP_0091	3	HH	04/12/2018	14:05	30	339.96	339.96	100	1	A	30
40001_VP_0104	3	HH	07/12/2018	14:12	90	679.93	679.93	100	1	A	90
40001_VP_0105	3	HH	08/12/2018	10:46	45	524.78	524.78	100	1	A	45
40001_VP_0107	4	HH	09/12/2018	15:30	255	2756.27	2756.27	100	1	A	255
40001_VP_0108	5	HH	17/12/2018	14:56	135	3198.74	3198.74	100	1	A	135
40001_VP_0144	2	HH	14/01/2019	12:49	15	590.55	590.55	100	1	A	15
40001_VP_0146	5	HH	15/01/2019	09:54	30	1075.73	1075.73	100	1	A	30
40001_VP_0147_a	3	HH	16/01/2019	14:27	30	674.08	674.08	100	1	A	30
40001_VP_0147_b	3	HH	16/01/2019	14:27	30	668.26	668.26	100	1	B	30
40001_VP_0147_c	3	HH	16/01/2019	14:27	15	418.35	418.35	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0135_a	3	HH	28/01/2019	09:46	15	188.62	188.62	100	1	B	15
40001_VP_0135_b	3	HH	28/01/2019	09:46	90	1076.94	1076.94	100	1	A	90
40001_VP_0125	8	HH	29/01/2019	10:58	40	766.06	766.06	100	1	A	40
40001_VP_0149_a	8	HH	11/02/2019	14:54	30	211.09	211.09	100	1	A	30
40001_VP_0149_b	8	HH	11/02/2019	14:54	45	395.24	395.24	100	1	B	45
40001_VP_0149_c	8	HH	11/02/2019	14:54	165	1350.71	1350.71	100	1	A	165
40001_VP_0150	3	HH	12/02/2019	16:21	195	1555.37	1555.37	100	1	A	195
40001_VP_0158_a	3	HH	18/02/2019	13:58	105	1638.29	1638.29	100	1	A	105
40001_VP_0158_b	3	HH	18/02/2019	14:02	105	1211.28	1211.28	100	1	A	105
40001_VP_0160_a	5	HH	19/02/2019	08:00	60	1324.58	1324.58	100	1	A	60
40001_VP_0161_a	5	HH	19/02/2019	08:03	165	625.66	303.39	48	1	A	80
40001_VP_0164_a	8	HH	19/02/2019	15:01	60	780.28	780.28	100	1	A	60
40001_VP_0165_a	8	HH	19/02/2019	16:17	75	1703.48	1703.48	100	1	B	75
40001_VP_0165_b	8	HH	19/02/2019	16:17	180	1746.10	1746.10	100	1	A	180
40001_VP_0166_a	8	HH	19/02/2019	16:32	45	670.67	670.67	100	1	B	45
40001_VP_0166_b	8	HH	19/02/2019	16:32	90	1315.86	1315.86	100	1	A	90

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0199	4	HH	20/03/2019	12:52	15	307.69	307.69	100	1	A	15
40001_VP_0203_a	8	HH	21/03/2019	09:04	30	515.17	515.17	100	1	A	30
40001_VP_0203_b	8	HH	21/03/2019	09:04	15	368.43	368.43	100	1	B	15
40001_VP_0203_c	8	HH	21/03/2019	09:04	30	572.46	572.46	100	1	A	30
40001_VP_0206	8	HH	21/03/2019	09:39	180	1962.23	1962.23	100	2	A	360
40001_VP_0208	1	HH	25/03/2019	09:34	210	5412.12	3540.26	65	1	A	137
40001_VP_0225_a	1	HH	27/03/2019	11:24	30	1675.69	1675.69	100	1	B	30
40001_VP_0225_b	1	HH	27/03/2019	11:24	30	1178.19	1178.19	100	1	A	30
40001_VP_0225_c	1	HH	27/03/2019	11:24	60	2529.17	723.03	29	1	B	17

B.12a VP Flight Data: Merlin – Year 1 Breeding (April – July 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0031_a	3	ML	25/04/2018	18:08	60	1145.23	1145.23	100	1	B	60
BS_SW_0031_b	3	ML	25/04/2018	18:08	15	353.26	353.26	100	1	A	15
BS_SW_0112	2	ML	01/05/2018	08:42	45	273.41	232.85	85	1	A	38



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0504	5	ML	13/05/2018	17:14	15	380.16	380.16	100	1	A	15
BS_SW_0279_a	8	ML	23/06/2018	18:46	30	443.50	443.50	100	1	A	30
BS_SW_0279_b	8	ML	23/06/2018	18:46	15	431.17	431.17	100	1	B	15
BS_SW_0280_a	8	ML	23/06/2018	18:46	30	369.03	369.03	100	1	A	30
BS_SW_0280_b	8	ML	23/06/2018	18:46	45	794.93	794.93	100	1	B	45
BS_SW_0438	5	ML	09/07/2018	15:52	30	396.60	396.60	100	2	A	60
BS_SW_0439_a	5	ML	09/07/2018	16:27	15	288.61	288.61	100	1	A	15
BS_SW_0439_b	5	ML	09/07/2018	16:27	15	223.60	223.60	100	1	B	15
BS_SW_0439_c	5	ML	09/07/2018	16:27	15	157.23	157.23	100	1	A	15
BS_SW_0455_a	5	ML	15/07/2018	10:10	15	239.73	239.73	100	1	B	15
BS_SW_0455_b	5	ML	15/07/2018	10:10	15	177.52	177.52	100	1	A	15
BS_SW_0457	5	ML	15/07/2018	10:32	30	954.33	954.33	100	1	A	30
BS_SW_0546	5	ML	26/07/2018	09:05	45	990.79	990.79	100	2	A	90
BS_SW_0631_a	8	ML	30/07/2018	18:06	15	924.32	924.32	100	1	A	15
BS_SW_0631_b	8	ML	30/07/2018	18:06	30	207.45	207.45	100	1	B	30
BS_SW_0636	1	ML	31/07/2018	08:04	15	368.06	368.06	100	1	A	15



B.12b VP Flight Data: Merlin – Year 2 Breeding (April – July 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0265_a	5	ML	12/04/2019	16:13	15	529.55	529.55	100	1	B	15
40001_VP_0265_b	5	ML	12/04/2019	16:13	2	55.85	55.85	100	1	A	2
40001_VP_0288_b	5	ML	14/04/2019	14:38	30	553.87	478.24	86	1	B	26
40001_VP_0288_c	5	ML	14/04/2019	14:38	5	64.37	64.37	100	1	A	5
40001_VP_0306	8	ML	16/04/2019	13:39	15	439.78	439.78	100	1	A	15
40001_VP_0403_a	8	ML	09/05/2019	17:24	45	545.70	545.70	100	1	A	45
40001_VP_0403_b	8	ML	09/05/2019	17:24	300	2308.99	2308.99	100	1	B	300
40001_VP_0312	2	ML	14/05/2019	Not recorded	60	1623.12	1309.40	81	2	A	97
40001_VP_0313	5	ML	15/05/2019	17:15	30	713.36	713.36	100	1	A	30
40001_VP_0830	5	ML	09/07/2019	14:04	15	289.36	289.36	100	1	A	15
40001_VP_0866	5	ML	24/07/2019	17:03	15	353.13	353.13	100	1	A	15

B.13a VP Flight Data: Pink-footed Goose – Year 1 Non-breeding (September 2017 – March 2018)

No data collected

B.13ba VP Flight Data: Pink-footed Goose – Year 2 Non-breeding (September 2018 – March 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1209	1	PG	21/09/2018	08:34	75	2123.84	1288.51	61	254	C	11557
BS_SW_1211	1	PG	21/09/2018	08:50	60	1895.24	444.08	23	345	C	4850
BS_SW_1212	1	PG	21/09/2018	08:52	60	2102.72	1830.92	87	32	D	1672
BS_SW_1226	3	PG	21/09/2018	15:59	45	2941.70	2941.70	100	37	D	1665
BS_SW_1227	3	PG	21/09/2018	16:15	30	1396.41	1396.41	100	62	D	1860
BS_SW_1230	3	PG	21/09/2018	17:02	45	1655.65	1655.65	100	48	D	2160
BS_SW_1231	2	PG	22/09/2018	11:34	45	1561.45	1561.45	100	31	D	1395
BS_SW_1235	4	PG	22/09/2018	17:47	60	2802.32	1904.15	68	141	D	5749
BS_SW_1238	8	PG	23/09/2018	13:35	90	2389.92	2321.91	97	56	D	4897
BS_SW_1239	2	PG	23/09/2018	15:50	60	2188.12	2188.12	100	340	D	20400
40001_VP_0021	5	PG	02/11/2018	09:59	585	3311.89	1381.13	42	8	B	1952

B.14a VP Flight Data: Red-throated Diver – Year 1 Breeding (April – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0534_a	3	RH	06/05/2018	19:17	15	435.85	435.85	100	1	C	15
BS_SW_0534_b	3	RH	06/05/2018	19:17	15	584.95	584.95	100	1	B	15
BS_SW_0535	3	RH	06/05/2018	19:35	75	2936.46	2936.46	100	1	B	75
BS_SW_0538	4	RH	06/05/2018	16:41	120	2591.70	2591.70	100	2	C	240
BS_SW_0539	8	RH	07/05/2018	05:16	45	2431.08	2431.08	100	1	A	45
BS_SW_0515	1	RH	11/05/2018	08:14	105	2334.31	2334.31	100	2	B	210
BS_SW_0517	1	RH	11/05/2018	10:24	30	957.88	823.17	86	1	B	26
BS_SW_0154_a	3	RH	12/05/2018	18:41	90	2615.52	2615.52	100	2	C	180
BS_SW_0154_b	3	RH	12/05/2018	18:41	30	1226.20	1226.20	100	2	B	60
BS_SW_0498	5	RH	22/05/2018	20:57	90	2273.79	2273.79	100	2	C	180
BS_SW_0994	5	RH	22/05/2018	20:03	45	2668.38	2077.96	78	1	A	35
BS_SW_0179	3	RH	24/05/2018	05:14	30	2269.59	2269.59	100	1	B	30
BS_SW_0213	1	RH	24/05/2018	20:22	45	2140.56	910.99	43	1	B	19
BS_SW_0215_a	1	RH	24/05/2018	21:28	15	783.59	783.59	100	1	A	15
BS_SW_0215_b	1	RH	24/05/2018	21:28	15	234.39	234.39	100	1	B	15
BS_SW_0303_a	1	RH	11/06/2018	09:26	45	706.07	84.35	12	1	B	5



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0303_b	1	RH	11/06/2018	09:26	90	1388.42	103.73	7	1	C	7
BS_SW_0307	1	RH	11/06/2018	06:43	105	1481.68	1479.94	100	1	B	105
BS_SW_0360	3	RH	18/06/2018	15:34	30	1315.50	1315.50	100	2	B	60
BS_SW_0362	4	RH	18/06/2018	18:39	150	1419.24	1419.24	100	2	C	300
BS_SW_0285	8	RH	23/06/2018	19:21	120	2569.42	2431.35	95	1	C	114
BS_SW_0371	1	RH	26/06/2018	18:04	105	2087.84	2087.84	100	1	B	105
BS_SW_0372	1	RH	26/06/2018	18:33	15	511.30	222.56	44	1	A	7
BS_SW_0378_a	1	RH	26/06/2018	20:36	30	620.76	620.76	100	2	B	60
BS_SW_0378_b	1	RH	26/06/2018	20:36	60	729.40	230.92	32	2	A	38
BS_SW_0385_a	3	RH	27/06/2018	16:42	15	545.42	545.42	100	1	C	15
BS_SW_0385_b	3	RH	27/06/2018	16:42	30	389.35	389.35	100	1	B	30
BS_SW_0336	5	RH	29/06/2018	19:50	15	403.30	403.30	100	1	A	15
BS_SW_0337_a	5	RH	29/06/2018	19:04	30	910.11	910.11	100	2	B	60
BS_SW_0337_b	5	RH	29/06/2018	19:04	15	302.64	302.64	100	2	A	30
BS_SW_0338	5	RH	29/06/2018	19:39	45	1374.04	1374.04	100	3	A	135
BS_SW_0339	5	RH	29/06/2018	19:40	45	1001.32	1001.32	100	1	B	45
BS_SW_0340	5	RH	29/06/2018	19:40	165	2879.45	2879.45	100	2	A	330



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0401	4	RH	29/06/2018	14:27	75	1150.35	1068.28	93	1	C	70
BS_SW_0322	3	RH	30/06/2018	08:40	60	1043.61	1043.61	100	1	C	60
BS_SW_0326	3	RH	30/06/2018	09:25	75	1537.82	1537.82	100	1	C	75
BS_SW_0332	1	RH	09/07/2018	17:48	135	3756.09	3697.69	98	1	B	133
BS_SW_0333	1	RH	09/07/2018	18:00	90	1684.15	1646.26	98	1	B	88
BS_SW_0334	1	RH	09/07/2018	18:43	180	2950.32	2740.09	93	2	C	334
BS_SW_0441	5	RH	09/07/2018	17:50	60	1500.31	1500.31	100	1	B	60
BS_SW_0444_a	5	RH	09/07/2018	18:50	45	1235.81	1072.28	87	1	B	39
BS_SW_0445_b	5	RH	09/07/2018	19:06	75	1827.42	1807.13	99	1	B	74
BS_SW_0445_c	5	RH	09/07/2018	19:06	75	2240.60	2240.60	100	1	C	75
BS_SW_0446_a	5	RH	09/07/2018	19:26	30	1012.34	1012.34	100	2	A	60
BS_SW_0446_b	5	RH	09/07/2018	19:26	30	1122.22	1122.22	100	2	B	60
BS_SW_0448_a	5	RH	09/07/2018	19:47	45	1384.72	1384.72	100	1	B	45
BS_SW_0448_b	5	RH	09/07/2018	19:47	30	960.62	794.24	83	1	C	25
BS_SW_0453_b	5	RH	13/07/2018	08:46	75	1585.71	1585.71	100	1	B	75
BS_SW_0453_a	5	RH	15/07/2018	08:46	30	992.09	406.38	41	1	A	12
BS_SW_0454	5	RH	15/07/2018	09:07	15	78.07	78.07	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0459_a	5	RH	15/07/2018	11:22	15	581.94	478.26	82	2	A	25
BS_SW_0459_b	5	RH	15/07/2018	11:22	90	2044.83	2044.83	100	2	B	180
BS_SW_0459_c	5	RH	15/07/2018	11:22	75	979.55	979.55	100	2	C	150
BS_SW_0495_a	2	RH	18/07/2018	07:40	30	699.48	699.48	100	1	A	30
BS_SW_0495_b	2	RH	18/07/2018	07:40	75	1749.97	1749.97	100	1	B	75
BS_SW_0495_c	2	RH	18/07/2018	07:40	15	229.36	229.36	100	1	C	15
BS_SW_0496_a	2	RH	18/07/2018	08:28	30	424.68	424.68	100	1	C	30
BS_SW_0496_b	2	RH	18/07/2018	08:28	45	1350.75	434.55	32	1	B	14
BS_SW_0497	2	RH	18/07/2018	08:44	30	780.80	488.68	63	1	A	19
BS_SW_0544_a	2	RH	23/07/2018	15:40	30	1022.33	1022.33	100	1	A	30
BS_SW_0544_b	2	RH	23/07/2018	15:40	30	983.32	983.32	100	1	B	30
BS_SW_0583	3	RH	25/07/2018	19:15	30	894.88	894.88	100	1	B	30
BS_SW_0586_a	3	RH	25/07/2018	20:07	15	360.47	360.47	100	1	B	15
BS_SW_0586_b	3	RH	25/07/2018	20:07	15	252.98	252.98	100	1	A	15
BS_SW_0547	5	RH	26/07/2018	09:15	75	2364.13	2364.13	100	1	B	75
BS_SW_0550	4	RH	26/07/2018	09:04	45	1894.21	981.14	52	1	B	23
BS_SW_0551_a	4	RH	26/07/2018	09:23	15	326.47	326.47	100	1	B	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0551_b	4	RH	26/07/2018	09:23	15	287.78	287.78	100	1	A	15
BS_SW_0609	4	RH	28/07/2018	15:12	105	2701.94	1648.81	61	2	C	128
BS_SW_0611_a	4	RH	28/07/2018	16:23	75	1932.46	1100.29	57	1	C	43
BS_SW_0611_b	4	RH	28/07/2018	16:23	30	630.86	630.86	100	1	B	30
BS_SW_0611_c	4	RH	28/07/2018	16:23	15	197.39	197.39	100	1	A	15
BS_SW_0621	4	RH	28/07/2018	17:33	105	2328.14	1491.77	64	2	B	135
BS_SW_0633	1	RH	31/07/2018	07:05	135	8951.94	7113.29	79	1	B	107
BS_SW_0635_a	1	RH	31/07/2018	08:00	75	1809.77	1516.31	84	1	B	63
BS_SW_0635_b	1	RH	31/07/2018	08:00	45	554.65	554.65	100	1	C	45
BS_SW_0637	1	RH	31/07/2018	08:20	45	1571.36	1413.08	90	2	B	81
BS_SW_0638_a	1	RH	31/07/2018	08:21	45	2711.05	2711.05	100	1	A	45
BS_SW_0638_b	1	RH	31/07/2018	08:21	30	1541.64	1349.83	88	1	B	26
BS_SW_0639	1	RH	31/07/2018	08:22	30	2132.93	2030.47	95	2	B	57
BS_SW_0640_a	1	RH	31/07/2018	08:28	60	1658.82	1658.82	100	4	B	240
BS_SW_0640_b	1	RH	31/07/2018	08:28	60	1104.05	882.69	80	4	C	192
BS_SW_0642_a	1	RH	31/07/2018	08:37	60	2532.65	2208.21	87	3	B	157
BS_SW_0642_b	1	RH	31/07/2018	08:37	45	1357.82	296.90	22	3	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0643	1	RH	31/07/2018	08:40	90	3743.71	2229.94	60	3	B	161
BS_SW_0647_b	1	RH	31/07/2018	09:10	135	6849.05	6220.50	91	2	B	245
BS_SW_0647_c	1	RH	31/07/2018	09:10	15	720.29	720.29	100	2	A	30
BS_SW_0648_a	1	RH	31/07/2018	09:11	15	205.08	205.08	100	2	A	30
BS_SW_0648_b	1	RH	31/07/2018	09:11	150	6070.57	6070.57	100	2	B	300
BS_SW_0648_c	1	RH	31/07/2018	09:11	180	3854.48	3854.48	100	2	C	360
BS_SW_0648_d	1	RH	31/07/2018	09:11	45	1737.55	964.99	56	2	B	50
BS_SW_0649_a	1	RH	31/07/2018	09:43	135	2793.17	2422.44	87	2	B	234
BS_SW_0990	1	RH	31/07/2018	07:05	165	9499.01	7058.20	74	1	B	123
BS_SW_0993_a	1	RH	31/07/2018	07:05	135	9416.09	8063.28	86	1	B	116
BS_SW_0993_b	1	RH	31/07/2018	07:05	15	288.78	257.05	89	1	A	13
BS_SW_0651_a	3	RH	01/08/2018	08:25	90	3781.64	3781.64	100	2	B	180
BS_SW_0651_b	3	RH	01/08/2018	08:25	15	388.14	388.14	100	2	A	30
BS_SW_0655_a	3	RH	01/08/2018	09:02	120	3425.75	3425.75	100	2	B	240
BS_SW_0655_b	3	RH	01/08/2018	09:02	30	598.18	598.18	100	2	A	60
BS_SW_0656	3	RH	01/08/2018	09:08	30	969.93	969.93	100	1	B	30
BS_SW_0662	3	RH	01/08/2018	09:58	105	2835.47	2835.47	100	1	B	105



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0676_a	2	RH	08/08/2018	14:52	15	562.51	562.51	100	1	C	15
BS_SW_0676_b	2	RH	08/08/2018	14:52	15	409.30	409.30	100	1	B	15
BS_SW_0676_c	2	RH	08/08/2018	14:52	15	420.64	420.64	100	1	A	15
BS_SW_0690_a	3	RH	10/08/2018	15:22	90	2098.07	2098.07	100	3	B	270
BS_SW_0690_b	3	RH	10/08/2018	15:22	45	1515.86	1515.86	100	3	C	135
BS_SW_0710	1	RH	12/08/2018	10:20	30	1168.87	866.23	74	1	B	22
BS_SW_0711_a	1	RH	12/08/2018	10:43	75	1901.41	1653.57	87	1	B	65
BS_SW_0713_a	1	RH	12/08/2018	10:58	30	744.59	715.51	96	1	B	29
BS_SW_0713_b	1	RH	12/08/2018	10:58	150	3112.35	1551.42	50	1	C	75
BS_SW_0730_a	1	RH	12/08/2018	15:08	15	404.46	318.69	79	1	A	12
BS_SW_0730_b	1	RH	12/08/2018	15:08	45	1311.29	857.76	65	1	B	29
BS_SW_0735	8	RH	13/08/2018	18:08	135	3538.84	3538.84	100	2	B	270
BS_SW_0737_a	8	RH	13/08/2018	18:13	30	1134.42	1134.42	100	1	B	30
BS_SW_0737_b	8	RH	13/08/2018	18:13	15	428.54	428.54	100	1	A	15
BS_SW_0739_a	8	RH	13/08/2018	18:24	15	657.24	657.24	100	1	A	15
BS_SW_0739_b	8	RH	13/08/2018	18:24	30	1216.01	1216.01	100	1	B	30
BS_SW_0739_c	8	RH	13/08/2018	18:24	45	659.09	659.09	100	1	C	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0741_a	8	RH	13/08/2018	18:53	45	1001.04	1001.04	100	1	B	45
BS_SW_0741_b	8	RH	13/08/2018	18:53	15	232.47	232.47	100	1	A	15
BS_SW_0743	8	RH	13/08/2018	20:00	75	1866.04	1866.04	100	1	B	75
BS_SW_0746	8	RH	13/08/2018	20:20	90	2697.43	2387.32	89	1	B	80
BS_SW_0748_a	8	RH	13/08/2018	20:30	75	1508.93	1508.93	100	1	B	75
BS_SW_0748_b	8	RH	13/08/2018	20:30	15	473.34	473.34	100	1	A	15
BS_SW_0749	8	RH	13/08/2018	20:34	45	1401.06	1401.06	100	2	B	90
BS_SW_0750_a	4	RH	13/08/2018	13:57	90	4025.70	4025.70	100	2	B	180
BS_SW_0750_b	4	RH	13/08/2018	13:57	45	941.92	941.92	100	2	C	90
BS_SW_0751	4	RH	13/08/2018	14:02	45	2185.08	2185.08	100	2	B	90
BS_SW_0754_a	4	RH	13/08/2018	14:12	15	620.88	620.88	100	1	A	15
BS_SW_0754_b	4	RH	13/08/2018	14:12	165	7933.19	7657.38	97	1	B	159
BS_SW_0754_c	4	RH	13/08/2018	14:12	15	690.05	690.05	100	1	A	15
BS_SW_0756	4	RH	13/08/2018	14:26	30	1431.41	1431.41	100	2	B	60
BS_SW_0758	4	RH	13/08/2018	14:32	255	13959.44	13959.44	100	2	C	510
BS_SW_0766	4	RH	13/08/2018	15:54	60	2035.63	1767.49	87	1	B	52
BS_SW_0768	4	RH	13/08/2018	16:18	75	2553.56	2553.56	100	1	B	75



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0770	4	RH	13/08/2018	16:30	135	2573.58	2117.98	82	1	B	111
BS_SW_0775	4	RH	14/08/2018	10:39	30	1268.09	1268.09	100	2	B	60
BS_SW_0776	4	RH	14/08/2018	10:40	30	1981.20	1981.20	100	2	B	60
BS_SW_0784	4	RH	14/08/2018	11:43	75	2577.64	1753.30	68	1	B	51
BS_SW_0792_a	4	RH	14/08/2018	12:16	30	681.38	681.38	100	2	B	60
BS_SW_0792_b	4	RH	14/08/2018	12:16	45	1017.51	1017.51	100	2	C	90
BS_SW_0794_a	4	RH	14/08/2018	12:27	60	1308.48	1113.65	85	1	C	51
BS_SW_0794_b	4	RH	14/08/2018	12:27	60	951.71	951.71	100	1	B	60
BS_SW_0797_a	4	RH	14/08/2018	12:55	45	990.64	990.64	100	1	C	45
BS_SW_0797_b	4	RH	14/08/2018	12:55	30	838.87	838.87	100	1	B	30
BS_SW_0800	8	RH	15/08/2018	10:20	60	1325.04	1325.04	100	1	A	60
BS_SW_0801	8	RH	15/08/2018	10:46	30	712.00	712.00	100	1	A	30
BS_SW_0803_a	8	RH	15/08/2018	11:34	30	528.14	528.14	100	1	B	30
BS_SW_0803_b	8	RH	15/08/2018	11:34	30	747.42	747.42	100	1	A	30
BS_SW_0807_a	8	RH	15/08/2018	12:07	45	1122.97	1122.97	100	1	B	45
BS_SW_0807_b	8	RH	15/08/2018	12:07	45	560.43	560.43	100	1	A	45
BS_SW_0812	2	RH	15/08/2018	11:50	30	601.72	601.72	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0816_a	1	RH	17/08/2018	19:14	30	610.17	610.17	100	1	B	30
BS_SW_0816_b	1	RH	17/08/2018	19:14	120	2493.36	1059.75	43	1	C	51
BS_SW_0824_b	3	RH	17/08/2018	10:10	75	931.05	931.05	100	1	C	75
BS_SW_0824_c	3	RH	17/08/2018	10:10	15	261.21	261.21	100	1	B	15
BS_SW_0834	2	RH	23/08/2018	07:55	15	119.51	119.51	100	1	A	15
BS_SW_0836	2	RH	23/08/2018	08:32	120	5395.24	2429.06	45	1	B	54
BS_SW_0837_a	2	RH	23/08/2018	08:55	60	1792.40	1028.35	57	2	A	69
BS_SW_0837_b	2	RH	23/08/2018	08:55	75	2138.28	2138.28	100	2	B	150
BS_SW_0838	2	RH	23/08/2018	10:05	15	145.91	145.91	100	1	A	15
BS_SW_0839	3	RH	24/08/2018	10:30	90	4268.49	4268.49	100	1	B	90
BS_SW_0843	3	RH	24/08/2018	11:34	165	5338.53	5338.53	100	2	C	330
BS_SW_0851	4	RH	25/08/2018	19:25	135	6580.92	6580.92	100	1	B	135
BS_SW_0852	4	RH	25/08/2018	19:25	135	6509.77	6509.77	100	1	B	135

B.14b VP Flight Data: Red-throated Diver – Year 2 Breeding (April – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0347_a	4	RH	22/04/2019	17:30	30	1885.12	1885.12	100	2	B	60
40001_VP_0347_b	4	RH	22/04/2019	17:30	15	341.07	341.07	100	2	A	30
40001_VP_0349_a	4	RH	22/04/2019	18:18	120	3196.34	3086.68	97	1	B	116
40001_VP_0349_b	4	RH	22/04/2019	18:18	60	2421.29	2421.29	100	1	C	60
40001_VP_0349_c	4	RH	22/04/2019	18:18	45	1495.76	1495.76	100	1	B	45
40001_VP_0349_d	4	RH	22/04/2019	18:18	15	307.86	307.86	100	1	A	15
40001_VP_0412_a	8	RH	09/05/2019	18:10	440	12973.52	12973.52	100	1	B	440
40001_VP_0412_b	8	RH	09/05/2019	18:10	120	482.41	482.41	100	1	C	120
40001_VP_0413	8	RH	09/05/2019	18:29	150	2403.83	2403.83	100	1	B	150
40001_VP_0420_a	8	RH	09/05/2019	19:48	60	838.17	838.17	100	1	B	60
40001_VP_0420_b	8	RH	09/05/2019	19:48	105	2476.85	2476.85	100	1	C	105
40001_VP_0421	8	RH	09/05/2019	19:48	165	3212.68	3212.68	100	1	C	165
40001_VP_0423_a	8	RH	09/05/2019	20:00	90	3394.70	3394.70	100	2	B	180
40001_VP_0423_b	8	RH	09/05/2019	20:00	30	338.19	338.19	100	2	A	60
40001_VP_0424	8	RH	09/05/2019	20:08	105	1680.79	1680.79	100	1	B	105



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0427	8	RH	09/05/2019	14:50	75	1874.55	1874.55	100	1	B	75
40001_VP_0434_a	2	RH	10/05/2019	19:45	60	916.93	916.93	100	2	C	120
40001_VP_0434_b	2	RH	10/05/2019	19:45	165	2581.93	1140.22	44	2	B	146
40001_VP_0435_a	2	RH	10/05/2019	19:45	75	1305.75	1305.75	100	1	C	75
40001_VP_0435_b	2	RH	10/05/2019	19:45	165	2718.70	2426.95	89	1	B	147
40001_VP_0436	2	RH	10/05/2019	19:55	145	3568.49	1957.63	55	1	B	80
40001_VP_0461_a	5	RH	11/05/2019	08:01	60	1051.58	1051.58	100	1	A	60
40001_VP_0461_b	5	RH	11/05/2019	08:01	75	2040.31	2040.31	100	1	B	75
40001_VP_0461_c	5	RH	11/05/2019	08:01	45	1417.49	1417.49	100	1	C	45
40001_VP_0463_a	5	RH	11/05/2019	08:25	60	911.28	849.50	93	2	B	112
40001_VP_0463_b	5	RH	11/05/2019	08:25	15	145.19	118.04	81	2	A	24
40001_VP_0465_a	5	RH	11/05/2019	08:53	150	4202.12	4202.12	100	2	B	300
40001_VP_0465_b	5	RH	11/05/2019	08:53	15	176.73	176.73	100	2	A	30
40001_VP_0319_a	1	RH	15/05/2019	20:13	15	698.63	698.63	100	2	A	30
40001_VP_0319_b	1	RH	15/05/2019	20:13	135	2352.81	2352.81	100	2	B	270
40001_VP_0319_c	1	RH	15/05/2019	20:13	60	904.29	904.29	100	2	C	120



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0319_d	1	RH	15/05/2019	20:13	75	992.84	45.90	5	2	B	7
40001_VP_0693	5	RH	03/06/2019	19:32	225	3399.81	3399.81	100	1	B	225
40001_VP_0695_a	5	RH	03/06/2019	19:42	105	1505.96	1505.96	100	1	B	105
40001_VP_0695_b	5	RH	03/06/2019	19:42	30	266.99	266.99	100	1	A	30
40001_VP_0697_a	5	RH	03/06/2019	20:09	270	4895.37	4895.37	100	2	B	540
40001_VP_0697_b	5	RH	03/06/2019	20:09	15	52.29	52.29	100	2	A	30
40001_VP_0340_a	1	RH	05/06/2019	09:12	75	970.72	345.57	36	3	B	80
40001_VP_0807	3	RH	12/06/2019	13:50	45	2039.89	2039.89	100	2	B	90
40001_VP_0798	4	RH	17/06/2019	16:50	255	3722.69	2937.63	79	1	C	201
40001_VP_0803	4	RH	17/06/2019	17:49	165	1796.06	1796.06	100	1	B	165
40001_VP_0627_a	14	RH	18/06/2019	17:15	135	2217.59	2159.79	97	2	C	263
40001_VP_0629_a	14	RH	18/06/2019	18:07	60	936.51	398.78	43	2	B	51
40001_VP_0629_b	14	RH	18/06/2019	18:07	45	479.51	479.51	100	2	A	90
40001_VP_0630	14	RH	18/06/2019	18:16	60	1215.61	1215.61	100	1	B	60
40001_VP_0631_a	14	RH	18/06/2019	18:27	30	1039.52	1039.52	100	3	B	90
40001_VP_0631_b	14	RH	18/06/2019	18:27	60	427.18	427.18	100	3	C	180



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0634_c	14	RH	18/06/2019	19:53	75	556.95	546.16	98	1	A	74
40001_VP_0640_a	14	RH	18/06/2019	14:17	75	697.09	697.09	100	1	B	75
40001_VP_0640_b	14	RH	18/06/2019	14:17	60	594.06	594.06	100	1	C	60
40001_VP_0640_c	14	RH	18/06/2019	14:17	45	468.41	468.41	100	1	B	45
40001_VP_0539	3	RH	19/06/2019	13:30	75	873.63	873.63	100	1	B	75
40001_VP_0573_a	4	RH	19/06/2019	05:18	60	2166.78	2166.78	100	1	B	60
40001_VP_0573_b	4	RH	19/06/2019	05:18	30	328.48	328.48	100	1	A	30
40001_VP_0574	4	RH	19/06/2019	05:28	105	2094.25	2094.25	100	2	B	210
40001_VP_0575	4	RH	19/06/2019	05:28	120	1294.31	1294.31	100	1	B	120
40001_VP_0576_a	4	RH	19/06/2019	05:39	30	540.29	540.29	100	2	B	60
40001_VP_0576_b	4	RH	19/06/2019	05:39	165	2579.56	2579.56	100	2	C	330
40001_VP_0576_c	4	RH	19/06/2019	05:39	30	1343.45	1343.45	100	2	B	60
40001_VP_0576_d	4	RH	19/06/2019	05:39	30	294.17	294.17	100	2	A	60
40001_VP_0577_a	4	RH	19/06/2019	05:39	195	3473.07	3473.07	100	2	C	390
40001_VP_0577_b	4	RH	19/06/2019	05:39	60	351.18	351.18	100	2	B	120
40001_VP_0579_a	4	RH	19/06/2019	05:53	75	2083.65	2083.65	100	1	C	75



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0579_b	4	RH	19/06/2019	05:53	45	566.86	566.86	100	1	B	45
40001_VP_0579_c	4	RH	19/06/2019	05:53	15	743.29	743.29	100	1	A	15
40001_VP_0580	4	RH	19/06/2019	06:05	105	1368.67	1368.67	100	1	C	105
40001_VP_0581_a	4	RH	19/06/2019	06:20	150	2122.43	2122.43	100	2	C	300
40001_VP_0581_b	4	RH	19/06/2019	06:20	105	2868.13	1998.08	70	2	B	146
40001_VP_0581_c	4	RH	19/06/2019	06:20	30	373.58	373.58	100	2	A	60
40001_VP_0582_a	4	RH	19/06/2019	06:42	75	2354.62	2354.62	100	1	C	75
40001_VP_0582_b	4	RH	19/06/2019	06:42	165	4401.42	4401.42	100	1	B	165
40001_VP_0583_a	4	RH	19/06/2019	07:03	180	2255.18	2255.18	100	1	C	180
40001_VP_0616_a	8	RH	21/06/2019	13:27	30	359.06	359.06	100	1	B	30
40001_VP_0616_b	8	RH	21/06/2019	13:27	15	311.53	311.53	100	1	C	15
40001_VP_0660	14	RH	21/06/2019	06:38	60	2445.33	954.56	39	1	B	23
40001_VP_0663_a	14	RH	21/06/2019	07:11	120	3008.69	2617.05	87	2	B	209
40001_VP_0663_b	14	RH	21/06/2019	07:11	45	1069.24	1069.24	100	2	C	90
40001_VP_0663_c	14	RH	21/06/2019	07:11	90	3104.46	2029.09	65	2	B	118
40001_VP_0663_h	14	RH	21/06/2019	07:11	15	278.71	43.11	15	2	A	5



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0664_b	14	RH	21/06/2019	07:25	45	1616.19	393.25	24	4	C	44
40001_VP_0566	3	RH	22/06/2019	21:16	90	1850.53	1635.67	88	1	C	80
40001_VP_0753_a	3	RH	22/06/2019	04:46	60	1792.50	1792.50	100	2	B	120
40001_VP_0753_b	3	RH	22/06/2019	04:46	15	155.31	155.31	100	2	A	30
40001_VP_0767_a	3	RH	22/06/2019	06:08	60	1074.15	1074.15	100	2	B	120
40001_VP_0767_b	3	RH	22/06/2019	06:08	30	522.32	522.32	100	2	A	60
40001_VP_0777_a	3	RH	22/06/2019	06:55	105	1173.35	1173.35	100	1	B	105
40001_VP_0777_b	3	RH	22/06/2019	06:55	75	869.51	12.85	1	1	C	1
40001_VP_0811	3	RH	22/06/2019	09:18	60	2330.41	2330.41	100	2	B	120
40001_VP_0812	3	RH	22/06/2019	10:33	45	1864.47	1864.47	100	1	B	45
40001_VP_0502	2	RH	23/06/2019	05:07	30	333.64	333.64	100	1	A	30
40001_VP_0504_a	2	RH	23/06/2019	05:50	15	1024.30	1024.30	100	1	B	15
40001_VP_0504_b	2	RH	23/06/2019	05:50	30	449.62	449.62	100	1	A	30
40001_VP_0504_c	2	RH	23/06/2019	05:50	180	5512.39	5328.03	97	1	B	174
40001_VP_0505_a	2	RH	23/06/2019	05:50	15	1046.12	1046.12	100	1	B	15
40001_VP_0505_b	2	RH	23/06/2019	05:50	30	832.76	832.76	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0505_c	2	RH	23/06/2019	05:50	45	2435.25	2435.25	100	1	B	45
40001_VP_0505_d	2	RH	23/06/2019	05:50	45	308.36	308.36	100	1	A	45
40001_VP_0507_a	2	RH	23/06/2019	06:14	30	628.60	628.60	100	2	A	60
40001_VP_0507_b	2	RH	23/06/2019	06:14	90	877.44	877.44	100	2	B	180
40001_VP_0507_c	2	RH	23/06/2019	06:14	105	576.70	576.70	100	2	C	210
40001_VP_0508_a	2	RH	23/06/2019	06:18	105	1483.39	1483.39	100	3	B	315
40001_VP_0508_b	2	RH	23/06/2019	06:18	120	1888.31	1888.31	100	3	C	360
40001_VP_0508_d	2	RH	23/06/2019	06:18	120	1107.69	1107.69	100	3	C	360
40001_VP_0509_a	2	RH	23/06/2019	06:45	45	418.43	418.43	100	2	B	90
40001_VP_0509_b	2	RH	23/06/2019	06:45	30	436.17	436.17	100	2	A	60
40001_VP_0510	2	RH	23/06/2019	06:50	75	2124.33	59.94	3	1	B	2
40001_VP_0513_a	2	RH	23/06/2019	19:45	90	1126.69	450.94	40	1	B	36
40001_VP_0513_b	2	RH	23/06/2019	19:45	105	2469.81	2469.81	100	1	C	105
40001_VP_0518	2	RH	23/06/2019	21:40	15	167.47	167.47	100	2	A	30
40001_VP_0595_a	5	RH	23/06/2019	12:31	30	1676.31	1676.31	100	1	B	30
40001_VP_0595_b	5	RH	23/06/2019	12:31	120	1807.58	1603.40	89	1	C	106



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0603_a	5	RH	23/06/2019	14:29	165	1246.19	1246.19	100	1	B	165
40001_VP_0603_b	5	RH	23/06/2019	14:29	135	365.66	365.66	100	1	C	135
40001_VP_0603_d	5	RH	23/06/2019	14:29	75	1210.58	174.32	14	1	C	11
40001_VP_0714_a	5	RH	24/06/2019	13:47	165	2493.27	2493.27	100	1	B	165
40001_VP_0714_b	5	RH	24/06/2019	13:47	60	895.95	895.95	100	1	A	60
40001_VP_0719_a	5	RH	24/06/2019	14:38	195	3217.85	3217.85	100	1	B	195
40001_VP_0719_b	5	RH	24/06/2019	14:38	105	1431.88	1431.88	100	1	C	105
40001_VP_0719_c	5	RH	24/06/2019	14:38	60	1041.02	1041.02	100	1	B	60
40001_VP_0809	5	RH	25/06/2019	08:40	60	1535.74	1535.74	100	2	B	120
40001_VP_0681_a	14	RH	03/07/2019	15:43	105	1338.56	442.78	33	1	B	35
40001_VP_0750_a	8	RH	06/07/2019	14:37	45	1221.31	1221.31	100	1	B	45
40001_VP_0750_b	8	RH	06/07/2019	14:37	150	1793.47	1793.47	100	1	C	150
40001_VP_0750_c	8	RH	06/07/2019	14:37	75	2155.23	2155.23	100	1	B	75
40001_VP_0817	2	RH	09/07/2019	19:10	75	2635.36	2121.37	80	3	B	181
40001_VP_0825_a	4	RH	10/07/2019	06:15	30	454.93	228.55	50	3	B	45
40001_VP_0825_b	4	RH	10/07/2019	06:15	15	1361.89	1361.89	100	3	A	45



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0826	4	RH	10/07/2019	07:10	60	1662.47	1662.47	100	1	B	60
40001_VP_0868_a	14	RH	10/07/2019	16:00	150	2723.22	1549.97	57	1	B	85
40001_VP_0868_b	14	RH	10/07/2019	16:00	15	298.14	153.18	51	1	A	8
40001_VP_0872_a	14	RH	10/07/2019	16:45	30	560.93	560.93	100	1	A	30
40001_VP_0872_b	14	RH	10/07/2019	16:45	75	2060.20	1073.70	52	1	B	39
40001_VP_0873	14	RH	10/07/2019	18:26	60	1074.35	366.26	34	2	B	41
40001_VP_0867_a	5	RH	24/07/2019	18:45	30	769.76	769.76	100	1	B	30
40001_VP_0867_b	5	RH	24/07/2019	18:45	15	530.16	476.75	90	1	A	13
40001_VP_0478	5	RH	25/07/2019	09:17	45	846.83	846.83	100	1	B	45
40001_VP_1051_a	8	RH	14/08/2019	07:22	30	763.61	763.61	100	2	A	60
40001_VP_1051_b	8	RH	14/08/2019	07:22	45	685.60	685.60	100	2	B	90
40001_VP_1051_c	8	RH	14/08/2019	07:22	45	840.79	840.79	100	2	C	90
40001_VP_1052_a	8	RH	14/08/2019	08:26	30	737.90	737.90	100	2	B	60
40001_VP_1052_b	8	RH	14/08/2019	08:26	30	663.70	663.70	100	2	A	60
40001_VP_1064	8	RH	17/08/2019	12:11	180	1807.90	1807.90	100	1	C	180
40001_VP_1065_a	4	RH	21/08/2019	17:21	15	266.62	266.62	100	2	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1065_b	4	RH	21/08/2019	17:21	45	1076.63	1076.63	100	2	B	90
40001_VP_1071_a	5	RH	22/08/2019	09:56	105	2153.80	2153.80	100	3	B	315
40001_VP_1071_b	5	RH	22/08/2019	09:56	15	152.23	152.23	100	3	A	45
40001_VP_1072_a	5	RH	22/08/2019	10:00	75	2530.45	2530.45	100	2	B	150
40001_VP_1072_b	5	RH	22/08/2019	10:00	15	225.95	163.04	72	2	A	22
40001_VP_1073	5	RH	22/08/2019	10:37	105	2189.24	2189.24	100	1	B	105
40001_VP_1075_a	5	RH	22/08/2019	11:22	15	135.49	135.49	100	2	A	30
40001_VP_1075_b	5	RH	22/08/2019	11:22	180	4220.35	4220.35	100	2	B	360
40001_VP_1076_a	5	RH	22/08/2019	11:32	120	2569.69	2481.11	97	1	B	116
40001_VP_1080	5	RH	22/08/2019	12:01	30	790.11	790.11	100	1	B	30
40001_VP_1081	5	RH	22/08/2019	12:02	75	2444.07	2444.07	100	2	B	150
40001_VP_1085_a	5	RH	23/08/2019	14:59	60	851.01	851.01	100	1	A	60
40001_VP_1085_b	5	RH	23/08/2019	14:59	30	358.48	358.48	100	1	B	30
40001_VP_1110_b	14	RH	24/08/2019	18:41	135	1468.24	327.01	22	1	B	30
40001_VP_1112	14	RH	24/08/2019	19:01	105	2264.83	778.29	34	1	B	36
40001_VP_1113_a	14	RH	24/08/2019	19:09	60	1640.74	1629.14	99	2	C	119



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_1113_b	14	RH	24/08/2019	19:09	45	544.82	544.82	100	2	B	90
40001_VP_1113_c	14	RH	24/08/2019	19:09	45	505.76	505.76	100	2	C	90
40001_VP_1114_a	14	RH	24/08/2019	19:24	60	1165.12	1084.56	93	1	B	56
40001_VP_1114_b	14	RH	24/08/2019	19:24	15	197.11	146.27	74	1	A	11
40001_VP_1115_a	14	RH	24/08/2019	19:28	15	304.33	304.33	100	1	A	15
40001_VP_1115_b	14	RH	24/08/2019	19:28	135	2355.37	1088.86	46	1	B	62
40001_VP_1105	4	RH	26/08/2019	09:26	105	2905.63	2905.63	100	1	B	105

B.15a VP Flight Data: White-tailed Eagle – Year 1 Breeding (February – August 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_143	8	WE	16/02/2018	09:22	30	286.21	286.21	100	1	B	30
SW_177	8	WE	19/02/2018	15:09	120	2049.66	2049.66	100	1	B	120
SW_156_a	2	WE	13/03/2018	14:45	75	1690.35	324.12	19	1	A	14
SW_156_b	2	WE	13/03/2018	14:45	60	1594.22	1594.22	100	1	B	60
SW_156_c	2	WE	13/03/2018	14:45	60	387.35	387.35	100	1	C	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_158	1	WE	14/03/2018	10:15	75	1397.05	1243.35	89	1	A	67
BS_SW_0429_a	5	WE	09/07/2018	13:47	90	1444.29	1444.29	100	1	B	90
BS_SW_0429_b	5	WE	09/07/2018	13:47	30	394.41	394.41	100	1	A	30
BS_SW_0429_c	5	WE	09/07/2018	13:47	120	1877.32	1877.32	100	1	B	120
BS_SW_0429_d	5	WE	09/07/2018	13:47	120	2006.47	2006.47	100	1	C	120
BS_SW_0548_a	5	WE	26/07/2018	09:18	90	977.98	977.98	100	1	B	90
BS_SW_0548_b	5	WE	26/07/2018	09:18	30	225.64	225.64	100	1	A	30
BS_SW_0646_a	1	WE	31/07/2018	09:07	60	702.47	702.47	100	2	B	120
BS_SW_0646_b	1	WE	31/07/2018	09:07	15	546.07	342.45	63	2	A	19
BS_SW_0660_a	3	WE	01/08/2018	09:50	45	745.58	745.58	100	1	B	45
BS_SW_0660_b	3	WE	01/08/2018	09:50	15	197.39	197.39	100	1	A	15
BS_SW_0661	3	WE	01/08/2018	09:53	15	293.96	293.96	100	1	A	15
BS_SW_0691_a	3	WE	10/08/2018	15:30	420	5961.41	996.69	17	1	B	70
BS_SW_0691_b	3	WE	10/08/2018	15:30	180	2103.83	2103.83	100	1	C	180
BS_SW_0699_a	3	WE	10/08/2018	17:13	105	1373.07	1373.07	100	1	B	105
BS_SW_0699_b	3	WE	10/08/2018	17:13	15	342.94	342.94	100	1	A	15
BS_SW_0765_a	4	WE	13/08/2018	15:30	60	854.13	854.13	100	1	B	60



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_0765_b	4	WE	13/08/2018	15:30	75	1372.70	1372.70	100	1	A	75
BS_SW_0767_a	4	WE	13/08/2018	16:01	45	556.75	556.75	100	1	B	45
BS_SW_0767_b	4	WE	13/08/2018	16:01	45	779.90	779.90	100	1	C	45
BS_SW_0767_c	4	WE	13/08/2018	16:01	45	543.35	543.35	100	1	B	45
BS_SW_0767_d	4	WE	13/08/2018	16:01	60	1388.40	1388.40	100	1	C	60

B.15b VP Flight Data: White-tailed Eagle – Year 2 Breeding (February – August 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0154	2	WE	17/02/2019	11:08	15	426.62	266.05	62	1	A	9
40001_VP_0186_a	4	WE	16/03/2019	13:50	45	932.50	932.50	100	1	B	45
40001_VP_0186_b	4	WE	16/03/2019	13:50	30	1004.92	1004.92	100	1	A	30
40001_VP_0186_c	4	WE	16/03/2019	13:50	15	378.81	378.81	100	1	B	15
40001_VP_0186_d	4	WE	16/03/2019	13:50	15	308.73	308.73	100	1	A	15
40001_VP_0186_e	4	WE	16/03/2019	13:50	15	299.86	299.86	100	1	B	15
40001_VP_0186_f	4	WE	16/03/2019	13:50	15	169.36	169.36	100	1	A	15



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0187_a	4	WE	16/03/2019	14:02	15	316.75	316.75	100	1	A	15
40001_VP_0187_b	4	WE	16/03/2019	14:02	15	578.16	578.16	100	1	B	15
40001_VP_0194_a	3	WE	18/03/2019	12:59	120	998.31	998.31	100	1	C	120
40001_VP_0194_c	3	WE	18/03/2019	12:59	270	3013.83	3013.83	100	1	C	270
40001_VP_0196	5	WE	20/03/2019	11:58	120	4084.64	4084.64	100	1	B	120
40001_VP_0254_a	8	WE	12/04/2019	11:21	150	1437.55	1437.55	100	1	C	150
40001_VP_0258_a	8	WE	12/04/2019	12:23	45	730.38	730.38	100	1	B	45
40001_VP_0258_b	8	WE	12/04/2019	12:23	270	3919.96	3919.96	100	1	C	270
40001_VP_0263	2	WE	12/04/2019	12:31	420	3740.83	3159.17	84	1	C	355
40001_VP_0348_a	4	WE	22/04/2019	17:39	105	1279.68	1279.68	100	1	A	105
40001_VP_0348_b	4	WE	22/04/2019	17:39	60	1351.25	608.16	45	1	B	27
40001_VP_0558	3	WE	22/06/2019	20:19	135	1835.05	1835.05	100	1	B	135
40001_VP_1054_a	2	WE	14/08/2019	11:18	30	505.82	505.82	100	1	A	30
40001_VP_1054_b	2	WE	14/08/2019	11:18	45	1008.80	345.80	34	1	B	15



B.16a VP Flight Data: White-tailed Eagle – Year 1 Non-breeding (September 2017 – January 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_043_a	4	WE	11/10/2017	12:19	210	1813.80	1446.65	80	1	C	167
SW_043_b	4	WE	11/10/2017	12:19	75	1204.03	1204.03	100	1	B	75
SW_043_c	4	WE	11/10/2017	12:19	90	1220.79	610.59	50	1	C	45
SW_016	8	WE	02/11/2017	10:04	30	526.79	526.79	100	1	B	30
SW_020	8	WE	02/11/2017	11:32	36	557.63	334.13	60	1	B	22
SW_069	5	WE	12/11/2017	14:13	225	3335.32	3335.32	100	1	C	225
SW_027_a	5	WE	14/11/2017	08:45	15	299.82	299.82	100	1	B	15
SW_027_b	5	WE	14/11/2017	08:45	15	261.63	261.63	100	1	A	15
SW_030_a	8	WE	14/11/2017	15:05	10	96.31	96.31	100	1	B	10
SW_030_b	8	WE	14/11/2017	15:05	55	625.18	625.18	100	1	C	55
SW_030_c	8	WE	14/11/2017	15:05	60	804.11	804.11	100	1	B	60
SW_030_d	8	WE	14/11/2017	15:05	62	971.75	971.75	100	1	A	62
SW_032	4	WE	16/11/2017	09:50	40	916.15	167.42	18	1	C	7
SW_110	8	WE	16/01/2018	09:52	53	857.07	857.07	100	1	B	53
SW_111	8	WE	16/01/2018	10:00	71	1285.12	1285.12	100	1	A	71
SW_114	8	WE	16/01/2018	13:12	133	2161.20	2161.20	100	1	B	133



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_125	5	WE	25/01/2018	14:11	75	1966.63	1966.63	100	1	C	75

B.16b VP Flight Data: White-tailed Eagle – Year 2 Non-breeding (September 2018 – January 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
BS_SW_1228_a	3	WE	21/09/2018	16:39	30	364.64	364.64	100	1	A	30
BS_SW_1228_b	3	WE	21/09/2018	16:39	180	6727.70	6727.70	100	1	B	180
BS_SW_1228_c	3	WE	21/09/2018	16:39	105	1152.29	1152.29	100	1	C	105
BS_SW_1229_a	3	WE	21/09/2018	16:42	60	2710.75	2710.75	100	1	B	60
BS_SW_1229_b	3	WE	21/09/2018	16:42	105	1086.35	1086.35	100	1	C	105
BS_SW_1243_a	8	WE	25/09/2018	08:51	75	1185.96	1185.96	100	1	C	75
BS_SW_1243_b	8	WE	25/09/2018	08:51	75	959.22	959.22	100	1	B	75
BS_SW_1243_c	8	WE	25/09/2018	08:51	30	244.43	244.43	100	1	A	30
40001_VP_0004_a	5	WE	24/10/2018	11:50	105	2165.40	2165.40	100	1	B	105
40001_VP_0004_b	5	WE	24/10/2018	11:50	15	368.05	368.05	100	1	A	15
40001_VP_0016_a	8	WE	31/10/2018	12:17	30	587.87	587.87	100	1	A	30



GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0016_b	8	WE	31/10/2018	12:17	30	404.15	404.15	100	1	B	30
40001_VP_0016_c	8	WE	31/10/2018	12:17	15	645.05	645.05	100	1	A	15
40001_VP_0022	5	WE	02/11/2018	10:38	255	1934.05	1572.31	81	1	B	207
40001_VP_0077	5	WE	19/11/2018	13:35	60	1099.23	1099.23	100	1	B	60
40001_VP_0078_a	5	WE	19/11/2018	13:37	30	404.12	404.12	100	1	B	30
40001_VP_0078_b	5	WE	19/11/2018	13:37	45	435.96	435.96	100	1	A	45
40001_VP_0067	1	WE	22/11/2018	14:47	75	1194.48	647.20	54	1	B	41
40001_VP_0074	3	WE	22/11/2018	11:29	75	738.99	738.99	100	1	B	75
40001_VP_0088_a	1	WE	03/12/2018	13:33	15	324.15	324.15	100	2	B	30
40001_VP_0088_b	1	WE	03/12/2018	13:33	30	167.35	167.35	100	2	A	60
40001_VP_0088_c	1	WE	03/12/2018	13:33	30	1150.27	1150.27	100	2	B	60
40001_VP_0090_a	3	WE	04/12/2018	13:54	45	671.08	671.08	100	1	B	45
40001_VP_0090_b	3	WE	04/12/2018	13:54	30	360.03	360.03	100	1	A	30
40001_VP_0092_a	3	WE	04/12/2018	14:32	30	425.55	425.55	100	1	A	30
40001_VP_0092_b	3	WE	04/12/2018	14:32	45	1330.26	1330.26	100	1	B	45
40001_VP_0092_c	3	WE	04/12/2018	14:32	30	310.87	310.87	100	1	A	30

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0093_a	3	WE	04/12/2018	15:12	30	1263.40	1263.40	100	1	A	30
40001_VP_0093_b	3	WE	04/12/2018	15:12	105	1373.24	1373.24	100	1	B	105
40001_VP_0093_c	3	WE	04/12/2018	15:12	30	705.67	705.67	100	1	A	30
40001_VP_0114_a	1	WE	19/12/2018	09:39	30	443.22	443.22	100	1	B	30
40001_VP_0114_b	1	WE	19/12/2018	09:39	60	864.81	835.09	97	1	A	58
40001_VP_0115	5	WE	19/12/2018	09:45	60	754.70	422.04	56	1	B	34
40001_VP_0116_c	5	WE	19/12/2018	9:48	30	1090.84	362.42	33	1	B	10
40001_VP_0133	1	WE	25/01/2019	14:20	195	3740.90	3678.41	98	1	B	192

B.17a VP Flight Data: Whooper Swan – Year 1 Non-breeding (September 2017 – March 2018)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
SW_051	2	WS	16/10/2017	13:56	90	1749.38	603.79	35	2	B	62
SW_055	4	WS	20/10/2017	16:36	120	1497.08	1497.08	100	3	C	360
SW_057	1	WS	21/10/2017	09:21	120	2244.20	1960.31	87	4	C	419
SW_065	3	WS	26/10/2017	16:10	165	2323.25	2323.25	100	7	C	1155



SW_002	5	WS	30/10/2017	11:28	15	499.51	499.51	100	12	C	180
SW_015	8	WS	02/11/2017	08:48	180	2639.13	2639.13	100	6	B	1080
SW_024	3	WS	03/11/2017	11:29	46	1051.98	1051.98	100	6	C	276

B.17b VP Flight Data: Whooper Swan – Year 2 Non-breeding (September 2018 – March 2019)

GISID	VP	Species	Date	Time	Seconds	Length (m)	Clipped length (m)	Clipped length %	Count	Height band	Total flight time (seconds)
40001_VP_0003_a	5	WS	24/10/2018	10:09	60	1823.46	1823.46	100	5	B	300
40001_VP_0184	3	WS	15/03/2019	08:38	135	2011.56	2011.56	100	4	B	540
40001_VP_0210	1	WS	25/03/2019	09:45	255	2838.70	2581.71	91	24	A	5566
40001_VP_0223	8	WS	26/03/2019	11:20	45	2947.03	2947.03	100	1	B	45



Annex C

CRM Calculations

C.1a CRM: Black-throated Diver – Consented Site Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.66				
Number turbines	36	wingspan (m)	1.2				
Rotor diameter	128	flapping (0) or gliding (1)	0				
Hub height (m)	81	Assumed flight speed (m/s)	19.3				
Max chord (m)	3.5	Number daylight hours available	2816.94				
Rotor depth	3.5	Maximum recording height (m)	200				
Pitch (degrees)	7.5	Minimum recording height (m)	0				
Rotation period (secs)	4.6						
Turbine operation time 85%	0.85						
Avoidance Rate 99.5%	0.005						
Rotor radius ²	4096.00						
Combined rotor swept area	463246.59						
Collision Risk volume 'Vw' (m ³)	2,176,000,000						
Rotor swept volume 'V _r ' (m ³)	1,927,106						
Survey Data							
VP		1	2	3	4	5	8
FRA (ha)	433	348	556	548	482	580	
Observation Time (hours)	45	45	45	45	45	45	
Time at height band A	0	0	30	0	15	428	
Time at height band B	0	0	120	0	135	592	
Time at height band C	26	0	90	0	0	360	
Time at height band D	0	0	0	0	0	0	
Total Time at PCH	26	0	240	0	150	1380	
Flight activity per unit time and area							
		1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	90072000	88776000	78084000	93960000 477414000.0
Flying time at risk height	Effort at each VP / FRA	3.71E-07	0.00E+00	2.66E-06	0.00E+00	1.92E-06	1.47E-05 1.96E-05
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	5.45E-08	0.00E+00	5.03E-07	0.00E+00	3.14E-07	2.89E-06 3.76E-06
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000003762					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	18.02					
FRAw	Estimated bird time*(rotor diameter/recording height band)	11.53					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	36.76					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.22					
Number of transits 'ntr'	'n'/'t'	170.54					
E							
Probability of collision (Band model)		0.058					
Calculation of number collisions				No avoidance		Avoidance 99.5%	
Collisions per year					8.42		0.042
Equivalent to 1 bird every x (years)					0.12		23.7
Over 25 years					210.5		1.05



C.1b CRM: Black-throated Diver – Consented Site Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.66							
Number turbines	36	wingspan (m)	1.2							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	19.3							
Max chord (m)	3.5	Number daylight hours available	2816.77							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 99.5%	0.005									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	1,927,106									
Survey Data										
VP		1	2	3	4	5	8	14		
FRA (ha)	433	348	556	548	482	580	290			
Observation Time (hours)	15	45	45	45	45	45	45	48		
Time at height band A	0	0	105	0	0	645	8			
Time at height band B	150	0	540	0	90	1215	73			
Time at height band C	0	0	0	0	0	30	60			
Time at height band D	0	0	0	0	0	30	0			
Total Time at PCH	150	0	645	0	90	1890	141			
Flight activity per unit time and area										
		1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0	
Flying time at risk height	Effort at each VP / FRA	6.42E-06	0.00E+00	7.16E-06	0.00E+00	1.15E-06	2.01E-05	2.81E-06	3.77E-05	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.12E-07	0.00E+00	1.34E-06	0.00E+00	1.87E-07	3.93E-06	2.93E-07	6.07E-06	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000006065								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	29.04								
FRAw	Estimated bird time*(rotor diameter/recording height band)	18.59								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	59.26								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.22								
Number of transits 'ntr'	'n'/'t'	274.95								
E										
Probability of collision (Band model)		0.058								
Calculation of number collisions							No avoidance	Avoidance 99.5%		
Collisions per year							13.58	0.068		
Equivalent to 1 bird every x (years)							0.07	14.7		
Over 25 years							339.4	1.70		



C.1c CRM: Black-throated Diver – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	contribution	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.66	m	0.025	0.575	8.83	28.48	0.96	0.00120	27.96	0.94	0.00118
Wingspan	1.2	m	0.075	0.575	2.94	9.67	0.33	0.00245	9.14	0.31	0.00232
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.77	6.74	0.23	0.00285	6.10	0.21	0.00258
			0.175	0.860	1.26	5.67	0.19	0.00335	4.89	0.17	0.00289
Bird speed	19.3	m/sec	0.225	0.994	0.98	5.02	0.17	0.00381	4.11	0.14	0.00312
RotorDiam	128	m	0.275	0.947	0.80	4.03	0.14	0.00375	3.17	0.11	0.00294
RotationPeriod	4.60	sec	0.325	0.899	0.68	3.34	0.11	0.00367	2.52	0.09	0.00277
			0.375	0.851	0.59	2.83	0.10	0.00359	2.06	0.07	0.00261
			0.425	0.804	0.52	2.48	0.08	0.00356	1.74	0.06	0.00250
			0.475	0.756	0.46	2.22	0.08	0.00357	1.53	0.05	0.00246
Bird aspect ratioo: β	0.55		0.525	0.708	0.42	2.02	0.07	0.00358	1.37	0.05	0.00243
			0.575	0.660	0.38	1.84	0.06	0.00358	1.24	0.04	0.00241
			0.625	0.613	0.35	1.69	0.06	0.00357	1.13	0.04	0.00239
			0.675	0.565	0.33	1.56	0.05	0.00356	1.04	0.04	0.00238
			0.725	0.517	0.30	1.44	0.05	0.00354	0.97	0.03	0.00238
			0.775	0.470	0.28	1.34	0.05	0.00351	0.91	0.03	0.00238
			0.825	0.422	0.27	1.24	0.04	0.00347	0.86	0.03	0.00239
			0.875	0.374	0.25	1.16	0.04	0.00343	0.82	0.03	0.00241
			0.925	0.327	0.24	1.08	0.04	0.00337	0.78	0.03	0.00244
			0.975	0.279	0.23	1.01	0.03	0.00332	0.75	0.03	0.00248
			Overall p(collision) =			Upwind	6.7%	Downwind	4.9%		
						Average	5.8%				



C.2a CRM: Black-throated Diver – Proposed Development Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.66				
Number turbines	35	wingspan (m)	1.2				
Rotor diameter	150	flapping (0) or gliding (1)	0				
Hub height (m)	105	Assumed flight speed (m/s)	19.3				
Max chord (m)	4.2	Number daylight hours available	2816.94				
Rotor depth	4.2	Maximum recording height (m)	200				
Pitch (degrees)	12	Minimum recording height (m)	20				
Survey Data							
Rotation period (secs)	4.7	VP	1	2	3	4	5
Turbine operation time 85%	0.85	FRA (ha)	433	348	556	548	482
Avoidance Rate 99.5%	0.005	Observation Time (hours)	45	45	45	45	45
Rotor radius ²	5625.00	Time at height band A	0	0	30	0	15
Combined rotor swept area	618500.93	Time at height band B	0	0	120	0	135
Collision Risk volume 'Vw' (m ³)	2,550,000,000	Time at height band C	26	0	90	0	0
Rotor swept volume 'V _r ' (m ³)	3,005,914	Time at height band D	0	0	0	0	0
		Total Time at PCH	26	0	210	0	135
							952
Flight activity per unit time and area				1	2	3	4
Observation effort	Obsevation time (seconds) * hectare		70146000	56376000	90072000	88776000	78084000
Flying time at risk height	Effort at each VP / FRA		3.71E-07	0.00E+00	2.33E-06	0.00E+00	1.73E-06
Weighted by observation effort				5	8	Total	
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01
Adjusted time at risk height	Weighted obs effort * flying time at risk height		5.45E-08	0.00E+00	4.40E-07	0.00E+00	2.83E-07
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000002771				
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		13.27				
FRAw	Estimated bird time*(rotor diameter/recording height band)		11.06				
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		46.93				
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.25				
Number of transits 'n't'	'n'/t'		186.37				
E							
Probability of collision (Band model)			0.057				
Calculation of number collisions				No avoidance	Avoidance 99.5%		
	Collisions per year				9.06	0.045	
	Equivalent to 1 bird every x (years)				0.11	22.1	
	Over 25 years				226.4	1.13	



C.2b CRM: Black-throated Diver – Proposed Development Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.66						
Number turbines	35	wingspan (m)	1.2						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	19.3						
Max chord (m)	4.2	Number daylight hours available	2816.77						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 99.5%	0.005								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	3,005,914								
Survey Data									
VP	1	2	3	4	5	8	14		
FRA (ha)	433	348	556	548	482	580	290		
Observation Time (hours)	15	45	45	45	45	45	48		
Time at height band A	0	0	105	0	0	645	8		
Time at height band B	150	0	540	0	90	1215	73		
Time at height band C	0	0	0	0	0	30	60		
Time at height band D	0	0	0	0	0	30	0		
Total Time at PCH	150	0	540	0	90	1245	133		
Flight activity per unit time and area									
	1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA	6.42E-06	0.00E+00	6.00E-06	0.00E+00	1.15E-06	1.33E-05	2.65E-06	2.95E-05
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.12E-07	0.00E+00	1.12E-06	0.00E+00	1.87E-07	2.59E-06	2.77E-07	4.49E-06
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000004489							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	21.49							
FRAw	Estimated bird time*(rotor diameter/recording height band)	17.91							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	76.01							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.25							
Number of transits 'ntr'	'n'/'t'	301.86							
E									
Probability of collision (Band model)		0.057							
Calculation of number collisions				No avoidance		Avoidance 99.5%			
Collisions per year						14.67		0.073	
Equivalent to 1 bird every x (years)						0.07		13.6	
Over 25 years						366.7		1.83	



C.2c CRM: Black-throated Diver – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.66	m	0.025	0.575	7.70	27.93	0.92	0.00115	26.93	0.89
Wingspan	1.2	m	0.075	0.575	2.57	9.64	0.32	0.00239	8.64	0.29
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.54	6.90	0.23	0.00285	5.67	0.19
			0.175	0.860	1.10	5.96	0.20	0.00345	4.46	0.15
Bird speed	19.3	m/sec	0.225	0.994	0.86	5.39	0.18	0.00401	3.65	0.12
RotorDiam	150	m	0.275	0.947	0.70	4.39	0.15	0.00399	2.74	0.09
RotationPeriod	4.70	sec	0.325	0.899	0.59	3.68	0.12	0.00396	2.11	0.07
			0.375	0.851	0.51	3.20	0.11	0.00397	1.71	0.06
			0.425	0.804	0.45	2.86	0.09	0.00402	1.45	0.05
			0.475	0.756	0.41	2.58	0.09	0.00405	1.26	0.04
Bird aspect ratioo: β	0.55		0.525	0.708	0.37	2.35	0.08	0.00407	1.11	0.04
			0.575	0.660	0.33	2.15	0.07	0.00408	0.99	0.03
			0.625	0.613	0.31	1.97	0.07	0.00407	0.90	0.03
			0.675	0.565	0.29	1.82	0.06	0.00405	0.83	0.03
			0.725	0.517	0.27	1.68	0.06	0.00402	0.77	0.03
			0.775	0.470	0.25	1.55	0.05	0.00397	0.73	0.02
			0.825	0.422	0.23	1.43	0.05	0.00391	0.70	0.02
			0.875	0.374	0.22	1.33	0.04	0.00383	0.67	0.02
			0.925	0.327	0.21	1.22	0.04	0.00375	0.67	0.02
			0.975	0.279	0.20	1.13	0.04	0.00364	0.68	0.02
Overall p(collision) =					Upwind	7.3%	Downwind	4.1%		
					Average	5.7%				



C.3a CRM: Common Tern – Consented Site Year 1 Breeding (April – August 2018)

Bird Parameters		
length (m)	0.34	
wingspan (m)	0.8	
flapping (0) or gliding (1)	0	
Assumed flight speed (m/s)	10.9	
Available hours active	2816.94	
Survey effort (hours)	270	
No birds observed in risk window	145	
Avoidance Rate 98%	0.02	
Wind Farm Parameters		
Max height of turbines (m)	145	
Number turbines	16	
Rotor diameter (m)	128	
Hub height (m)	81	
Max chord (m)	3.5	
Pitch (degrees)	7.5	
Rotation period (secs)	4.6	
Turbine operation time 85%	0.85	
Risk window width (m)	3502	
Calculations		
Risk window area (m ²)	507790	
Area occupied by rotors	205887	
Rotor area as a proportion of risk window area	0.405	
No of birds per hour of observation	0.537	
Potential number birds crossing windfarm area	1513	
Number birds through rotors	613.38	
Stage 2 Probability of collision	0.054	
Calculation of number collisions		No avoidance
		Avoidance 99.5%
Collisions per year	28.39	0.568
Years per collision	0.035	1.76
Over 25 years	709.85	14.20

C.3b CRM: Common Tern – Consented Site Year 2 Breeding (April – August 2019)

Bird Parameters	
length (m)	0.34
wingspan (m)	0.8
flapping (0)or gliding (1)	0
Assumed flight speed (m/s)	10.9
Available hours active	2816.77
Survey effort (hours)	288
No birds observed in risk window	240
Avoidance Rate 98%	0.02
Wind Farm Parameters	
Max height of turbines (m)	145
Number turbines	16
Rotor diameter (m)	128
Hub height (m)	81
Max chord (m)	3.5
Pitch (degrees)	7.5
Rotation period (secs)	4.6
Turbine operation time 85%	0.85
Risk window width (m)	3502
Calculations	
Risk window area (m ²)	507790
Area occupied by rotors	205887
Rotor area as a proportion of risk window area	0.405
No of birds per hour of observation	0.833
Potential number birds crossing windfarm area	2347
Number birds through rotors	951.73
Stage 2 Probability of collision	0.054
Calculation of number collisions	
No avoidance	
Collisions per year	44.06
Years per collision	0.023
Over 25 years	1101.42
Avoidance 99.5%	
	0.881
	1.13
	22.03

C.3c CRM: Common Tern – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:								Dow nw ind:	
MaxChord	3.5	m	r/R	c/C	α	collide		contribution	collide		
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.34	m	0.025	0.575	4.99	14.20	0.85	0.00106	13.68	0.82	0.00102
Wingspan	0.8	m	0.075	0.575	1.66	4.91	0.29	0.00220	4.38	0.26	0.00197
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.00	3.55	0.21	0.00265	2.91	0.17	0.00217
			0.175	0.860	0.71	3.09	0.18	0.00323	2.30	0.14	0.00241
Bird speed	10.9	m/sec	0.225	0.994	0.55	2.81	0.17	0.00378	1.90	0.11	0.00256
RotorDiam	128	m	0.275	0.947	0.45	2.28	0.14	0.00376	1.42	0.08	0.00234
RotationPeriod	4.60	sec	0.325	0.899	0.38	1.95	0.12	0.00379	1.13	0.07	0.00219
			0.375	0.851	0.33	1.71	0.10	0.00384	0.93	0.06	0.00209
			0.425	0.804	0.29	1.53	0.09	0.00388	0.79	0.05	0.00201
			0.475	0.756	0.26	1.37	0.08	0.00390	0.68	0.04	0.00194
Bird aspect ratioo: β	0.43		0.525	0.708	0.24	1.25	0.07	0.00392	0.60	0.04	0.00189
			0.575	0.660	0.22	1.14	0.07	0.00392	0.54	0.03	0.00184
			0.625	0.613	0.20	1.04	0.06	0.00390	0.48	0.03	0.00181
			0.675	0.565	0.18	0.96	0.06	0.00388	0.44	0.03	0.00179
			0.725	0.517	0.17	0.89	0.05	0.00384	0.41	0.02	0.00179
			0.775	0.470	0.16	0.82	0.05	0.00379	0.39	0.02	0.00180
			0.825	0.422	0.15	0.75	0.05	0.00372	0.37	0.02	0.00182
			0.875	0.374	0.14	0.70	0.04	0.00364	0.35	0.02	0.00185
			0.925	0.327	0.13	0.64	0.04	0.00355	0.34	0.02	0.00190
			0.975	0.279	0.13	0.59	0.04	0.00345	0.34	0.02	0.00200
			Overall p(collision) =			Upwind	7.0%		Downwind	3.9%	
								Average	5.4%		



C.4a CRM: Common Tern – Proposed Development Year 1 Breeding (April – August 2018)

Bird Parameters	
length (m)	0.34
wingspan (m)	0.8
flapping (0)or gliding (1)	0
Assumed flight speed (m/s)	10.9
Available hours active	2816.94
Survey effort (hours)	270
No birds observed in risk window	66
Avoidance Rate 98%	0.02
Wind Farm Parameters	
Max height of turbines (m)	180
Number turbines	12
Rotor diameter (m)	150
Hub height (m)	105
Max chord (m)	4.2
Pitch (degrees)	12
Rotation period (secs)	4.7
Turbine operation time 85%	0.85
Risk window width (m)	3502
Calculations	
Risk window area (m ²)	630360
Area occupied by rotors	212058
Rotor area as a proportion of risk window area	0.336
No of birds per hour of observation	0.244
Potential number birds crossing windfarm area	689
Number birds through rotors	231.64
Stage 2 Probability of collision	0.059
Calculation of number collisions	
No avoidance	
Collisions per year	11.61
Years per collision	0.086
Over 25 years	290.18
Avoidance 99.5%	
	0.232
	4.31
	5.80

C.4b CRM: Common Tern – Proposed Development Year 2 Breeding (April – August 2019)

Bird Parameters	
length (m)	0.34
wingspan (m)	0.8
flapping (0)or gliding (1)	0
Assumed flight speed (m/s)	10.9
Available hours active	2816.77
Survey effort (hours)	288
No birds observed in risk window	127
Avoidance Rate 98%	0.02
Wind Farm Parameters	
Max height of turbines (m)	180
Number turbines	12
Rotor diameter (m)	150
Hub height (m)	105
Max chord (m)	4.2
Pitch (degrees)	12
Rotation period (secs)	4.7
Turbine operation time 85%	0.85
Risk window width (m)	3502
Calculations	
Risk window area (m ²)	630360
Area occupied by rotors	212058
Rotor area as a proportion of risk window area	0.336
No of birds per hour of observation	0.441
Potential number birds crossing windfarm area	1242
Number birds through rotors	417.86
Stage 2 Probability of collision	0.059
Calculation of number collisions	
No avoidance	
Collisions per year	20.94
Years per collision	0.048
Over 25 years	523.45
Avoidance 99.5%	
	0.419
	2.39
	10.47

C.4c CRM: Common Tern – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha		p(collision)	from radius r		p(collision)	from radius r
BirdLength	0.34	m	0.025	0.575	4.35	14.25	0.83	0.00104	13.25	0.78
Wingspan	0.8	m	0.075	0.575	1.45	5.09	0.30	0.00223	4.08	0.24
F: Flapping (0) or gliding (+1)	0		0.125	0.702	0.87	3.81	0.22	0.00279	2.59	0.15
			0.175	0.860	0.62	3.44	0.20	0.00353	1.94	0.11
Bird speed	10.9	m/sec	0.225	0.994	0.48	3.23	0.19	0.00425	1.49	0.09
RotorDiam	150	m	0.275	0.947	0.40	2.70	0.16	0.00435	1.05	0.06
RotationPeriod	4.70	sec	0.325	0.899	0.33	2.36	0.14	0.00449	0.79	0.05
			0.375	0.851	0.29	2.10	0.12	0.00461	0.61	0.04
			0.425	0.804	0.26	1.89	0.11	0.00469	0.48	0.03
			0.475	0.756	0.23	1.71	0.10	0.00476	0.39	0.02
Bird aspect ratioo: β	0.43		0.525	0.708	0.21	1.56	0.09	0.00480	0.36	0.02
			0.575	0.660	0.19	1.43	0.08	0.00481	0.40	0.02
			0.625	0.613	0.17	1.31	0.08	0.00481	0.44	0.03
			0.675	0.565	0.16	1.21	0.07	0.00477	0.46	0.03
			0.725	0.517	0.15	1.11	0.07	0.00471	0.47	0.03
			0.775	0.470	0.14	1.02	0.06	0.00463	0.48	0.03
			0.825	0.422	0.13	0.94	0.05	0.00453	0.48	0.03
			0.875	0.374	0.12	0.86	0.05	0.00440	0.48	0.03
			0.925	0.327	0.12	0.78	0.05	0.00424	0.47	0.03
			0.975	0.279	0.11	0.71	0.04	0.00406	0.46	0.03
			Overall p(collision) =			Upwind	8.3%	Downwind	3.5%	
						Average	5.9%			



C.5a CRM: Golden Eagle – Consented Site Year 1 Breeding (February – August 2018)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.82						
Number turbines	36	wingspan (m)	2.03						
Rotor diameter	128	flapping (0)or gliding (1)	1						
Hub height (m)	81	Assumed flight speed (m/s)	11.9						
Max chord (m)	3.5	Number daylight hours available	3565.18						
Rotor depth	3.5	Maximum recording height (m)	200						
Pitch (degrees)	7.5	Minimum recording height (m)	0						
Rotation period (secs)	4.6								
Turbine operation time 85%	0.85								
Avoidance Rate 99%	0.01								
Rotor radius ²	4096.00								
Combined rotor swept area	463246.59								
Collision Risk volume 'Vw' (m ³)	2,176,000,000								
Rotor swept volume 'V _r ' (m ³)	2,001,225								
Survey Data									
		VP	1	2	3	4	5	8	
	FRA (ha)		433	348	556	548	482	580	
	Observation Time (hours)		66	66	66	63	63	63	
	Time at height band A		60	222	0	0	45	315	
	Time at height band B		253	240	210	0	43	555	
	Time at height band C		120	61	294	0	0	434	
	Time at height band D		0	239	250	0	0	300	
	Total Time at PCH		433	523	504	0	88	1304	
Flight activity per unit time and area				1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare		102880800	82684800	132105600	124286400	109317600	131544000	#####
Flying time at risk height	Effort at each VP / FRA		4.21E-06	6.33E-06	3.82E-06	0.00E+00	8.05E-07	9.91E-06	2.51E-05
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		1.51E-01	1.21E-01	1.93E-01	1.82E-01	1.60E-01	1.93E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		6.34E-07	7.66E-07	7.38E-07	0.00E+00	1.29E-07	1.91E-06	4.18E-06
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000004177						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		25.31						
FRAw	Estimated bird time*(rotor diameter/recording height band)		16.20						
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		53.64						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.36						
Number of transits 'ntr'	'n'/'t'		147.76						
E									
Probability of collision (Band model)			0.078						
Calculation of number collisions				No avoidance		Avoidance 99%			
Collisions per year				9.84		0.098			
Equivalent to 1 bird every x (years)				0.10		10.2			
Over 25 years				246.0		2.46			



C.5b CRM: Golden Eagle – Consented Site Year 2 Breeding (February – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.82							
Number turbines	36	wingspan (m)	2.03							
Rotor diameter	128	flapping (0)or gliding (1)	1							
Hub height (m)	81	Assumed flight speed (m/s)	11.9							
Max chord (m)	3.5	Number daylight hours available	3563.83							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 99%	0.01									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	2,001,225									
Survey Data										
		VP	1	2	3	4	5	8	14	
	FRA (ha)		433	348	556	548	482	580	290	
	Observation Time (hours)		27	66	63	63	66	60	48	
	Time at height band A		308	231	225	75	0	0	6	
	Time at height band B		1293	1002	135	180	206	540	329	
	Time at height band C		270	180	300	75	698	558	703	
	Time at height band D		0	60	390	330	60	442	45	
	Total Time at PCH		1871	1413	660	330	904	1098	1038	
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		42087600	82684800	126100800	124286400	114523200	125280000	50112000	665074800.0
Flying time at risk height	Effort at each VP / FRA		4.45E-05	1.71E-05	5.23E-06	2.66E-06	7.89E-06	8.76E-06	2.07E-05	1.07E-04
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		6.33E-02	1.24E-01	1.90E-01	1.87E-01	1.72E-01	1.88E-01	7.53E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		2.81E-06	2.12E-06	9.92E-07	4.96E-07	1.36E-06	1.65E-06	1.56E-06	1.10E-05
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000010997							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		66.63							
FRAw	Estimated bird time*(rotor diameter/recording height band)		42.64							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		141.18							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.36							
Number of transits 'ntr'	'n'/'t'		388.90							
E										
Probability of collision (Band model)			0.078							
Calculation of number collisions							No avoidance		Avoidance 99%	
Collisions per year								25.90		0.259
Equivalent to 1 bird every x (years)								0.04		3.9
Over 25 years								647.4		6.47



C.5c CRM: Golden Eagle – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.82	m	0.025	0.575	5.45	18.16	1.00	0.00124	17.64	0.97
Wingspan	2.03	m	0.075	0.575	1.82	6.23	0.34	0.00256	5.70	0.31
F: Flapping (0) or gliding (+1)	1		0.125	0.702	1.09	4.38	0.24	0.00300	3.74	0.20
			0.175	0.860	0.78	3.72	0.20	0.00357	2.93	0.16
Bird speed	11.9	m/sec	0.225	0.994	0.61	3.32	0.18	0.00410	2.42	0.13
RotorDiam	128	m	0.275	0.947	0.50	2.70	0.15	0.00407	1.83	0.10
RotationPeriod	4.60	sec	0.325	0.899	0.42	2.26	0.12	0.00402	1.44	0.08
			0.375	0.851	0.36	2.28	0.13	0.00469	1.50	0.08
			0.425	0.804	0.32	2.08	0.11	0.00485	1.35	0.07
			0.475	0.756	0.29	1.92	0.11	0.00499	1.23	0.07
Bird aspect ratioo: β	0.40		0.525	0.708	0.26	1.78	0.10	0.00512	1.13	0.06
			0.575	0.660	0.24	1.66	0.09	0.00524	1.06	0.06
			0.625	0.613	0.22	1.56	0.09	0.00535	1.00	0.05
			0.675	0.565	0.20	1.47	0.08	0.00545	0.96	0.05
			0.725	0.517	0.19	1.39	0.08	0.00554	0.92	0.05
			0.775	0.470	0.18	1.32	0.07	0.00561	0.89	0.05
			0.825	0.422	0.17	1.25	0.07	0.00567	0.87	0.05
			0.875	0.374	0.16	1.19	0.07	0.00572	0.85	0.05
			0.925	0.327	0.15	1.14	0.06	0.00576	0.84	0.05
			0.975	0.279	0.14	1.08	0.06	0.00578	0.83	0.05
			Overall p(collision) =			Upwind	9.2%	Downwind	6.4%	
						Average	7.8%			



C.6a CRM: Golden Eagle – Proposed Development Year 1 Breeding (February – August 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.82				
Number turbines	35	wingspan (m)	2.03				
Rotor diameter	150	flapping (0) or gliding (1)	1				
Hub height (m)	105	Assumed flight speed (m/s)	11.9				
Max chord (m)	4.2	Number daylight hours available	3565.18				
Rotor depth	4.2	Maximum recording height (m)	200				
Pitch (degrees)	12	Minimum recording height (m)	20				
Rotation period (secs)	4.7						
Turbine operation time 85%	0.85						
Avoidance Rate 99%	0.01						
Rotor radius ²	5625.00						
Combined rotor swept area	618500.93						
Collision Risk volume 'Vw' (m ³)	2,550,000,000						
Rotor swept volume 'V _r ' (m ³)	3,104,875						
Survey Data							
	VP	1	2	3	4	5	8
FRA (ha)		433	348	556	548	482	580
Observation Time (hours)		66	66	66	63	63	63
Time at height band A		60	222	0	0	48	315
Time at height band B		253	240	210	0	43	555
Time at height band C		120	61	294	0	0	434
Time at height band D		0	239	250	0	0	300
Total Time at PCH		373	301	504	0	43	989
Flight activity per unit time and area							
		1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare	102880800	82684800	132105600	124286400	109317600	131544000 #####
Flying time at risk height	Effort at each VP / FRA	3.63E-06	3.64E-06	3.82E-06	0.00E+00	3.93E-07	7.52E-06 1.90E-05
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.51E-01	1.21E-01	1.93E-01	1.82E-01	1.60E-01	1.93E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	5.46E-07	4.41E-07	7.38E-07	0.00E+00	6.30E-08	1.45E-06 3.24E-06
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000003237					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	19.62					
FRAw	Estimated bird time*(rotor diameter/recording height band)	16.35					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	71.65					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42					
Number of transits 'ntr'	'n'/'t'	169.86					
E							
Probability of collision (Band model)		0.081					
Calculation of number collisions						No avoidance	Avoidance 99%
Collisions per year						11.72	0.117
Equivalent to 1 bird every x (years)						0.09	8.5
Over 25 years						292.9	2.93



C.6b CRM: Golden Eagle – Proposed Development Year 2 Breeding (February – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.82							
Number turbines	35	wingspan (m)	2.03							
Rotor diameter	150	flapping (0) or gliding (1)	1							
Hub height (m)	105	Assumed flight speed (m/s)	11.9							
Max chord (m)	4.2	Number daylight hours available	3563.83							
Rotor depth	4.2	Maximum recording height (m)	200							
Pitch (degrees)	12	Minimum recording height (m)	20							
Rotation period (secs)	4.7									
Turbine operation time 85%	0.85									
Avoidance Rate 99%	0.01									
Rotor radius ²	5625.00									
Combined rotor swept area	618500.93									
Collision Risk volume 'Vw' (m ³)	2,550,000,000									
Rotor swept volume 'V _r ' (m ³)	3,104,875									
Survey Data										
	VP	1	2	3	4	5	8	14		
FRA (ha)		433	348	556	548	482	580	290		
Observation Time (hours)		27	66	63	63	66	60	48		
Time at height band A		308	231	225	75	0	0	6		
Time at height band B		1293	1002	135	180	206	540	329		
Time at height band C		270	180	300	75	698	558	703		
Time at height band D		0	60	390	330	60	442	45		
Total Time at PCH		1563	1182	435	255	904	1098	1032		
Flight activity per unit time and area										
		1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	42087600	82684800	126100800	124286400	114523200	125280000	50112000	665074800.0	
Flying time at risk height	Effort at each VP / FRA	3.71E-05	1.43E-05	3.45E-06	2.05E-06	7.89E-06	8.76E-06	2.06E-05	9.42E-05	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	6.33E-02	1.24E-01	1.90E-01	1.87E-01	1.72E-01	1.88E-01	7.53E-02	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.35E-06	1.78E-06	6.54E-07	3.83E-07	1.36E-06	1.65E-06	1.55E-06	9.73E-06	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000009727								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	58.93								
FRAw	Estimated bird time*(rotor diameter/recording height band)	49.11								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	215.26								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42								
Number of transits 'ntr'	'n'/'t'	510.27								
E										
Probability of collision (Band model)		0.081								
Calculation of number collisions							No avoidance	Avoidance 99%		
Collisions per year							35.20	0.352		
Equivalent to 1 bird every x (years)							0.03	2.8		
Over 25 years							879.9	8.80		



C.6c CRM: Golden Eagle – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.82	m	0.025	0.575	4.75	17.85	0.96	0.00120	16.85	0.90
Wingspan	2.03	m	0.075	0.575	1.58	6.29	0.34	0.00253	5.28	0.28
F: Flapping (0) or gliding (+1)	1		0.125	0.702	0.95	4.58	0.25	0.00307	3.35	0.18
			0.175	0.860	0.68	4.02	0.22	0.00378	2.52	0.14
Bird speed	11.9	m/sec	0.225	0.994	0.53	3.70	0.20	0.00447	1.97	0.11
RotorDiam	150	m	0.275	0.947	0.43	3.06	0.16	0.00452	1.41	0.08
RotationPeriod	4.70	sec	0.325	0.899	0.37	2.95	0.16	0.00515	1.38	0.07
			0.375	0.851	0.32	2.67	0.14	0.00537	1.18	0.06
			0.425	0.804	0.28	2.44	0.13	0.00557	1.04	0.06
			0.475	0.756	0.25	2.26	0.12	0.00575	0.94	0.05
Bird aspect ratioo: β	0.40		0.525	0.708	0.23	2.10	0.11	0.00590	0.86	0.05
			0.575	0.660	0.21	1.96	0.10	0.00604	0.84	0.04
			0.625	0.613	0.19	1.83	0.10	0.00615	0.88	0.05
			0.675	0.565	0.18	1.72	0.09	0.00623	0.91	0.05
			0.725	0.517	0.16	1.62	0.09	0.00630	0.92	0.05
			0.775	0.470	0.15	1.53	0.08	0.00634	0.93	0.05
			0.825	0.422	0.14	1.44	0.08	0.00636	0.94	0.05
			0.875	0.374	0.14	1.36	0.07	0.00636	0.94	0.05
			0.925	0.327	0.13	1.28	0.07	0.00634	0.93	0.05
			0.975	0.279	0.12	1.20	0.06	0.00629	0.92	0.05
Overall p(collision) =					Upwind	10.4%	Downwind	5.9%		
					Average	8.1%				

C.7a CRM: Golden Eagle – Consented Site Year 1 Non-breeding (September 2017– January 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.82					
Number turbines	36	wingspan (m)	2.03					
Rotor diameter	128	flapping (0) or gliding (1)	1					
Hub height (m)	81	Assumed flight speed (m/s)	11.9					
Max chord (m)	3.5	Number daylight hours available	1671.41					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)								
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99%	0.01							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	2,001,225							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		33	33	33	36	36	36	
Time at height band A		0	30	30	0	0	0	
Time at height band B		0	398	90	0	96	0	
Time at height band C		375	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		375	428	120	0	96	0	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	51440400	41342400	66052800	71020800	62467200	75168000	#####
Flying time at risk height	Effort at each VP / FRA	7.29E-06	1.04E-05	1.82E-06	0.00E+00	1.54E-06	0.00E+00	2.10E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.40E-01	1.12E-01	1.80E-01	1.93E-01	1.70E-01	2.05E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.02E-06	1.16E-06	3.27E-07	0.00E+00	2.61E-07	0.00E+00	2.77E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000002773						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	7.88						
FRAw	Estimated bird time*(rotor diameter/recording height band)	5.04						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	16.69						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.36						
Number of transits 'n't'	'n'/t'	45.99						
E								
Probability of collision (Band model)		0.078						
Calculation of number collisions							No avoidance	Avoidance 99%
Collisions per year							3.06	0.031
Equivalent to 1 bird every x (years)							0.33	32.7
Over 25 years							76.6	0.77



C.7b CRM: Golden Eagle – Consented Site Year 2 Non-breeding (September 2018– January 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.82					
Number turbines	36	wingspan (m)	2.03					
Rotor diameter	128	flapping (0) or gliding (1)	1					
Hub height (m)	81	Assumed flight speed (m/s)	11.9					
Max chord (m)	3.5	Number daylight hours available	1672.82					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99%	0.01							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	2,001,225							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433.00	348.00	556	548	482	580	
Observation Time (hours)		48	42	48	45	48	51	
Time at height band A		474	155	40	75	0	85	
Time at height band B		994	345	941	98	22	326	
Time at height band C		255	0	0	0	0	0	
Time at height band D		90	0	0	0	0	0	
Total Time at PCH		1723	500	981	173	22	411	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	74822400	52617600	96076800	88776000	83289600	106488000	502070400.0
Flying time at risk height	Effort at each VP / FRA	2.30E-05	9.50E-06	1.02E-05	1.95E-06	2.64E-07	3.86E-06	4.88E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.05E-01	1.91E-01	1.77E-01	1.66E-01	2.12E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.43E-06	9.96E-07	1.95E-06	3.45E-07	4.38E-08	8.19E-07	7.59E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000007589						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	21.58						
FRAw	Estimated bird time*(rotor diameter/recording height band)	13.81						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	45.73						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.36						
Number of transits 'ntr'	'n'/'t'	125.96						
E								
Probability of collision (Band model)		0.078						
Calculation of number collisions						No avoidance	Avoidance 99%	
Collisions per year						8.39	0.084	
Equivalent to 1 bird every x (years)						0.12	11.9	
Over 25 years						209.7	2.10	



C.7c CRM: Golden Eagle – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.82	m	0.025	0.575	5.45	18.16	1.00	0.00124	17.64	0.97
Wingspan	2.03	m	0.075	0.575	1.82	6.23	0.34	0.00256	5.70	0.31
F: Flapping (0) or gliding (+1)	1		0.125	0.702	1.09	4.38	0.24	0.00300	3.74	0.20
			0.175	0.860	0.78	3.72	0.20	0.00357	2.93	0.16
Bird speed	11.9	m/sec	0.225	0.994	0.61	3.32	0.18	0.00410	2.42	0.13
RotorDiam	128	m	0.275	0.947	0.50	2.70	0.15	0.00407	1.83	0.10
RotationPeriod	4.60	sec	0.325	0.899	0.42	2.26	0.12	0.00402	1.44	0.08
			0.375	0.851	0.36	2.28	0.13	0.00469	1.50	0.08
			0.425	0.804	0.32	2.08	0.11	0.00485	1.35	0.07
			0.475	0.756	0.29	1.92	0.11	0.00499	1.23	0.07
Bird aspect ratioo: β	0.40		0.525	0.708	0.26	1.78	0.10	0.00512	1.13	0.06
			0.575	0.660	0.24	1.66	0.09	0.00524	1.06	0.06
			0.625	0.613	0.22	1.56	0.09	0.00535	1.00	0.05
			0.675	0.565	0.20	1.47	0.08	0.00545	0.96	0.05
			0.725	0.517	0.19	1.39	0.08	0.00554	0.92	0.05
			0.775	0.470	0.18	1.32	0.07	0.00561	0.89	0.05
			0.825	0.422	0.17	1.25	0.07	0.00567	0.87	0.05
			0.875	0.374	0.16	1.19	0.07	0.00572	0.85	0.05
			0.925	0.327	0.15	1.14	0.06	0.00576	0.84	0.05
			0.975	0.279	0.14	1.08	0.06	0.00578	0.83	0.05
			Overall p(collision) =			Upwind	9.2%	Downwind	6.4%	
						Average	7.8%			





C.8b CRM: Golden Eagle – Proposed Development Year 2 Non-breeding (September 2018– January 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.82						
Number turbines	35	wingspan (m)	2.03						
Rotor diameter	150	flapping (0) or gliding (1)	1						
Hub height (m)	105	Assumed flight speed (m/s)	11.9						
Max chord (m)	4.2	Number daylight hours available	1672.82						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 99%	0.01								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	3,104,875								
Survey Data									
		VP	1	2	3	4	5	8	
	FRA (ha)		433.00	348.00	556	548	482	580	
	Observation Time (hours)		48	42	48	45	48	51	
	Time at height band A		474	155	40	75	0	85	
	Time at height band B		994	345	941	98	22	326	
	Time at height band C		255	0	0	0	0	0	
	Time at height band D		90	0	0	0	0	0	
	Total Time at PCH		1249	345	941	98	22	326	
Flight activity per unit time and area									
		1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	74822400	52617600	96076800	88776000	83289600	106488000	502070400.0	
Flying time at risk height	Effort at each VP / FRA	1.67E-05	6.56E-06	9.79E-06	1.10E-06	2.64E-07	3.06E-06	3.75E-05	
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.05E-01	1.91E-01	1.77E-01	1.66E-01	2.12E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.49E-06	6.87E-07	1.87E-06	1.95E-07	4.38E-08	6.49E-07	5.94E-06	
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000005937							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	16.88							
FRAw	Estimated bird time*(rotor diameter/recording height band)	14.07							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	61.68							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42							
Number of transits 'ntr'	'n'/'t'	146.21							
E									
Probability of collision (Band model)		0.081							
Calculation of number collisions						No avoidance	Avoidance 99%		
Collisions per year						10.08	0.101		
Equivalent to 1 bird every x (years)						0.10	9.9		
Over 25 years						252.1	2.52		



C.8c CRM: Golden Eagle – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.82	m	0.025	0.575	4.75	17.85	0.96	0.00120	16.85	0.90
Wingspan	2.03	m	0.075	0.575	1.58	6.29	0.34	0.00253	5.28	0.28
F: Flapping (0) or gliding (+1)	1		0.125	0.702	0.95	4.58	0.25	0.00307	3.35	0.18
			0.175	0.860	0.68	4.02	0.22	0.00378	2.52	0.14
Bird speed	11.9	m/sec	0.225	0.994	0.53	3.70	0.20	0.00447	1.97	0.11
RotorDiam	150	m	0.275	0.947	0.43	3.06	0.16	0.00452	1.41	0.08
RotationPeriod	4.70	sec	0.325	0.899	0.37	2.95	0.16	0.00515	1.38	0.07
			0.375	0.851	0.32	2.67	0.14	0.00537	1.18	0.06
			0.425	0.804	0.28	2.44	0.13	0.00557	1.04	0.06
			0.475	0.756	0.25	2.26	0.12	0.00575	0.94	0.05
Bird aspect ratioo: β	0.40		0.525	0.708	0.23	2.10	0.11	0.00590	0.86	0.05
			0.575	0.660	0.21	1.96	0.10	0.00604	0.84	0.04
			0.625	0.613	0.19	1.83	0.10	0.00615	0.88	0.05
			0.675	0.565	0.18	1.72	0.09	0.00623	0.91	0.05
			0.725	0.517	0.16	1.62	0.09	0.00630	0.92	0.05
			0.775	0.470	0.15	1.53	0.08	0.00634	0.93	0.05
			0.825	0.422	0.14	1.44	0.08	0.00636	0.94	0.05
			0.875	0.374	0.14	1.36	0.07	0.00636	0.94	0.05
			0.925	0.327	0.13	1.28	0.07	0.00634	0.93	0.05
			0.975	0.279	0.12	1.20	0.06	0.00629	0.92	0.05
Overall p(collision) =					Upwind	10.4%	Downwind	5.9%		
					Average	8.1%				

C.9a CRM: Golden Plover – Consented Site Year 1 Breeding (March – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	36	wingspan (m)	0.72					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	13.7					
Max chord (m)	3.5	Number daylight hours available	2950.66					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	4096.00	Survey Data						
Combined rotor swept area	463246.59	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,176,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	1,751,072	Observation Time (hours)	45	45	42	45	45	45
		Time at height band A	122	90	0	0	0	0
		Time at height band B	72	101	0	0	0	120
		Time at height band C	0	90	0	0	0	0
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	194	281	0	0	0	120
Flight activity per unit time and area		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	84067200	88776000	78084000	93960000	#####
Flying time at risk height	Effort at each VP / FRA	2.77E-06	4.98E-06	0.00E+00	0.00E+00	0.00E+00	1.28E-06	9.03E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01	1.99E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	4.12E-07	5.96E-07	0.00E+00	0.00E+00	0.00E+00	2.55E-07	1.26E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000001262						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	6.33						
FRAw	Estimated bird time*(rotor diameter/recording height band)	4.05						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	11.74						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.28						
Number of transits 'ntr'	'n'/'t'	42.54						
E								
Probability of collision (Band model)		0.048						
Calculation of number collisions					No avoidance	Avoidance 98%		
Collisions per year					1.73	0.035		
Equivalent to 1 bird every x (years)					0.58	28.9		
Over 25 years					43.3	0.87		



C.9b CRM: Golden Plover – Consented Site Year 2 Breeding (March – July 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.28							
Number turbines	36	wingspan (m)	0.72							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	13.7							
Max chord (m)	3.5	Number daylight hours available	2949.62							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Survey Data										
		VP	1	2	3	4	5	8	14	
Avoidance Rate 98%	0.02	FRA (ha)	433	348	556	548	482	580	290	
Rotor radius ²	4096.00	Observation Time (hours)	27	54	54	54	54	54	48	
Combined rotor swept area	463246.59	Time at height band A	195	0	0	90	0	15	262	
Collision Risk volume 'Vw' (m ³)	2,176,000,000	Time at height band B	555	129	0	3405	90	0	203	
Rotor swept volume 'V _r ' (m ³)	1,751,072	Time at height band C	0	0	0	0	0	0	0	
		Time at height band D	0	0	0	0	0	0	0	
		Total Time at PCH	750	129	0	3495	90	15	465	
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		42087600	67651200	108086400	106531200	93700800	112752000	50112000	#####
Flying time at risk height	Effort at each VP / FRA		1.78E-05	1.91E-06	0.00E+00	3.28E-05	9.61E-07	1.33E-07	9.28E-06	6.29E-05
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		7.24E-02	1.16E-01	1.86E-01	1.83E-01	1.61E-01	1.94E-01	8.63E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		1.29E-06	2.22E-07	0.00E+00	6.02E-06	1.55E-07	2.58E-08	8.00E-07	8.51E-06
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000008511							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		42.68							
FRAw	Estimated bird time*(rotor diameter/recording height band)		27.31							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		79.12							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.28							
Number of transits 'n't'	'n'/t'		286.77							
E										
Probability of collision (Band model)			0.048							
Calculation of number collisions							No avoidance	Avoidance 98%		
Collisions per year								11.67	0.233	
Equivalent to 1 bird every x (years)								0.09	4.3	
Over 25 years								291.7	5.83	



C.9c CRM: Golden Plover – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.28	m	0.025	0.575	6.27	17.28	0.82	0.00103	16.76	0.80
Wingspan	0.72	m	0.075	0.575	2.09	5.94	0.28	0.00212	5.41	0.26
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.25	4.28	0.20	0.00254	3.63	0.17
			0.175	0.860	0.90	3.71	0.18	0.00309	2.92	0.14
Bird speed	13.7	m/sec	0.225	0.994	0.70	3.36	0.16	0.00360	2.45	0.12
RotorDiam	128	m	0.275	0.947	0.57	2.71	0.13	0.00355	1.85	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.48	2.26	0.11	0.00350	1.44	0.07
			0.375	0.851	0.42	1.92	0.09	0.00344	1.15	0.05
			0.425	0.804	0.37	1.68	0.08	0.00339	0.94	0.04
			0.475	0.756	0.33	1.49	0.07	0.00337	0.80	0.04
Bird aspect ratioo: β	0.39		0.525	0.708	0.30	1.34	0.06	0.00334	0.69	0.03
			0.575	0.660	0.27	1.21	0.06	0.00330	0.60	0.03
			0.625	0.613	0.25	1.09	0.05	0.00325	0.53	0.03
			0.675	0.565	0.23	0.99	0.05	0.00319	0.48	0.02
			0.725	0.517	0.22	0.90	0.04	0.00312	0.43	0.02
			0.775	0.470	0.20	0.82	0.04	0.00304	0.39	0.02
			0.825	0.422	0.19	0.75	0.04	0.00295	0.37	0.02
			0.875	0.374	0.18	0.68	0.03	0.00285	0.34	0.02
			0.925	0.327	0.17	0.62	0.03	0.00274	0.32	0.02
			0.975	0.279	0.16	0.56	0.03	0.00261	0.31	0.01
Overall p(collision) =					Upwind	6.0%	Downwind	3.6%		
					Average	4.8%				



C.10a CRM: Golden Plover – Proposed Development Year 1 Breeding (March – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	35	wingspan (m)	0.72					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	13.7					
Max chord (m)	4.2	Number daylight hours available	2950.66					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	5625.00	Survey Data						
Combined rotor swept area	618500.93	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,550,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	2,770,884	Observation Time (hours)	45	45	42	45	45	45
		Time at height band A	122	90	0	0	0	0
		Time at height band B	72	101	0	0	0	120
		Time at height band C	0	90	0	0	0	0
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	72	191	0	0	0	120
Flight activity per unit time and area		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	84067200	88776000	78084000	93960000	#####
Flying time at risk height	Effort at each VP / FRA	1.03E-06	3.39E-06	0.00E+00	0.00E+00	0.00E+00	1.28E-06	5.69E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01	1.99E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.53E-07	4.05E-07	0.00E+00	0.00E+00	0.00E+00	2.55E-07	8.12E-07
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000000812						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	4.08						
FRAw	Estimated bird time*(rotor diameter/recording height band)	3.40						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	13.29						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33						
Number of transits 'n't'	'n'/'t'	40.63						
E								
Probability of collision (Band model)		0.049						
Calculation of number collisions				No avoidance		Avoidance 98%		
Collisions per year						1.70	0.034	
Equivalent to 1 bird every x (years)						0.59	29.4	
Over 25 years						42.6	0.85	



C.10b CRM: Golden Plover – Proposed Development Year 2 Breeding (March – July 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.28							
Number turbines	35	wingspan (m)	0.72							
Rotor diameter	150	flapping (0) or gliding (1)	0							
Hub height (m)	105	Assumed flight speed (m/s)	13.7							
Max chord (m)	4.2	Number daylight hours available	2949.62							
Rotor depth	4.2	Maximum recording height (m)	200							
Pitch (degrees)	12	Minimum recording height (m)	20							
Rotation period (secs)	4.7									
Turbine operation time 85%	0.85									
Avoidance Rate 98%	0.02									
Rotor radius ²	5625.00									
Combined rotor swept area	618500.93									
Collision Risk volume 'Vw' (m ³)	2,550,000,000									
Rotor swept volume 'V _r ' (m ³)	2,770,884									
Survey Data										
		VP	1	2	3	4	5	8	14	
	FRA (ha)		433	348	556	548	482	580	290	
	Observation Time (hours)		27	54	54	54	54	54	48	
	Time at height band A		195	0	0	90	0	15	262	
	Time at height band B		555	129	0	3405	90	0	203	
	Time at height band C		0	0	0	0	0	0	0	
	Time at height band D		0	0	0	0	0	0	0	
	Total Time at PCH		555	129	0	3405	90	0	203	
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		42087600	67651200	108086400	106531200	93700800	112752000	50112000	#####
Flying time at risk height	Effort at each VP / FRA		1.32E-05	1.91E-06	0.00E+00	3.20E-05	9.61E-07	0.00E+00	4.05E-06	5.21E-05
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		7.24E-02	1.16E-01	1.86E-01	1.83E-01	1.61E-01	1.94E-01	8.63E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		9.55E-07	2.22E-07	0.00E+00	5.86E-06	1.55E-07	0.00E+00	3.49E-07	7.54E-06
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000007543							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		37.82							
FRAw	Estimated bird time*(rotor diameter/recording height band)		31.52							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		123.30							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.33							
Number of transits 'n't'	'n'/t'		377.06							
E										
Probability of collision (Band model)			0.049							
Calculation of number collisions							No avoidance	Avoidance 98%		
Collisions per year								15.81		0.316
Equivalent to 1 bird every x (years)								0.06		3.2
Over 25 years								395.2		7.90



C.10c CRM: Golden Plover – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3									
Pitch (degrees)	4.2	m	r/R	c/C	α	collide		contribution	collide	
BirdLength	12	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
Wingspan	0.28	m	0.025	0.575	5.47	17.35	0.81	0.00101	16.34	0.76
F: Flapping (0) or gliding (+1)	0.72	m	0.075	0.575	1.82	6.12	0.29	0.00214	5.11	0.24
Bird speed	0	m/sec	0.125	0.702	1.09	4.55	0.21	0.00265	3.32	0.15
RotorDiam	13.7	m/sec	0.175	0.860	0.78	4.07	0.19	0.00332	2.57	0.12
RotationPeriod	150	m	0.225	0.994	0.61	3.79	0.18	0.00397	2.05	0.10
	4.70	sec	0.275	0.947	0.50	3.12	0.15	0.00399	1.46	0.07
			0.325	0.899	0.42	2.64	0.12	0.00400	1.07	0.05
			0.375	0.851	0.36	2.30	0.11	0.00401	0.81	0.04
			0.425	0.804	0.32	2.04	0.10	0.00405	0.64	0.03
			0.475	0.756	0.29	1.83	0.09	0.00406	0.51	0.02
Bird aspect ratioo: β	0.39		0.525	0.708	0.26	1.66	0.08	0.00405	0.42	0.02
			0.575	0.660	0.24	1.50	0.07	0.00402	0.35	0.02
			0.625	0.613	0.22	1.37	0.06	0.00398	0.30	0.01
			0.675	0.565	0.20	1.24	0.06	0.00391	0.30	0.01
			0.725	0.517	0.19	1.13	0.05	0.00382	0.33	0.02
			0.775	0.470	0.18	1.03	0.05	0.00372	0.35	0.02
			0.825	0.422	0.17	0.94	0.04	0.00360	0.36	0.02
			0.875	0.374	0.16	0.85	0.04	0.00345	0.37	0.02
			0.925	0.327	0.15	0.76	0.04	0.00329	0.37	0.02
			0.975	0.279	0.14	0.68	0.03	0.00311	0.36	0.02
			Overall p(collision) =		Upwind	7.0%	Downwind	2.9%		
						Average	4.9%			



C.11a CRM: Great Skua – Consented Site Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.56					
Number turbines	36	wingspan (m)	1.36					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	14.9					
Max chord (m)	3.5	Number daylight hours available	2816.94					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	4096.00	Survey Data						
Combined rotor swept area	463246.59	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,176,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	1,880,781	Observation Time (hours)	45	45	45	45	45	45
		Time at height band A	305	66	5875	2565	540	1410
		Time at height band B	501	384	3525	4845	1425	1200
		Time at height band C	175	664	660	810	345	90
		Time at height band D	0	642	210	2325	0	105
		Total Time at PCH	981	1114	10060	8220	2310	2700
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	90072000	88776000	78084000	93960000	#####
Flying time at risk height	Effort at each VP / FRA	1.40E-05	1.98E-05	1.12E-04	9.26E-05	2.96E-05	2.87E-05	2.96E-04
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.05E-06	2.33E-06	2.11E-05	1.72E-05	4.84E-06	5.66E-06	5.32E-05
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000053172						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	254.63						
FRAw	Estimated bird time*(rotor diameter/recording height band)	162.96						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	507.07						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.27						
Number of transits 'ntr'	'n'/'t'	1860.93						
Stage 2								
Probability of collision (Band model)		0.061						
Calculation of number collisions							No avoidance	Avoidance 99.5%
Collisions per year							96.23	0.481
Equivalent to 1 bird every x (years)							0.01	2.1
Over 25 years							2405.7	12.03



C.11b CRM: Great Skua – Consented Site Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.56							
Number turbines	36	wingspan (m)	1.36							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	14.9							
Max chord (m)	3.5	Number daylight hours available	2816.77							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)										
Turbine operation time 85%	0.85	Survey Data								
Avoidance Rate 99.5%	0.005	VP	1	2	3	4	5	8	14	
Rotor radius ²	4096.00	FRA (ha)	433	348	556	548	482	580	290	
Combined rotor swept area	463246.59	Observation Time (hours)	15	45	45	45	45	45	48	
Collision Risk volume 'Vw' (m ³)	2,176,000,000	Time at height band A	465	225	7875	1703	810	1016	1553	
Rotor swept volume 'V _r ' (m ³)	1,880,781	Time at height band B	165	289	5345	3105	1629	2820	2247	
		Time at height band C	0	60	315	1575	240	1372	360	
		Time at height band D	0	277	45	540	420	165	0	
		Total Time at PCH	630	574	13535	6383	2679	5208	4160	
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA		2.69E-05	1.02E-05	1.50E-04	7.19E-05	3.43E-05	5.54E-05	8.30E-05	4.32E-04
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		1.31E-06	1.19E-06	2.82E-05	1.33E-05	5.57E-06	1.08E-05	8.65E-06	6.90E-05
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000068993							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		330.37							
FRAw	Estimated bird time*(rotor diameter/recording height band)		211.44							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		657.91							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.27	Calculation of number collisions			No avoidance		Avoidance 99.5%	
Number of transits 'n't'	'n'/t'		2414.49	Collisions per year				124.85		0.624
Stage 2				Equivalent to 1 bird every x (years)				0.01		1.6
Probability of collision (Band model)			0.061	Over 25 years				3121.3		15.61



C.11c CRM: Great Skua – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
BirdLength	0.56	m	0.025	0.575	6.82	23.14	1.00	0.00125	22.61	0.99
Wingspan	1.36	m	0.075	0.575	2.27	7.89	0.35	0.00259	7.36	0.32
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.36	5.49	0.24	0.00301	4.85	0.21
			0.175	0.860	0.97	4.62	0.20	0.00354	3.84	0.17
Bird speed	14.9	m/sec	0.225	0.994	0.76	4.10	0.18	0.00404	3.19	0.14
RotorDiam	128	m	0.275	0.947	0.62	3.31	0.14	0.00399	2.45	0.11
RotationPeriod	4.60	sec	0.325	0.899	0.52	2.76	0.12	0.00393	1.94	0.08
			0.375	0.851	0.45	2.35	0.10	0.00386	1.57	0.07
			0.425	0.804	0.40	2.05	0.09	0.00380	1.31	0.06
			0.475	0.756	0.36	1.85	0.08	0.00384	1.16	0.05
Bird aspect ratioo: β	0.41		0.525	0.708	0.32	1.68	0.07	0.00386	1.03	0.05
			0.575	0.660	0.30	1.54	0.07	0.00388	0.94	0.04
			0.625	0.613	0.27	1.42	0.06	0.00388	0.86	0.04
			0.675	0.565	0.25	1.31	0.06	0.00388	0.80	0.03
			0.725	0.517	0.24	1.22	0.05	0.00387	0.75	0.03
			0.775	0.470	0.22	1.13	0.05	0.00384	0.70	0.03
			0.825	0.422	0.21	1.06	0.05	0.00381	0.67	0.03
			0.875	0.374	0.19	0.98	0.04	0.00377	0.64	0.03
			0.925	0.327	0.18	0.92	0.04	0.00372	0.62	0.03
			0.975	0.279	0.17	0.86	0.04	0.00366	0.60	0.03
Overall p(collision) =					Upwind	7.2%	Downwind	5.0%		
					Average	6.1%				



C.12a CRM: Great Skua – Proposed Development Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.56					
Number turbines	35	wingspan (m)	1.36					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	14.9					
Max chord (m)	4.2	Number daylight hours available	2816.94					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	2,944,064							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		45	45	45	45	45	45	
Time at height band A		305	66	5875	2565	540	1410	
Time at height band B		501	384	3525	4845	1425	1200	
Time at height band C		175	664	660	810	345	90	
Time at height band D		0	642	210	2325	0	105	
Total Time at PCH		676	1048	4185	5655	1770	1290	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	90072000	88776000	78084000	93960000	#####
Flying time at risk height	Effort at each VP / FRA	9.64E-06	1.86E-05	4.65E-05	6.37E-05	2.27E-05	1.37E-05	1.75E-04
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.42E-06	2.20E-06	8.77E-06	1.18E-05	3.71E-06	2.70E-06	3.06E-05
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000030632						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	146.69						
FRAw	Estimated bird time*(rotor diameter/recording height band)	122.24						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	508.07						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.32						
Number of transits 'ntr'	'n'/'t'	1590.40						
Stage 2								
Probability of collision (Band model)		0.061						
Calculation of number collisions							No avoidance	Avoidance 99.5%
Collisions per year							82.26	0.411
Equivalent to 1 bird every x (years)							0.01	2.4
Over 25 years							2056.5	10.28



C.12b CRM: Great Skua – Proposed Development Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.56							
Number turbines	35	wingspan (m)	1.36							
Rotor diameter	150	flapping (0) or gliding (1)	0							
Hub height (m)	105	Assumed flight speed (m/s)	14.9							
Max chord (m)	4.2	Number daylight hours available	2816.77							
Rotor depth	4.2	Maximum recording height (m)	200							
Pitch (degrees)	12	Minimum recording height (m)	20							
Rotation period (secs)	4.7									
Turbine operation time 85%	0.85									
Avoidance Rate 99.5%	0.005									
Rotor radius ²	5625.00									
Combined rotor swept area	618500.93									
Collision Risk volume 'Vw' (m ³)	2,550,000,000									
Rotor swept volume 'V _r ' (m ³)	2,944,064									
Survey Data										
		VP	1	2	3	4	5	8	14	
	FRA (ha)		433	348	556	548	482	580	290	
	Observation Time (hours)		15	45	45	45	45	45	48	
	Time at height band A		465	225	7875	1703	810	1016	1553	
	Time at height band B		165	289	5345	3105	1629	2820	2247	
	Time at height band C		0	60	315	1575	240	1372	360	
	Time at height band D		0	277	45	540	420	165	0	
	Total Time at PCH		165	349	5660	4680	1869	4192	2607	
Flight activity per unit time and area										
			1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare		23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA		7.06E-06	6.19E-06	6.28E-05	5.27E-05	2.39E-05	4.46E-05	5.20E-05	2.49E-04
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		3.43E-07	7.26E-07	1.18E-05	9.73E-06	3.89E-06	8.72E-06	5.42E-06	4.06E-05
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000040606							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		194.44							
FRAw	Estimated bird time*(rotor diameter/recording height band)		162.04							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		673.48							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.32							
Number of transits 'ntr'	'n'/t'		2108.15							
Stage 2										
Probability of collision (Band model)			0.061							
Calculation of number collisions							No avoidance		Avoidance 99.5%	
							Collisions per year	109.04		0.545
							Equivalent to 1 bird every x (years)	0.01		1.8
							Over 25 years	2726.0		13.63



C.12c CRM: Great Skua – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3									
Pitch (degrees)	4.2	m	r/R	c/C	α	collide		contribution	collide	
BirdLength	12	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
Wingspan	0.56	m	0.025	0.575	5.94	22.63	0.97	0.00121	21.62	0.93
F: Flapping (0) or gliding (+1)	1.36	m	0.075	0.575	1.98	7.88	0.34	0.00253	6.87	0.29
Bird speed	0		0.125	0.702	1.19	5.66	0.24	0.00303	4.43	0.19
RotorDiam	14.9	m/sec	0.225	0.994	0.66	4.46	0.19	0.00430	2.73	0.12
RotationPeriod	150	m	0.275	0.947	0.54	3.66	0.16	0.00432	2.01	0.09
Bird aspect ratioo: β	4.70	sec	0.325	0.899	0.46	3.10	0.13	0.00431	1.53	0.07
			0.375	0.851	0.40	2.69	0.12	0.00432	1.20	0.05
			0.425	0.804	0.35	2.42	0.10	0.00440	1.01	0.04
			0.475	0.756	0.31	2.19	0.09	0.00446	0.87	0.04
			0.525	0.708	0.28	2.00	0.09	0.00450	0.77	0.03
			0.575	0.660	0.26	1.84	0.08	0.00453	0.68	0.03
			0.625	0.613	0.24	1.69	0.07	0.00453	0.62	0.03
			0.675	0.565	0.22	1.56	0.07	0.00452	0.58	0.02
			0.725	0.517	0.20	1.45	0.06	0.00450	0.58	0.02
			0.775	0.470	0.19	1.34	0.06	0.00445	0.60	0.03
			0.825	0.422	0.18	1.24	0.05	0.00438	0.62	0.03
			0.875	0.374	0.17	1.15	0.05	0.00430	0.63	0.03
			0.925	0.327	0.16	1.06	0.05	0.00420	0.63	0.03
			0.975	0.279	0.15	0.98	0.04	0.00409	0.63	0.03
Overall p(collision) =					Upwind	8.1%		Downwind	4.1%	
							Average	6.1%		



C.13a CRM: Greenshank – Consented Site Year 1 Breeding (March – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	36	wingspan (m)	0.72					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	13.7					
Max chord (m)	3.5	Number daylight hours available	2950.66					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,751,072							
Survey Data								
		VP	1	2	3	4	5	8
	FRA (ha)		433	348	556	548	482	580
	Observation Time (hours)		45	45	42	45	45	45
	Time at height band A		0	0	0	0	30	0
	Time at height band B		47	90	0	0	255	45
	Time at height band C		0	72	0	0	0	0
	Time at height band D		0	0	0	0	0	0
	Total Time at PCH		47	162	0	0	285	45
Flight activity per unit time and area				1	2	3	4	5
Observation effort	Obsevation time (seconds) * hectare		70146000	56376000	84067200	88776000	78084000	93960000
Flying time at risk height	Effort at each VP / FRA		6.70E-07	2.87E-06	0.00E+00	0.00E+00	3.65E-06	4.79E-07
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01	1.99E-01
Adjusted time at risk height	Weighted obs effort * flying time at risk height		9.97E-08	3.44E-07	0.00E+00	0.00E+00	6.05E-07	9.55E-08
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000001143					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		5.74					
FRAw	Estimated bird time*(rotor diameter/recording height band)		3.67					
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		10.63					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.28					
Number of transits 'n't'	'n'/t'		38.54					
E								
Probability of collision (Band model)			0.048					
Calculation of number collisions						No avoidance	Avoidance 98%	
	Collisions per year						1.57	0.031
	Equivalent to 1 bird every x (years)						0.64	31.9
	Over 25 years						39.2	0.78



C.13b CRM: Greenshank – Consented Site Year 2 Breeding (March – July 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.28							
Number turbines	36	wingspan (m)	0.72							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	13.7							
Max chord (m)	3.5	Number daylight hours available	2949.62							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 98%	0.02									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	1,751,072									
Survey Data										
		VP	1	2	3	4	5	8	14	
	FRA (ha)		433	348	556	548	482	580	290	
	Observation Time (hours)		27	54	54	54	54	54	48	
	Time at height band A		0	30	75	15	0	0	0	
	Time at height band B		0	11	0	120	0	0	0	
	Time at height band C		0	0	0	0	0	0	0	
	Time at height band D		0	0	0	0	0	0	0	
	Total Time at PCH		0	41	75	135	0	0	0	
Flight activity per unit time and area				1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare		42087600	67651200	108086400	106531200	93700800	112752000	50112000	#####
Flying time at risk height	Effort at each VP / FRA		0.00E+00	6.06E-07	6.94E-07	1.27E-06	0.00E+00	0.00E+00	0.00E+00	2.57E-06
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		7.24E-02	1.16E-01	1.86E-01	1.83E-01	1.61E-01	1.94E-01	8.63E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		0.00E+00	7.06E-08	1.29E-07	2.32E-07	0.00E+00	0.00E+00	0.00E+00	4.32E-07
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000000432							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		2.17							
FRAw	Estimated bird time*(rotor diameter/recording height band)		1.39							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		4.02							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.28							
Number of transits 'n't'	'n'/t'		14.56							
E										
Probability of collision (Band model)			0.048							
Calculation of number collisions							No avoidance	Avoidance 98%		
Collisions per year								0.59	0.012	
Equivalent to 1 bird every x (years)								1.69	84.4	
Over 25 years								14.8	0.30	



C.13c CRM: Greenshank – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.28	m	0.025	0.575	6.27	17.28	0.82	0.00103	16.76	0.80
Wingspan	0.72	m	0.075	0.575	2.09	5.94	0.28	0.00212	5.41	0.26
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.25	4.28	0.20	0.00254	3.63	0.17
			0.175	0.860	0.90	3.71	0.18	0.00309	2.92	0.14
Bird speed	13.7	m/sec	0.225	0.994	0.70	3.36	0.16	0.00360	2.45	0.12
RotorDiam	128	m	0.275	0.947	0.57	2.71	0.13	0.00355	1.85	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.48	2.26	0.11	0.00350	1.44	0.07
			0.375	0.851	0.42	1.92	0.09	0.00344	1.15	0.05
			0.425	0.804	0.37	1.68	0.08	0.00339	0.94	0.04
			0.475	0.756	0.33	1.49	0.07	0.00337	0.80	0.04
Bird aspect ratioo: β	0.39		0.525	0.708	0.30	1.34	0.06	0.00334	0.69	0.03
			0.575	0.660	0.27	1.21	0.06	0.00330	0.60	0.03
			0.625	0.613	0.25	1.09	0.05	0.00325	0.53	0.03
			0.675	0.565	0.23	0.99	0.05	0.00319	0.48	0.02
			0.725	0.517	0.22	0.90	0.04	0.00312	0.43	0.02
			0.775	0.470	0.20	0.82	0.04	0.00304	0.39	0.02
			0.825	0.422	0.19	0.75	0.04	0.00295	0.37	0.02
			0.875	0.374	0.18	0.68	0.03	0.00285	0.34	0.02
			0.925	0.327	0.17	0.62	0.03	0.00274	0.32	0.02
			0.975	0.279	0.16	0.56	0.03	0.00261	0.31	0.01
Overall p(collision) =					Upwind	6.0%		Downwind	3.6%	
					Average	4.8%				



C.14a CRM: Greenshank – Proposed Development Year 1 Breeding (March – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	35	wingspan (m)	0.72					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	13.7					
Max chord (m)	4.2	Number daylight hours available	2950.66					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	2,770,884							
Survey Data				VP	1	2	3	4
				FRA (ha)	433	348	556	548
				Observation Time (hours)	45	45	42	45
				Time at height band A	0	0	0	0
				Time at height band B	47	90	0	255
				Time at height band C	0	72	0	0
				Time at height band D	0	0	0	0
				Total Time at PCH	47	162	0	255
								45
Flight activity per unit time and area				1	2	3	4	5
Observation effort	Obsevation time (seconds) * hectare			70146000	56376000	84067200	88776000	78084000
Flying time at risk height	Effort at each VP / FRA			6.70E-07	2.87E-06	0.00E+00	0.00E+00	3.27E-06
Weighted by observation effort								4.79E-07
Weighted obs effort	Effort at each VP / sum of all effort at all VP's			1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01
Adjusted time at risk height	Weighted obs effort * flying time at risk height			9.97E-08	3.44E-07	0.00E+00	0.00E+00	5.41E-07
Occupancy Rate								9.55E-08
Summed Occupancy rate	Sum of weighted average flight activity per visible ha			0.000001080				1.08E-06
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active			5.42				
FRAw	Estimated bird time*(rotor diameter/recording height band)			4.51				
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*			17.66				
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)			0.33				
Number of transits 'n't'	'n'/t'			53.99				
E								
Probability of collision (Band model)				0.049				
Calculation of number collisions								
No avoidance								
Collisions per year								2.26
Equivalent to 1 bird every x (years)								0.44
Over 25 years								56.6
								1.13



C.14b CRM: Greenshank – Proposed Development Year 2 Breeding (March – July 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.28						
Number turbines	35	wingspan (m)	0.72						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	13.7						
Max chord (m)	4.2	Number daylight hours available	2949.62						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 98%	0.02								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	2,770,884								
Survey Data									
	VP	1	2	3	4	5	8	14	
FRA (ha)		433	348	556	548	482	580	290	
Observation Time (hours)		27	54	54	54	54	54	48	
Time at height band A		0	30	75	15	0	0	0	
Time at height band B		0	11	0	120	0	0	0	
Time at height band C		0	0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	0	
Total Time at PCH		0	11	0	120	0	0	0	
Flight activity per unit time and area									
		1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	42087600	67651200	108086400	106531200	93700800	112752000	50112000	#####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	1.63E-07	0.00E+00	1.13E-06	0.00E+00	0.00E+00	0.00E+00	1.29E-06
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	7.24E-02	1.16E-01	1.86E-01	1.83E-01	1.61E-01	1.94E-01	8.63E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	1.89E-08	0.00E+00	2.07E-07	0.00E+00	0.00E+00	0.00E+00	2.26E-07
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000000226							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	1.13							
FRAw	Estimated bird time*(rotor diameter/recording height band)	0.94							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	3.69							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33							
Number of transits 'n't'	'n'/t'	11.27							
E									
Probability of collision (Band model)		0.049							
Calculation of number collisions								No avoidance	Avoidance 98%
Collisions per year								0.47	0.009
Equivalent to 1 bird every x (years)								2.12	105.8
Over 25 years								11.8	0.24



C.14c CRM: Greenshank – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.28	m	0.025	0.575	5.47	17.35	0.81	0.00101	16.34	0.76
Wingspan	0.72	m	0.075	0.575	1.82	6.12	0.29	0.00214	5.11	0.24
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.09	4.55	0.21	0.00265	3.32	0.15
			0.175	0.860	0.78	4.07	0.19	0.00332	2.57	0.12
Bird speed	13.7	m/sec	0.225	0.994	0.61	3.79	0.18	0.00397	2.05	0.10
RotorDiam	150	m	0.275	0.947	0.50	3.12	0.15	0.00399	1.46	0.07
RotationPeriod	4.70	sec	0.325	0.899	0.42	2.64	0.12	0.00400	1.07	0.05
			0.375	0.851	0.36	2.30	0.11	0.00401	0.81	0.04
			0.425	0.804	0.32	2.04	0.10	0.00405	0.64	0.03
			0.475	0.756	0.29	1.83	0.09	0.00406	0.51	0.02
Bird aspect ratioo: β	0.39		0.525	0.708	0.26	1.66	0.08	0.00405	0.42	0.02
			0.575	0.660	0.24	1.50	0.07	0.00402	0.35	0.02
			0.625	0.613	0.22	1.37	0.06	0.00398	0.30	0.01
			0.675	0.565	0.20	1.24	0.06	0.00391	0.30	0.01
			0.725	0.517	0.19	1.13	0.05	0.00382	0.33	0.02
			0.775	0.470	0.18	1.03	0.05	0.00372	0.35	0.02
			0.825	0.422	0.17	0.94	0.04	0.00360	0.36	0.02
			0.875	0.374	0.16	0.85	0.04	0.00345	0.37	0.02
			0.925	0.327	0.15	0.76	0.04	0.00329	0.37	0.02
			0.975	0.279	0.14	0.68	0.03	0.00311	0.36	0.02
Overall p(collision) =					Upwind	7.0%	Downwind	2.9%		
					Average	4.9%				

C.15a CRM: Greylag Goose – Consented Site Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.82					
Number turbines	36	wingspan (m)	1.64					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	17					
Max chord (m)	3.5	Number daylight hours available	3030.69					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99.8%	0.002							
Rotor radius ²	4096.00	Survey Data						
Combined rotor swept area	463246.59	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,176,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	2,001,225	Observation Time (hours)	45	45	42	45	45	45
		Time at height band A	0	0	1800	1320	1695	90
		Time at height band B	120	0	1245	405	60	0
		Time at height band C	0	0	0	0	0	0
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	120	0	3045	1725	1755	90
Flight activity per unit time and area								
Observation effort			1	2	3	4	5	8 Total
Flying time at risk height		Obsevation time (seconds) * hectare	70146000	56376000	84067200	88776000	78084000	93960000 #####
Weighted by observation effort			1.71E-06	0.00E+00	3.62E-05	1.94E-05	2.25E-05	9.58E-07 8.08E-05
Weighted obs effort		Effort at each VP / FRA						
Adjusted time at risk height		Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01	1.99E-01 1.0
		Weighted obs effort * flying time at risk height	2.55E-07	0.00E+00	6.46E-06	3.66E-06	3.72E-06	1.91E-07 1.43E-05
Occupancy Rate								
Summed Occupancy rate		Sum of weighted average flight activity per visible ha	0.000014287					
Estimated bird time 'b' in risk area		Summed Occupancy rate*windfarm polygon*hours active	73.61					
FRAw		Estimated bird time*(rotor diameter/recording height band)	47.11					
Rotor Transits								
Bird occupancy of rotor swept volume ('b')		Estimated bird time * (rotor swept volume / collision risk volume)*	155.97					
Bird transit time (t)		(rotor depth+bird length)/flight speed(m/s)	0.25					
Number of transits 'ntr'		'n'/'t'	613.78					
E								
Probability of collision (Band model)			0.068					
Calculation of number collisions				No avoidance		Avoidance 99.8%		
Collisions per year						35.55		0.071
Equivalent to 1 bird every x (years)						0.03		14.1
Over 25 years						888.7		1.78

C.15b CRM: Greylag Goose – Consented Site Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.82							
Number turbines	36	wingspan (m)	1.64							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	17							
Max chord (m)	3.5	Number daylight hours available	3030.56							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 99.8%	0.002									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	2,001,225									
Survey Data										
		VP	1	2	3	4	5	8	14	
		FRA (ha)	433.00	348.00	556	548	482	580	290	
		Observation Time (hours)	15	45	45	45	45	45	48	
		Time at height band A	115	0	690	1349	165	375	0	
		Time at height band B	124	0	2610	3191	135	105	0	
		Time at height band C	0	0	0	0	0	0	189	
		Time at height band D	0	0	0	0	0	0	0	
		Total Time at PCH	239	0	3300	4540	300	480	189	
Flight activity per unit time and area										
			1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0	
Flying time at risk height	Effort at each VP / FRA	1.02E-05	0.00E+00	3.66E-05	5.11E-05	3.84E-06	5.11E-06	3.77E-06	1.11E-04	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	4.97E-07	0.00E+00	6.86E-06	9.44E-06	6.24E-07	9.98E-07	3.93E-07	1.88E-05	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000018820								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	96.96								
FRAw	Estimated bird time*(rotor diameter/recording height band)	62.05								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	205.45								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.25								
Number of transits 'ntr'	'n'/'t'	808.50								
E		0.068								
Probability of collision (Band model)										
Calculation of number collisions							No avoidance	Avoidance 99.8%		
Collisions per year							46.83	0.094		
Equivalent to 1 bird every x (years)							0.02	10.7		
Over 25 years							1170.7	2.34		



C.15c CRM: Greylag Goose – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	contribution		collide	contribution	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.82	m	0.025	0.575	7.78	28.54	1.00	0.00125	28.02	1.00	0.00125
Wingspan	1.64	m	0.075	0.575	2.59	9.69	0.37	0.00279	9.16	0.35	0.00264
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.56	6.66	0.26	0.00319	6.02	0.23	0.00289
			0.175	0.860	1.11	5.53	0.21	0.00371	4.75	0.18	0.00319
Bird speed	17	m/sec	0.225	0.994	0.86	4.85	0.19	0.00419	3.95	0.15	0.00341
RotorDiam	128	m	0.275	0.947	0.71	3.92	0.15	0.00413	3.05	0.12	0.00322
RotationPeriod	4.60	sec	0.325	0.899	0.60	3.26	0.13	0.00406	2.44	0.09	0.00304
			0.375	0.851	0.52	2.77	0.11	0.00399	1.99	0.08	0.00287
			0.425	0.804	0.46	2.46	0.09	0.00402	1.73	0.07	0.00282
			0.475	0.756	0.41	2.24	0.09	0.00408	1.55	0.06	0.00282
Bird aspect ratioo: β	0.50		0.525	0.708	0.37	2.05	0.08	0.00414	1.41	0.05	0.00283
			0.575	0.660	0.34	1.90	0.07	0.00418	1.29	0.05	0.00285
			0.625	0.613	0.31	1.76	0.07	0.00422	1.20	0.05	0.00288
			0.675	0.565	0.29	1.64	0.06	0.00425	1.13	0.04	0.00292
			0.725	0.517	0.27	1.54	0.06	0.00428	1.07	0.04	0.00296
			0.775	0.470	0.25	1.44	0.06	0.00429	1.01	0.04	0.00302
			0.825	0.422	0.24	1.36	0.05	0.00430	0.97	0.04	0.00308
			0.875	0.374	0.22	1.28	0.05	0.00430	0.94	0.04	0.00315
			0.925	0.327	0.21	1.21	0.05	0.00428	0.91	0.03	0.00323
			0.975	0.279	0.20	1.14	0.04	0.00427	0.89	0.03	0.00331
			Overall p(collision) =			Upwind	7.8%	Downwind		5.8%	
						Average	6.8%				



C.16a CRM: Greylag Goose – Proposed Development Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.82					
Number turbines	35	wingspan (m)	1.64					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	17					
Max chord (m)	4.2	Number daylight hours available	3030.69					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)								
Turbine operation time 85%	0.85	Survey Data						
Avoidance Rate 99.8%	0.002	VP	1	2	3	4	5	8
Rotor radius ²	5625.00	FRA (ha)	433	348	556	548	482	580
Combined rotor swept area	618500.93	Observation Time (hours)	45	45	42	45	45	45
Collision Risk volume 'Vw' (m ³)	2,550,000,000	Time at height band A	0	0	1800	1320	1695	90
Rotor swept volume 'V _r ' (m ³)	3,104,875	Time at height band B	120	0	1245	405	60	0
		Time at height band C	0	0	0	0	0	0
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	120	0	1245	405	60	0
Flight activity per unit time and area		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	84067200	88776000	78084000	93960000	#####
Flying time at risk height	Effort at each VP / FRA	1.71E-06	0.00E+00	1.48E-05	4.56E-06	7.68E-07	0.00E+00	2.19E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.78E-01	1.88E-01	1.66E-01	1.99E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.55E-07	0.00E+00	2.64E-06	8.59E-07	1.27E-07	0.00E+00	3.88E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000003882						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	20.00						
FRAw	Estimated bird time*(rotor diameter/recording height band)	16.67						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	73.06						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.30						
Number of transits 'n't'	'n'/t'	247.41						
E								
Probability of collision (Band model)		0.067						
Calculation of number collisions						No avoidance	Avoidance 99.8%	
Collisions per year						14.13	0.028	
Equivalent to 1 bird every x (years)						0.07	35.4	
Over 25 years						353.2	0.71	



C.16b CRM: Greylag Goose – Proposed Development Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.82						
Number turbines	35	wingspan (m)	1.64						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	17						
Max chord (m)	4.2	Number daylight hours available	3030.56						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 99.8%	0.002								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	3,104,875								
Survey Data									
		VP	1	2	3	4	5	8	14
	FRA (ha)	433.00	348.00	556	548	482	580	290	
	Observation Time (hours)	15	45	45	45	45	45	48	
	Time at height band A	115	0	690	1349	165	375	0	
	Time at height band B	124	0	2610	3191	135	105	0	
	Time at height band C	0	0	0	0	0	0	189	
	Time at height band D	0	0	0	0	0	0	0	
	Total Time at PCH	124	0	2610	3191	135	105	189	
Flight activity per unit time and area									
		1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA	5.30E-06	0.00E+00	2.90E-05	3.59E-05	1.73E-06	1.12E-06	3.77E-06	7.68E-05
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.58E-07	0.00E+00	5.43E-06	6.64E-06	2.81E-07	2.18E-07	3.93E-07	1.32E-05
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000013217							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	68.09							
FRAw	Estimated bird time*(rotor diameter/recording height band)	56.74							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	248.72							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.30							
Number of transits 'ntr'	'n'/t'	842.29							
E									
Probability of collision (Band model)		0.067							
Calculation of number collisions									
	No avoidance								
Collisions per year		48.10							0.096
Equivalent to 1 bird every x (years)		0.02							10.4
Over 25 years		1202.6							2.41



C.16c CRM: Greylag Goose – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length	
Pitch (degrees)	12		radius	chord	alpha	p(collision)	from radius r	contribution	p(collision)	from radius r	
BirdLength	0.82	m	0.025	0.575	6.78	27.65	1.00	0.00125	26.64	1.00	0.00125
Wingspan	1.64	m	0.075	0.575	2.26	9.55	0.36	0.00269	8.55	0.32	0.00241
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.36	6.75	0.25	0.00317	5.52	0.21	0.00259
			0.175	0.860	0.97	5.76	0.22	0.00379	4.26	0.16	0.00280
Bird speed	17	m/sec	0.225	0.994	0.75	5.18	0.19	0.00438	3.45	0.13	0.00291
RotorDiam	150	m	0.275	0.947	0.62	4.24	0.16	0.00437	2.58	0.10	0.00267
RotationPeriod	4.70	sec	0.325	0.899	0.52	3.57	0.13	0.00435	2.00	0.07	0.00244
			0.375	0.851	0.45	3.14	0.12	0.00443	1.66	0.06	0.00233
			0.425	0.804	0.40	2.84	0.11	0.00453	1.44	0.05	0.00229
			0.475	0.756	0.36	2.59	0.10	0.00462	1.27	0.05	0.00226
Bird aspect ratioo: β	0.50		0.525	0.708	0.32	2.38	0.09	0.00469	1.14	0.04	0.00225
			0.575	0.660	0.29	2.20	0.08	0.00474	1.04	0.04	0.00225
			0.625	0.613	0.27	2.04	0.08	0.00478	0.97	0.04	0.00227
			0.675	0.565	0.25	1.90	0.07	0.00481	0.91	0.03	0.00231
			0.725	0.517	0.23	1.77	0.07	0.00482	0.87	0.03	0.00236
			0.775	0.470	0.22	1.65	0.06	0.00481	0.83	0.03	0.00242
			0.825	0.422	0.21	1.54	0.06	0.00478	0.83	0.03	0.00258
			0.875	0.374	0.19	1.44	0.05	0.00475	0.85	0.03	0.00279
			0.925	0.327	0.18	1.35	0.05	0.00469	0.86	0.03	0.00298
			0.975	0.279	0.17	1.26	0.05	0.00462	0.86	0.03	0.00316
			Overall p(collision) =			Upwind	8.5%		Downwind	4.9%	
								Average	6.7%		



C.17a CRM: Greylag Goose – Consented Site Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.66				
Number turbines	36	wingspan (m)	1.2				
Rotor diameter	128	flapping (0) or gliding (1)	0				
Hub height (m)	81	Assumed flight speed (m/s)	19.3				
Max chord (m)	3.5	Number daylight hours available	3086.73				
Rotor depth	3.5	Maximum recording height (m)	200				
Pitch (degrees)	7.5	Minimum recording height (m)	0				
Rotation period (secs)	4.6						
Turbine operation time 85%	0.85						
Avoidance Rate 99.8%	0.002						
Rotor radius ²	4096.00						
Combined rotor swept area	463246.59						
Collision Risk volume 'Vw' (m ³)	2,176,000,000						
Rotor swept volume 'V _r ' (m ³)	1,927,106						
Survey Data							
VP		1	2	3	4	5	8
FRA (ha)	433	348	556	548	482	580	
Observation Time (hours)	54	54	54	54	54	54	
Time at height band A	60	0	7570	1701	990	350	
Time at height band B	120	0	3981	1578	1084	126	
Time at height band C	0	0	315	0	480	0	
Time at height band D	0	0	0	0	0	0	
Total Time at PCH	180	0	11866	3279	2554	476	
Flight activity per unit time and area							
		1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000 572896800.0
Flying time at risk height	Effort at each VP / FRA	2.14E-06	0.00E+00	1.10E-04	3.08E-05	2.73E-05	4.22E-06 1.74E-04
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.14E-07	0.00E+00	2.07E-05	5.72E-06	4.46E-06	8.31E-07 3.20E-05
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000032039					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	168.12					
FRAw	Estimated bird time*(rotor diameter/recording height band)	107.60					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	343.05					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.22					
Number of transits 'ntr'	'n'/'t'	1591.54					
E							
Probability of collision (Band model)		0.058					
Calculation of number collisions				No avoidance		Avoidance 99.8%	
Collisions per year					78.59		0.157
Equivalent to 1 bird every x (years)					0.01		6.4
Over 25 years					1964.7		3.93



C.17b CRM: Greylag Goose – Consented Site Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.66				
Number turbines	36	wingspan (m)	1.2				
Rotor diameter	128	flapping (0) or gliding (1)	0				
Hub height (m)	81	Assumed flight speed (m/s)	19.3				
Max chord (m)	3.5	Number daylight hours available	3086.91				
Rotor depth	3.5	Maximum recording height (m)	200				
Pitch (degrees)	7.5	Minimum recording height (m)	0				
Rotation period (secs)	4.6						
Turbine operation time 85%	0.85						
Avoidance Rate 99.8%	0.002						
Rotor radius ²	4096.00						
Combined rotor swept area	463246.59						
Collision Risk volume 'Vw' (m ³)	2,176,000,000						
Rotor swept volume 'V _r ' (m ³)	1,927,106						
Survey Data							
VP		1	2	3	4	5	8
FRA (ha)	433	348	556	548	482	580	
Observation Time (hours)	60	63	66	63	69	66	
Time at height band A	40	0	0	5423	344	150	
Time at height band B	30	0	0	1073	3054	60	
Time at height band C	0	2880	0	0	0	0	
Time at height band D	0	0	0	0	0	0	
Total Time at PCH	70	2880	0	6496	3398	210	
Flight activity per unit time and area							
		1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare	93528000	78926400	132105600	124286400	119728800	137808000 686383200.0
Flying time at risk height	Effort at each VP / FRA	7.48E-07	3.65E-05	0.00E+00	5.23E-05	2.84E-05	1.52E-06 1.19E-04
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.36E-01	1.15E-01	1.92E-01	1.81E-01	1.74E-01	2.01E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.02E-07	4.20E-06	0.00E+00	9.46E-06	4.95E-06	3.06E-07 1.90E-05
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000019019					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	99.80					
FRAw	Estimated bird time*(rotor diameter/recording height band)	63.87					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	203.65					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.22					
Number of transits 'ntr'	'n'/'t'	944.81					
E							
Probability of collision (Band model)		0.058					
Calculation of number collisions				No avoidance		Avoidance 99.8%	
Collisions per year				46.65		0.093	
Equivalent to 1 bird every x (years)				0.02		10.7	
Over 25 years				1166.3		2.33	



C.17c CRM: Greylag Goose – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	contribution	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.66	m	0.025	0.575	8.83	28.48	0.96	0.00120	27.96	0.94	0.00118
Wingspan	1.2	m	0.075	0.575	2.94	9.67	0.33	0.00245	9.14	0.31	0.00232
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.77	6.74	0.23	0.00285	6.10	0.21	0.00258
			0.175	0.860	1.26	5.67	0.19	0.00335	4.89	0.17	0.00289
Bird speed	19.3	m/sec	0.225	0.994	0.98	5.02	0.17	0.00381	4.11	0.14	0.00312
RotorDiam	128	m	0.275	0.947	0.80	4.03	0.14	0.00375	3.17	0.11	0.00294
RotationPeriod	4.60	sec	0.325	0.899	0.68	3.34	0.11	0.00367	2.52	0.09	0.00277
			0.375	0.851	0.59	2.83	0.10	0.00359	2.06	0.07	0.00261
			0.425	0.804	0.52	2.48	0.08	0.00356	1.74	0.06	0.00250
			0.475	0.756	0.46	2.22	0.08	0.00357	1.53	0.05	0.00246
Bird aspect ratioo: β	0.55		0.525	0.708	0.42	2.02	0.07	0.00358	1.37	0.05	0.00243
			0.575	0.660	0.38	1.84	0.06	0.00358	1.24	0.04	0.00241
			0.625	0.613	0.35	1.69	0.06	0.00357	1.13	0.04	0.00239
			0.675	0.565	0.33	1.56	0.05	0.00356	1.04	0.04	0.00238
			0.725	0.517	0.30	1.44	0.05	0.00354	0.97	0.03	0.00238
			0.775	0.470	0.28	1.34	0.05	0.00351	0.91	0.03	0.00238
			0.825	0.422	0.27	1.24	0.04	0.00347	0.86	0.03	0.00239
			0.875	0.374	0.25	1.16	0.04	0.00343	0.82	0.03	0.00241
			0.925	0.327	0.24	1.08	0.04	0.00337	0.78	0.03	0.00244
			0.975	0.279	0.23	1.01	0.03	0.00332	0.75	0.03	0.00248
			Overall p(collision) =			Upwind	6.7%	Downwind		4.9%	
						Average	5.8%				



C.18a CRM: Greylag Goose – Proposed Development Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.66					
Number turbines	35	wingspan (m)	1.2					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	19.3					
Max chord (m)	4.2	Number daylight hours available	3086.73					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.8%	0.002							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	3,005,914							
Survey Data								
VP	1	2	3	4	5	8		
FRA (ha)	433	348	556	548	482	580		
Observation Time (hours)	54	54	54	54	54	54		
Time at height band A	60	0	7570	1701	990	350		
Time at height band B	120	0	3981	1578	1084	126		
Time at height band C	0	0	315	0	480	0		
Time at height band D	0	0	0	0	0	0		
Total Time at PCH	120	0	4296	1578	1564	126		
Flight activity per unit time and area								
	1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000	572896800.0
Flying time at risk height	Effort at each VP / FRA	1.43E-06	0.00E+00	3.97E-05	1.48E-05	1.67E-05	1.12E-06	7.38E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	2.09E-07	0.00E+00	7.50E-06	2.75E-06	2.73E-06	2.20E-07	1.34E-05
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000013413						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	70.38						
FRAw	Estimated bird time*(rotor diameter/recording height band)	58.65						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	248.90						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.25						
Number of transits 'ntr'	'n'/'t'	988.41						
E								
Probability of collision (Band model)		0.057						
Calculation of number collisions				No avoidance		Avoidance 99.8%		
Collisions per year				48.03		0.096		
Equivalent to 1 bird every x (years)				0.02		10.4		
Over 25 years				1200.8		2.40		



C.18b CRM: Greylag Goose – Proposed Development Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.66					
Number turbines	35	wingspan (m)	1.2					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	19.3					
Max chord (m)	4.2	Number daylight hours available	3086.91					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.8%	0.002							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	3,005,914							
Survey Data								
VP	1	2	3	4	5	8		
FRA (ha)	433	348	556	548	482	580		
Observation Time (hours)	60	63	66	63	69	66		
Time at height band A	40	0	0	5423	344	150		
Time at height band B	30	0	0	1073	3054	60		
Time at height band C	0	2880	0	0	0	0		
Time at height band D	0	0	0	0	0	0		
Total Time at PCH	30	2880	0	1073	3054	60		
Flight activity per unit time and area								
	1	2	3	4	5	8	Total	
Observation effort	93528000	78926400	132105600	124286400	119728800	137808000	686383200.0	
Flying time at risk height	3.21E-07	3.65E-05	0.00E+00	8.63E-06	2.55E-05	4.35E-07	7.14E-05	
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.36E-01	1.15E-01	1.92E-01	1.81E-01	1.74E-01	2.01E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	4.37E-08	4.20E-06	0.00E+00	1.56E-06	4.45E-06	8.74E-08	1.03E-05
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000010340						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	54.26						
FRAw	Estimated bird time*(rotor diameter/recording height band)	45.22						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	191.88						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.25						
Number of transits 'ntr'	'n'/'t'	762.01						
E								
Probability of collision (Band model)		0.057						
Calculation of number collisions				No avoidance		Avoidance 99.8%		
Collisions per year				37.03		0.074		
Equivalent to 1 bird every x (years)				0.03		13.5		
Over 25 years				925.8		1.85		



C.18c CRM: Greylag Goose – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.66	m	0.025	0.575	7.70	27.93	0.92	0.00115	26.93	0.89
Wingspan	1.2	m	0.075	0.575	2.57	9.64	0.32	0.00239	8.64	0.29
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.54	6.90	0.23	0.00285	5.67	0.19
			0.175	0.860	1.10	5.96	0.20	0.00345	4.46	0.15
Bird speed	19.3	m/sec	0.225	0.994	0.86	5.39	0.18	0.00401	3.65	0.12
RotorDiam	150	m	0.275	0.947	0.70	4.39	0.15	0.00399	2.74	0.09
RotationPeriod	4.70	sec	0.325	0.899	0.59	3.68	0.12	0.00396	2.11	0.07
			0.375	0.851	0.51	3.20	0.11	0.00397	1.71	0.06
			0.425	0.804	0.45	2.86	0.09	0.00402	1.45	0.05
			0.475	0.756	0.41	2.58	0.09	0.00405	1.26	0.04
Bird aspect ratioo: β	0.55		0.525	0.708	0.37	2.35	0.08	0.00407	1.11	0.04
			0.575	0.660	0.33	2.15	0.07	0.00408	0.99	0.03
			0.625	0.613	0.31	1.97	0.07	0.00407	0.90	0.03
			0.675	0.565	0.29	1.82	0.06	0.00405	0.83	0.03
			0.725	0.517	0.27	1.68	0.06	0.00402	0.77	0.03
			0.775	0.470	0.25	1.55	0.05	0.00397	0.73	0.02
			0.825	0.422	0.23	1.43	0.05	0.00391	0.70	0.02
			0.875	0.374	0.22	1.33	0.04	0.00383	0.67	0.02
			0.925	0.327	0.21	1.22	0.04	0.00375	0.67	0.02
			0.975	0.279	0.20	1.13	0.04	0.00364	0.68	0.02
Overall p(collision) =					Upwind	7.3%	Downwind		4.1%	
					Average	5.7%				



C.19a CRM: Hen Harrier – Consented Site Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.48				
Number turbines	36	wingspan (m)	1.1				
Rotor diameter	128	flapping (0) or gliding (1)	0				
Hub height (m)	81	Assumed flight speed (m/s)	9.1				
Max chord (m)	3.5	Number daylight hours available	2816.94				
Rotor depth	3.5	Maximum recording height (m)	200				
Pitch (degrees)	7.5	Minimum recording height (m)	0				
Rotation period (secs)	4.6						
Turbine operation time 85%	0.85						
Avoidance Rate 99%	0.01						
Rotor radius ²	4096.00						
Combined rotor swept area	463246.59						
Collision Risk volume 'Vw' (m ³)	2,176,000,000						
Rotor swept volume 'V _r ' (m ³)	1,843,721						
Survey Data							
VP		1	2	3	4	5	8
FRA (ha)	433	348	556	548	482	580	
Observation Time (hours)	45	45	45	45	45	45	
Time at height band A	0	1267	3240	1065	1080	1513	
Time at height band B	0	30	1940	150	420	225	
Time at height band C	0	0	300	0	195	315	
Time at height band D	0	0	0	0	0	120	
Total Time at PCH	0	1297	5480	1215	1695	2053	
Flight activity per unit time and area							
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	90072000	88776000	78084000	93960000 #####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	2.30E-05	6.08E-05	1.37E-05	2.17E-05	2.18E-05 1.41E-04
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	2.72E-06	1.15E-05	2.54E-06	3.55E-06	4.30E-06 2.46E-05
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000024591					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	117.76					
FRAw	Estimated bird time*(rotor diameter/recording height band)	75.37					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	229.89					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.44					
Number of transits 'ntr'	'n'/'t'	525.63					
E							
Probability of collision (Band model)		0.069					
Calculation of number collisions				No avoidance		Avoidance 99%	
Collisions per year					30.85		0.309
Equivalent to 1 bird every x (years)					0.03		3.2
Over 25 years					771.3		7.71



C.19b CRM: Hen Harrier – Consented Site Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.48							
Number turbines	36	wingspan (m)	1.1							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	9.1							
Max chord (m)	3.5	Number daylight hours available	2816.77							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 99%	0.01									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	1,843,721									
Survey Data										
VP		1	2	3	4	5	8	14		
FRA (ha)	433	348	556	548	482	580	290			
Observation Time (hours)	15	45	45	45	45	45	45	48		
Time at height band A	64	599	691	285	2039	945	45			
Time at height band B	0	396	435	0	624	600	58			
Time at height band C	0	0	0	0	0	0	0			
Time at height band D	0	0	0	0	0	0	0			
Total Time at PCH	64	995	1126	285	2663	1545	103			
Flight activity per unit time and area										
		1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0	
Flying time at risk height	Effort at each VP / FRA	2.74E-06	1.76E-05	1.25E-05	3.21E-06	3.41E-05	1.64E-05	2.06E-06	8.87E-05	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.33E-07	2.07E-06	2.34E-06	5.93E-07	5.54E-06	3.21E-06	2.14E-07	1.41E-05	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000014105								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	67.54								
FRAw	Estimated bird time*(rotor diameter/recording height band)	43.23								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	131.85								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.44								
Number of transits 'ntr'	'n'/'t'	301.47								
E										
Probability of collision (Band model)		0.069								
Calculation of number collisions							No avoidance	Avoidance 99%		
Collisions per year							17.69	0.177		
Equivalent to 1 bird every x (years)							0.06	5.7		
Over 25 years							442.3	4.42		



C.19c CRM: Hen Harrier – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3.5	m	r/R	c/C	α	collide		contribution	collide	
Pitch (degrees)	7.5		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision) from radius r
BirdLength	0.48	m	0.025	0.575	4.16	13.15	0.94	0.00118	12.63	0.90
Wingspan	1.1	m	0.075	0.575	1.39	4.56	0.33	0.00245	4.03	0.29
F: Flapping (0) or gliding (+1)	0		0.125	0.702	0.83	3.26	0.23	0.00292	2.62	0.19
			0.175	0.860	0.59	2.82	0.20	0.00354	2.04	0.15
Bird speed	9.1	m/sec	0.225	0.994	0.46	2.56	0.18	0.00413	1.65	0.12
RotorDiam	128	m	0.275	0.947	0.38	2.16	0.15	0.00425	1.29	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.32	1.89	0.14	0.00440	1.07	0.08
			0.375	0.851	0.28	1.69	0.12	0.00454	0.91	0.07
			0.425	0.804	0.24	1.53	0.11	0.00466	0.80	0.06
			0.475	0.756	0.22	1.40	0.10	0.00477	0.71	0.05
Bird aspect ratioo: β	0.44		0.525	0.708	0.20	1.29	0.09	0.00486	0.64	0.05
			0.575	0.660	0.18	1.20	0.09	0.00493	0.59	0.04
			0.625	0.613	0.17	1.11	0.08	0.00499	0.55	0.04
			0.675	0.565	0.15	1.04	0.07	0.00503	0.52	0.04
			0.725	0.517	0.14	0.97	0.07	0.00506	0.50	0.04
			0.775	0.470	0.13	0.91	0.07	0.00507	0.48	0.03
			0.825	0.422	0.13	0.86	0.06	0.00507	0.49	0.03
			0.875	0.374	0.12	0.81	0.06	0.00505	0.50	0.04
			0.925	0.327	0.11	0.76	0.05	0.00502	0.50	0.04
			0.975	0.279	0.11	0.71	0.05	0.00497	0.50	0.04
			Overall p(collision) =			Upwind	8.7%	Downwind	5.1%	
								Average	6.9%	

C.20a CRM: Hen Harrier – Proposed Development Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters					
WFP (ha)	1700	length (m)	0.48				
Number turbines	35	wingspan (m)	1.1				
Rotor diameter	150	flapping (0) or gliding (1)	0				
Hub height (m)	105	Assumed flight speed (m/s)	9.1				
Max chord (m)	4.2	Number daylight hours available	2816.94				
Rotor depth	4.2	Maximum recording height (m)	200				
Pitch (degrees)	12	Minimum recording height (m)	20				
Rotation period (secs)	4.7						
Turbine operation time 85%	0.85						
Avoidance Rate 99%	0.01						
Rotor radius ²	5625.00	Survey Data					
Combined rotor swept area	618500.93	VP	1	2	3	4	5
Collision Risk volume 'Vw' (m ³)	2,550,000,000	FRA (ha)	433	348	556	548	482
Rotor swept volume 'V _r ' (m ³)	2,894,584	Observation Time (hours)	45	45	45	45	45
		Time at height band A	0	1267	3240	1065	1080
		Time at height band B	0	30	1940	150	420
		Time at height band C	0	0	300	0	195
		Time at height band D	0	0	0	0	0
		Total Time at PCH	0	30	2240	150	615
							540
Flight activity per unit time and area		1	2	3	4	5	8 Total
Observation effort	Obsevation time (seconds) * hectare	70146000	56376000	90072000	88776000	78084000	93960000 #####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	5.32E-07	2.49E-05	1.69E-06	7.88E-06	5.75E-06 4.07E-05
Weighted by observation effort							
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01 1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	6.28E-08	4.69E-06	3.14E-07	1.29E-06	1.13E-06 7.49E-06
Occupancy Rate							
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000007488					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	35.86					
FRAw	Estimated bird time*(rotor diameter/recording height band)	29.88					
Rotor Transits							
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	122.12					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.51					
Number of transits 'n't'	'n'/'t'	237.45					
E							
Probability of collision (Band model)		0.077					
Calculation of number collisions				No avoidance	Avoidance 99%		
Collisions per year					15.45		0.154
Equivalent to 1 bird every x (years)					0.06		6.5
Over 25 years					386.2		3.86



C.20b CRM: Hen Harrier – Proposed Development Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.48							
Number turbines	35	wingspan (m)	1.1							
Rotor diameter	150	flapping (0) or gliding (1)	0							
Hub height (m)	105	Assumed flight speed (m/s)	9.1							
Max chord (m)	4.2	Number daylight hours available	2816.77							
Rotor depth	4.2	Maximum recording height (m)	200							
Pitch (degrees)	12	Minimum recording height (m)	20							
Rotation period (secs)	4.7									
Turbine operation time 85%	0.85									
Avoidance Rate 99%	0.01									
Rotor radius ²	5625.00									
Combined rotor swept area	618500.93									
Collision Risk volume 'Vw' (m ³)	2,550,000,000									
Rotor swept volume 'V _r ' (m ³)	2,894,584									
Survey Data										
VP		1	2	3	4	5	8	14		
FRA (ha)		433	348	556	548	482	580	290		
Observation Time (hours)		15	45	45	45	45	45	48		
Time at height band A		64	599	691	285	2039	945	45		
Time at height band B		0	396	435	0	624	600	58		
Time at height band C		0	0	0	0	0	0	0		
Time at height band D		0	0	0	0	0	0	0		
Total Time at PCH		0	396	435	0	624	600	58		
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA		0.00E+00	7.02E-06	4.83E-06	0.00E+00	7.99E-06	6.39E-06	1.16E-06	2.74E-05
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		0.00E+00	8.24E-07	9.05E-07	0.00E+00	1.30E-06	1.25E-06	1.21E-07	4.40E-06
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000004395							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		21.05							
FRAw	Estimated bird time*(rotor diameter/recording height band)		17.54							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		71.67							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.51							
Number of transits 'n't'	'n'/t'		139.36							
E										
Probability of collision (Band model)			0.077							
Calculation of number collisions							No avoidance	Avoidance 99%		
Collisions per year								9.07		0.091
Equivalent to 1 bird every x (years)								0.11		11.0
Over 25 years								226.6		2.27



C.20c CRM: Hen Harrier – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12		radius	chord	alpha	p(collision)	from radius r	contribution	p(collision)	from radius r
BirdLength	0.48	m	0.025	0.575	3.63	13.07	0.92	0.00115	12.07	0.85
Wingspan	1.1	m	0.075	0.575	1.21	4.69	0.33	0.00247	3.69	0.26
F: Flapping (0) or gliding (+1)	0		0.125	0.702	0.73	3.50	0.25	0.00307	2.28	0.16
			0.175	0.860	0.52	3.15	0.22	0.00387	1.65	0.12
Bird speed	9.1	m/sec	0.225	0.994	0.40	3.00	0.21	0.00473	1.26	0.09
RotorDiam	150	m	0.275	0.947	0.33	2.59	0.18	0.00500	0.94	0.07
RotationPeriod	4.70	sec	0.325	0.899	0.28	2.30	0.16	0.00523	0.73	0.05
			0.375	0.851	0.24	2.07	0.15	0.00544	0.58	0.04
			0.425	0.804	0.21	1.89	0.13	0.00562	0.48	0.03
			0.475	0.756	0.19	1.73	0.12	0.00578	0.55	0.04
Bird aspect ratioo: β	0.44		0.525	0.708	0.17	1.60	0.11	0.00590	0.60	0.04
			0.575	0.660	0.16	1.49	0.10	0.00599	0.63	0.04
			0.625	0.613	0.15	1.38	0.10	0.00605	0.65	0.05
			0.675	0.565	0.13	1.29	0.09	0.00609	0.66	0.05
			0.725	0.517	0.13	1.20	0.08	0.00609	0.67	0.05
			0.775	0.470	0.12	1.12	0.08	0.00607	0.66	0.05
			0.825	0.422	0.11	1.04	0.07	0.00601	0.66	0.05
			0.875	0.374	0.10	0.97	0.07	0.00593	0.65	0.05
			0.925	0.327	0.10	0.90	0.06	0.00582	0.63	0.04
			0.975	0.279	0.09	0.83	0.06	0.00568	0.62	0.04
Overall p(collision) =					Upwind	10.2%	Downwind	5.1%		
					Average	7.7%				



C.21a CRM: Hen Harrier – Consented Site Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.48					
Number turbines	36	wingspan (m)	1.1					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	9.1					
Max chord (m)	3.5	Number daylight hours available	2419.66					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99%	0.01							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,843,721							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		54	54	54	54	54	54	
Time at height band A		0	90	425	333	645	624	
Time at height band B		0	71	120	90	155	451	
Time at height band C		0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		0	161	545	423	800	1075	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000	572896800.0
Flying time at risk height	Effort at each VP / FRA	0.00E+00	2.38E-06	5.04E-06	3.97E-06	8.54E-06	9.53E-06	0.00002946
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	2.81E-07	9.51E-07	7.38E-07	1.40E-06	1.88E-06	0.000005244
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000005244						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	21.57						
FRAw	Estimated bird time*(rotor diameter/recording height band)	13.80						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	42.11						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.44						
Number of transits 'ntr'	'n'/'t'	96.27						
E								
Probability of collision (Band model)		0.069						
Calculation of number collisions						No avoidance	Avoidance 99%	
Collisions per year						5.65	0.057	
Equivalent to 1 bird every x (years)						0.18	17.7	
Over 25 years						141.3	1.41	



C.21b CRM: Hen Harrier – Consented Site Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.48					
Number turbines	36	wingspan (m)	1.1					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	9.1					
Max chord (m)	3.5	Number daylight hours available	2419.89					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99%	0.01							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,843,721							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		52	63	66	63	69	66	
Time at height band A		650	150	1744	510	1360	1525	
Time at height band B		107	0	45	120	219	180	
Time at height band C		0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		757	150	1789	630	1579	1705	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds)* hectare	81057600	78926400	132105600	124286400	119728800	137808000	673912800.0
Flying time at risk height	Effort at each VP / FRA	9.34E-06	1.90E-06	1.35E-05	5.07E-06	1.32E-05	1.24E-05	0.00005541
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.20E-01	1.17E-01	1.96E-01	1.84E-01	1.78E-01	2.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.12E-06	2.23E-07	2.65E-06	9.35E-07	2.34E-06	2.53E-06	0.000009808
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000009808						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	40.35						
FRAw	Estimated bird time*(rotor diameter/recording height band)	25.82						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	78.77						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.44						
Number of transits 'ntr'	'n'/t'	180.10						
E								
Probability of collision (Band model)		0.069						
Calculation of number collisions						No avoidance	Avoidance 99%	
Collisions per year						10.57	0.106	
Equivalent to 1 bird every x (years)						0.09	9.5	
Over 25 years						264.3	2.64	



C.21c CRM: Hen Harrier – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3.5	m	r/R	c/C	α	collide		contribution	collide	
Pitch (degrees)	7.5		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision) from radius r
BirdLength	0.48	m	0.025	0.575	4.16	13.15	0.94	0.00118	12.63	0.90
Wingspan	1.1	m	0.075	0.575	1.39	4.56	0.33	0.00245	4.03	0.29
F: Flapping (0) or gliding (+1)	0		0.125	0.702	0.83	3.26	0.23	0.00292	2.62	0.19
			0.175	0.860	0.59	2.82	0.20	0.00354	2.04	0.15
Bird speed	9.1	m/sec	0.225	0.994	0.46	2.56	0.18	0.00413	1.65	0.12
RotorDiam	128	m	0.275	0.947	0.38	2.16	0.15	0.00425	1.29	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.32	1.89	0.14	0.00440	1.07	0.08
			0.375	0.851	0.28	1.69	0.12	0.00454	0.91	0.07
			0.425	0.804	0.24	1.53	0.11	0.00466	0.80	0.06
			0.475	0.756	0.22	1.40	0.10	0.00477	0.71	0.05
Bird aspect ratioo: β	0.44		0.525	0.708	0.20	1.29	0.09	0.00486	0.64	0.05
			0.575	0.660	0.18	1.20	0.09	0.00493	0.59	0.04
			0.625	0.613	0.17	1.11	0.08	0.00499	0.55	0.04
			0.675	0.565	0.15	1.04	0.07	0.00503	0.52	0.04
			0.725	0.517	0.14	0.97	0.07	0.00506	0.50	0.04
			0.775	0.470	0.13	0.91	0.07	0.00507	0.48	0.03
			0.825	0.422	0.13	0.86	0.06	0.00507	0.49	0.03
			0.875	0.374	0.12	0.81	0.06	0.00505	0.50	0.04
			0.925	0.327	0.11	0.76	0.05	0.00502	0.50	0.04
			0.975	0.279	0.11	0.71	0.05	0.00497	0.50	0.04
			Overall p(collision) =			Upwind	8.7%	Downwind	5.1%	
								Average	6.9%	



C.22a CRM: Hen Harrier – Proposed Development Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.48						
Number turbines	35	wingspan (m)	1.1						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	9.1						
Max chord (m)	4.2	Number daylight hours available	2419.66						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 99%	0.01								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	2,894,584								
Survey Data									
		VP	1	2	3	4	5	8	
FRA (ha)			433	348	556	548	482	580	
Observation Time (hours)			54	54	54	54	54	54	
Time at height band A			0	90	425	333	645	624	
Time at height band B			0	71	120	90	155	451	
Time at height band C			0	0	0	0	0	0	
Time at height band D			0	0	0	0	0	0	
Total Time at PCH			0	71	120	90	155	451	
Flight activity per unit time and area									
		1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000	572896800.0	
Flying time at risk height	Effort at each VP / FRA	0.00E+00	1.05E-06	1.11E-06	8.45E-07	1.65E-06	4.00E-06	0.00000866	
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	1.24E-07	2.09E-07	1.57E-07	2.71E-07	7.87E-07	0.000001548	
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000001548							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	6.37							
FRAw	Estimated bird time*(rotor diameter/recording height band)	5.31							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	21.69							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.51							
Number of transits 'ntr'	'n'/'t'	42.17							
E									
Probability of collision (Band model)		0.077							
Calculation of number collisions						No avoidance	Avoidance 99%		
Collisions per year						2.74	0.027		
Equivalent to 1 bird every x (years)						0.36	36.5		
Over 25 years						68.6	0.69		



C.22b CRM: Hen Harrier – Proposed Development Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.48						
Number turbines	35	wingspan (m)	1.1						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	9.1						
Max chord (m)	4.2	Number daylight hours available	2419.89						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 99%	0.01								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	2,894,584								
Survey Data									
		VP	1	2	3	4	5	8	
	FRA (ha)		433	348	556	548	482	580	
	Observation Time (hours)		52	63	66	63	69	66	
	Time at height band A		650	150	1744	510	1360	1525	
	Time at height band B		107	0	45	120	219	180	
	Time at height band C		0	0	0	0	0	0	
	Time at height band D		0	0	0	0	0	0	
	Total Time at PCH		107	0	45	120	219	180	
Flight activity per unit time and area									
		1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	81057600	78926400	132105600	124286400	119728800	137808000	673912800.0	
Flying time at risk height	Effort at each VP / FRA	1.32E-06	0.00E+00	3.41E-07	9.66E-07	1.83E-06	1.31E-06	0.00000576	
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.20E-01	1.17E-01	1.96E-01	1.84E-01	1.78E-01	2.04E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.59E-07	0.00E+00	6.68E-08	1.78E-07	3.25E-07	2.67E-07	0.000000996	
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000000996							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	4.10							
FRAw	Estimated bird time*(rotor diameter/recording height band)	3.41							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	13.95							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.51							
Number of transits 'ntr'	'n'/'t'	27.12							
E									
Probability of collision (Band model)		0.077							
Calculation of number collisions				No avoidance		Avoidance 99%			
Collisions per year						1.76		0.018	
Equivalent to 1 bird every x (years)						0.57		56.7	
Over 25 years						44.1		0.44	



C.22c CRM: Hen Harrier – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.48	m	0.025	0.575	3.63	13.07	0.92	0.00115	12.07	0.85
Wingspan	1.1	m	0.075	0.575	1.21	4.69	0.33	0.00247	3.69	0.26
F: Flapping (0) or gliding (+1)	0		0.125	0.702	0.73	3.50	0.25	0.00307	2.28	0.16
			0.175	0.860	0.52	3.15	0.22	0.00387	1.65	0.12
Bird speed	9.1	m/sec	0.225	0.994	0.40	3.00	0.21	0.00473	1.26	0.09
RotorDiam	150	m	0.275	0.947	0.33	2.59	0.18	0.00500	0.94	0.07
RotationPeriod	4.70	sec	0.325	0.899	0.28	2.30	0.16	0.00523	0.73	0.05
			0.375	0.851	0.24	2.07	0.15	0.00544	0.58	0.04
			0.425	0.804	0.21	1.89	0.13	0.00562	0.48	0.03
			0.475	0.756	0.19	1.73	0.12	0.00578	0.55	0.04
Bird aspect ratioo: β	0.44		0.525	0.708	0.17	1.60	0.11	0.00590	0.60	0.04
			0.575	0.660	0.16	1.49	0.10	0.00599	0.63	0.04
			0.625	0.613	0.15	1.38	0.10	0.00605	0.65	0.05
			0.675	0.565	0.13	1.29	0.09	0.00609	0.66	0.05
			0.725	0.517	0.13	1.20	0.08	0.00609	0.67	0.05
			0.775	0.470	0.12	1.12	0.08	0.00607	0.66	0.05
			0.825	0.422	0.11	1.04	0.07	0.00601	0.66	0.05
			0.875	0.374	0.10	0.97	0.07	0.00593	0.65	0.05
			0.925	0.327	0.10	0.90	0.06	0.00582	0.63	0.04
			0.975	0.279	0.09	0.83	0.06	0.00568	0.62	0.04
Overall p(collision) =					Upwind	10.2%	Downwind	5.1%		
					Average	7.7%				



C.23a CRM: Merlin – Consented Site Year 1 Breeding (April – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	36	wingspan (m)	0.72					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	13.7					
Max chord (m)	3.5	Number daylight hours available	2280.73					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,751,072							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		36	36	33	36	36	36	
Time at height band A		15	38	15	0	240	75	
Time at height band B		0	0	60	0	30	90	
Time at height band C		0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		15	38	75	0	270	165	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	56116800	45100800	66052800	71020800	62467200	75168000	375926400.0
Flying time at risk height	Effort at each VP / FRA	2.67E-07	8.43E-07	1.14E-06	0.00E+00	4.32E-06	2.20E-06	8.76E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.76E-01	1.89E-01	1.66E-01	2.00E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.99E-08	1.01E-07	2.00E-07	0.00E+00	7.18E-07	4.39E-07	1.50E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000001498						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	5.81						
FRAw	Estimated bird time*(rotor diameter/recording height band)	3.72						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	10.77						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.28						
Number of transits 'ntr'	'n'/'t'	39.02						
E								
Probability of collision (Band model)		0.048						
Calculation of number collisions				No avoidance		Avoidance 98%		
Collisions per year								1.59
Equivalent to 1 bird every x (years)								0.032
Over 25 years								31.5
								0.63
								39.7
								0.79



C.23b CRM: Merlin – Consented Site Year 2 Breeding (April – July 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.28						
Number turbines	36	wingspan (m)	0.72						
Rotor diameter	128	flapping (0) or gliding (1)	0						
Hub height (m)	81	Assumed flight speed (m/s)	13.7						
Max chord (m)	3.5	Number daylight hours available	2279.96						
Rotor depth	3.5	Maximum recording height (m)	200						
Pitch (degrees)	7.5	Minimum recording height (m)	0						
Rotation period (secs)	4.6								
Turbine operation time 85%	0.85								
Avoidance Rate 98%	0.02								
Rotor radius ²	4096.00								
Combined rotor swept area	463246.59								
Collision Risk volume 'Vw' (m ³)	2,176,000,000								
Rotor swept volume 'V _r ' (m ³)	1,751,072								
Survey Data									
	VP	1	2	3	4	5	8	14	
FRA (ha)		433	348	556	548	482	580	290	
Observation Time (hours)		15	33	36	36	36	36	39	
Time at height band A		0	97	0	0	67	60	0	
Time at height band B		0	0	0	0	41	300	0	
Time at height band C		0	0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	0	
Total Time at PCH		0	97	0	0	108	360	0	
Flight activity per unit time and area									
		1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare	23382000	41342400	72057600	71020800	62467200	75168000	40716000	#####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	2.35E-06	0.00E+00	0.00E+00	1.73E-06	4.79E-06	0.00E+00	8.86E-06
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	6.06E-02	1.07E-01	1.87E-01	1.84E-01	1.62E-01	1.95E-01	1.05E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	2.51E-07	0.00E+00	0.00E+00	2.80E-07	9.32E-07	0.00E+00	1.46E-06
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000001463							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	5.67							
FRAw	Estimated bird time*(rotor diameter/recording height band)	3.63							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	10.51							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.28							
Number of transits 'ntr'	'n'/'t'	38.11							
E									
Probability of collision (Band model)		0.048							
Calculation of number collisions								No avoidance	Avoidance 98%
Collisions per year								1.55	0.031
Equivalent to 1 bird every x (years)								0.64	32.2
Over 25 years								38.8	0.78



C.23c CRM: Merlin – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.28	m	0.025	0.575	6.27	17.28	0.82	0.00103	16.76	0.80
Wingspan	0.72	m	0.075	0.575	2.09	5.94	0.28	0.00212	5.41	0.26
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.25	4.28	0.20	0.00254	3.63	0.17
			0.175	0.860	0.90	3.71	0.18	0.00309	2.92	0.14
Bird speed	13.7	m/sec	0.225	0.994	0.70	3.36	0.16	0.00360	2.45	0.12
RotorDiam	128	m	0.275	0.947	0.57	2.71	0.13	0.00355	1.85	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.48	2.26	0.11	0.00350	1.44	0.07
			0.375	0.851	0.42	1.92	0.09	0.00344	1.15	0.05
			0.425	0.804	0.37	1.68	0.08	0.00339	0.94	0.04
			0.475	0.756	0.33	1.49	0.07	0.00337	0.80	0.04
Bird aspect ratioo: β	0.39		0.525	0.708	0.30	1.34	0.06	0.00334	0.69	0.03
			0.575	0.660	0.27	1.21	0.06	0.00330	0.60	0.03
			0.625	0.613	0.25	1.09	0.05	0.00325	0.53	0.03
			0.675	0.565	0.23	0.99	0.05	0.00319	0.48	0.02
			0.725	0.517	0.22	0.90	0.04	0.00312	0.43	0.02
			0.775	0.470	0.20	0.82	0.04	0.00304	0.39	0.02
			0.825	0.422	0.19	0.75	0.04	0.00295	0.37	0.02
			0.875	0.374	0.18	0.68	0.03	0.00285	0.34	0.02
			0.925	0.327	0.17	0.62	0.03	0.00274	0.32	0.02
			0.975	0.279	0.16	0.56	0.03	0.00261	0.31	0.01
Overall p(collision) =					Upwind	6.0%	Downwind	3.6%		
					Average	4.8%				



C.24a CRM: Merlin – Proposed Development Year 1 Breeding (April – July 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.28					
Number turbines	35	wingspan (m)	0.72					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	13.7					
Max chord (m)	4.2	Number daylight hours available	2280.73					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 98%	0.02							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	2,770,884							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)	433.00	348.00	556	548	482	580		
Observation Time (hours)	36	36	33	36	36	36		
Time at height band A	15	38	15	0	240	75		
Time at height band B	0	0	60	0	30	90		
Time at height band C	0	0	0	0	0	0		
Time at height band D	0	0	0	0	0	0		
Total Time at PCH	0	0	60	0	30	90		
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	56116800	45100800	66052800	71020800	62467200	75168000	375926400.0
Flying time at risk height	Effort at each VP / FRA	0.00E+00	0.00E+00	9.08E-07	0.00E+00	4.80E-07	1.20E-06	2.59E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.20E-01	1.76E-01	1.89E-01	1.66E-01	2.00E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	0.00E+00	1.60E-07	0.00E+00	7.98E-08	2.39E-07	4.79E-07
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000000479						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	1.86						
FRAw	Estimated bird time*(rotor diameter/recording height band)	1.55						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	6.05						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33						
Number of transits 'ntr'	'n'/'t'	18.51						
E								
Probability of collision (Band model)		0.049						
Calculation of number collisions							No avoidance	Avoidance 98%
Collisions per year							0.78	0.016
Equivalent to 1 bird every x (years)							1.29	64.4
Over 25 years							19.4	0.39



C.24b CRM: Merlin – Proposed Development Year 2 Breeding (April – July 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.28						
Number turbines	35	wingspan (m)	0.72						
Rotor diameter	150	flapping (0) or gliding (1)	0						
Hub height (m)	105	Assumed flight speed (m/s)	13.7						
Max chord (m)	4.2	Number daylight hours available	2279.96						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 98%	0.02								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	2,770,884								
Survey Data									
	VP	1	2	3	4	5	8	14	
FRA (ha)		433.00	348.00	556	548	482	580	290	
Observation Time (hours)		15	33	36	36	36	36	39	
Time at height band A		0	97	0	0	67	60	0	
Time at height band B		0	0	0	0	41	300	0	
Time at height band C		0	0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	0	
Total Time at PCH		0	0	0	0	41	300	0	
Flight activity per unit time and area									
		1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare	23382000	41342400	72057600	71020800	62467200	75168000	40716000	# #####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-07	3.99E-06	0.00E+00	4.65E-06
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	6.06E-02	1.07E-01	1.87E-01	1.84E-01	1.62E-01	1.95E-01	1.05E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-07	7.77E-07	0.00E+00	8.83E-07
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000000883							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	3.42							
FRAw	Estimated bird time*(rotor diameter/recording height band)	2.85							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	11.16							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33							
Number of transits 'ntr'	'n'/'t'	34.12							
E									
Probability of collision (Band model)		0.049							
Calculation of number collisions						No avoidance	Avoidance 98%		
Collisions per year						1.43	0.029		
Equivalent to 1 bird every x (years)						0.70	35.0		
Over 25 years						35.8	0.72		



C.24c CRM: Merlin – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.28	m	0.025	0.575	5.47	17.35	0.81	0.00101	16.34	0.76
Wingspan	0.72	m	0.075	0.575	1.82	6.12	0.29	0.00214	5.11	0.24
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.09	4.55	0.21	0.00265	3.32	0.15
			0.175	0.860	0.78	4.07	0.19	0.00332	2.57	0.12
Bird speed	13.7	m/sec	0.225	0.994	0.61	3.79	0.18	0.00397	2.05	0.10
RotorDiam	150	m	0.275	0.947	0.50	3.12	0.15	0.00399	1.46	0.07
RotationPeriod	4.70	sec	0.325	0.899	0.42	2.64	0.12	0.00400	1.07	0.05
			0.375	0.851	0.36	2.30	0.11	0.00401	0.81	0.04
			0.425	0.804	0.32	2.04	0.10	0.00405	0.64	0.03
			0.475	0.756	0.29	1.83	0.09	0.00406	0.51	0.02
Bird aspect ratioo: β	0.39		0.525	0.708	0.26	1.66	0.08	0.00405	0.42	0.02
			0.575	0.660	0.24	1.50	0.07	0.00402	0.35	0.02
			0.625	0.613	0.22	1.37	0.06	0.00398	0.30	0.01
			0.675	0.565	0.20	1.24	0.06	0.00391	0.30	0.01
			0.725	0.517	0.19	1.13	0.05	0.00382	0.33	0.02
			0.775	0.470	0.18	1.03	0.05	0.00372	0.35	0.02
			0.825	0.422	0.17	0.94	0.04	0.00360	0.36	0.02
			0.875	0.374	0.16	0.85	0.04	0.00345	0.37	0.02
			0.925	0.327	0.15	0.76	0.04	0.00329	0.37	0.02
			0.975	0.279	0.14	0.68	0.03	0.00311	0.36	0.02
Overall p(collision) =					Upwind	7.0%	Downwind	2.9%		
					Average	4.9%				



C.25a CRM: Pink-footed Goose – Consented Site Year 2 Non-breeding (September 2018 – March 2019)

Bird Parameters	
length (m)	0.76
wingspan (m)	1.61
flapping (0)or gliding (1)	0
Assumed flight speed (m/s)	17.3
Available hours active	3086.91
Survey effort (hours)	387
No birds observed in risk window	607
Avoidance Rate 99.8%	0.002

Wind Farm Parameters	
Max height of turbines (m)	145
Number turbines	16
Rotor diameter (m)	128
Hub height (m)	81
Max chord (m)	3.5
Pitch (degrees)	7.5
Rotation period (secs)	4.6
Turbine operation time 85%	0.85
Risk window width (m)	6217

Calculations	
Risk window area (m ²)	901465
Area occupied by rotors	205887
Rotor area as a proportion of risk window area	0.228
No of birds per hour of observation	1.568
Potential number birds crossing windfarm area	4842
Number birds through rotors	1105.82
Stage 2 Probability of collision	0.066

Calculation of number collisions	No avoidance	Avoidance 99.8%
Collisions per year	61.68	0.123
Years per collision	0.016	8.11
Over 25 years	1542.07	3.08

C.25b CRM: Pink-footed Goose – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	contribution		collide	contribution	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.76	m	0.025	0.575	7.92	28.80	1.00	0.00125	28.28	1.00	0.00125
Wingspan	1.61	m	0.075	0.575	2.64	9.78	0.37	0.00276	9.25	0.35	0.00262
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.58	6.72	0.25	0.00317	6.08	0.23	0.00287
			0.175	0.860	1.13	5.59	0.21	0.00369	4.80	0.18	0.00317
Bird speed	17.3	m/sec	0.225	0.994	0.88	4.91	0.18	0.00416	4.00	0.15	0.00339
RotorDiam	128	m	0.275	0.947	0.72	3.96	0.15	0.00410	3.09	0.12	0.00320
RotationPeriod	4.60	sec	0.325	0.899	0.61	3.29	0.12	0.00403	2.47	0.09	0.00303
			0.375	0.851	0.53	2.80	0.11	0.00395	2.02	0.08	0.00286
			0.425	0.804	0.47	2.43	0.09	0.00389	1.69	0.06	0.00271
			0.475	0.756	0.42	2.20	0.08	0.00394	1.51	0.06	0.00270
Bird aspect ratioo: β	0.47		0.525	0.708	0.38	2.01	0.08	0.00398	1.36	0.05	0.00270
			0.575	0.660	0.34	1.85	0.07	0.00401	1.25	0.05	0.00270
			0.625	0.613	0.32	1.71	0.06	0.00404	1.15	0.04	0.00272
			0.675	0.565	0.29	1.59	0.06	0.00405	1.08	0.04	0.00274
			0.725	0.517	0.27	1.49	0.06	0.00406	1.01	0.04	0.00277
			0.775	0.470	0.26	1.39	0.05	0.00406	0.96	0.04	0.00281
			0.825	0.422	0.24	1.30	0.05	0.00406	0.92	0.03	0.00286
			0.875	0.374	0.23	1.22	0.05	0.00404	0.88	0.03	0.00291
			0.925	0.327	0.21	1.15	0.04	0.00402	0.85	0.03	0.00298
			0.975	0.279	0.20	1.08	0.04	0.00398	0.83	0.03	0.00305
			Overall p(collision) =			Upwind	7.5%	Downwind		5.6%	
								Average	6.6%		



C.26a CRM: Pink-footed Goose – Proposed Development Year 2 Non-breeding (September 2018 – March 2019)

Bird Parameters	
length (m)	0.76
wingspan (m)	1.61
flapping (0) or gliding (1)	0
Assumed flight speed (m/s)	17.3
Available hours active	3086.91
Survey effort (hours)	387
No birds observed in risk window	607
Avoidance Rate 99.8%	0.002
Wind Farm Parameters	
Max height of turbines (m)	180
Number turbines	35
Rotor diameter (m)	150
Hub height (m)	105
Max chord (m)	4.2
Pitch (degrees)	12
Rotation period (secs)	4.7
Turbine operation time 85%	0.85
Risk window width (m)	6217
Calculations	
Risk window area (m ²)	1119060
Area occupied by rotors	618501
Rotor area as a proportion of risk window area	0.553
No of birds per hour of observation	1.568
Potential number birds crossing windfarm area	4842
Number birds through rotors	2676.02
Stage 2 Probability of collision	0.065
Calculation of number collisions	
No avoidance	
Collisions per year	146.91
Years per collision	0.007
Over 25 years	3672.84
Avoidance 99.8%	

C.26b CRM: Pink-footed Goose – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.76	m	0.025	0.575	6.90	27.92	1.00	0.00125	26.91	0.99
Wingspan	1.61	m	0.075	0.575	2.30	9.64	0.36	0.00267	8.64	0.32
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.38	6.81	0.25	0.00314	5.59	0.21
			0.175	0.860	0.99	5.82	0.21	0.00376	4.32	0.16
Bird speed	17.3	m/sec	0.225	0.994	0.77	5.24	0.19	0.00435	3.50	0.13
RotorDiam	150	m	0.275	0.947	0.63	4.28	0.16	0.00434	2.62	0.10
RotationPeriod	4.70	sec	0.325	0.899	0.53	3.60	0.13	0.00432	2.03	0.07
			0.375	0.851	0.46	3.11	0.11	0.00431	1.63	0.06
			0.425	0.804	0.41	2.80	0.10	0.00439	1.40	0.05
			0.475	0.756	0.36	2.55	0.09	0.00447	1.23	0.05
Bird aspect ratioo: β	0.47		0.525	0.708	0.33	2.33	0.09	0.00452	1.10	0.04
			0.575	0.660	0.30	2.15	0.08	0.00456	1.00	0.04
			0.625	0.613	0.28	1.99	0.07	0.00459	0.92	0.03
			0.675	0.565	0.26	1.85	0.07	0.00460	0.86	0.03
			0.725	0.517	0.24	1.72	0.06	0.00459	0.81	0.03
			0.775	0.470	0.22	1.60	0.06	0.00457	0.78	0.03
			0.825	0.422	0.21	1.49	0.06	0.00454	0.77	0.03
			0.875	0.374	0.20	1.39	0.05	0.00449	0.78	0.03
			0.925	0.327	0.19	1.30	0.05	0.00442	0.79	0.03
			0.975	0.279	0.18	1.21	0.04	0.00434	0.80	0.03
Overall p(collision) =					Upwind	8.2%	Downwind	4.7%		
					Average	6.5%				



C.27a CRM: Red-throated Diver – Consented Site Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.69					
Number turbines	36	wingspan (m)	1.16					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	17.89					
Max chord (m)	3.5	Number daylight hours available	2816.94					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,941,003							
Survey Data								
		VP	1	2	3	4	5	8
	FRA (ha)		433	348	556	548	482	580
	Observation Time (hours)		45	45	45	45	45	45
	Time at height band A		219	223	105	60	672	270
	Time at height band B		2902	339	1245	1521	713	770
	Time at height band C		1064	60	885	1567	430	159
	Time at height band D		0	0	15	0	0	0
	Total Time at PCH		4185	622	2235	3148	1815	1199
Flight activity per unit time and area				1	2	3	4	5
Observation effort	Obsevation time (seconds) * hectare		70146000	56376000	90072000	88776000	78084000	93960000
Flying time at risk height	Effort at each VP / FRA		5.97E-05	1.10E-05	2.48E-05	3.55E-05	2.32E-05	1.28E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01
Adjusted time at risk height	Weighted obs effort * flying time at risk height		8.77E-06	1.30E-06	4.68E-06	6.59E-06	3.80E-06	2.51E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000027657					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		132.45					
FRAw	Estimated bird time*(rotor diameter/recording height band)		84.77					
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		272.20					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.23					
Number of transits 'n't'	'n'/t'		1162.21					
E								
Probability of collision (Band model)			0.060					
Calculation of number collisions						No avoidance	Avoidance 99.5%	
	Collisions per year						59.19	0.296
	Equivalent to 1 bird every x (years)						0.02	3.4
	Over 25 years						1479.7	7.40



C.27b CRM: Red-throated Diver – Consented Site Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.69							
Number turbines	36	wingspan (m)	1.16							
Rotor diameter	128	flapping (0) or gliding (1)	0							
Hub height (m)	81	Assumed flight speed (m/s)	17.89							
Max chord (m)	3.5	Number daylight hours available	2816.77							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)		Survey Data								
Turbine operation time 85%	0.85	VP	1	2	3	4	5	8	14	
Avoidance Rate 99.5%	0.005	FRA (ha)	433	348	556	548	482	580	290	
Rotor radius ²	4096.00	Observation Time (hours)	15	45	45	45	45	45	48	
Combined rotor swept area	463246.59	Time at height band A	30	285	90	285	405	180	232	
Collision Risk volume 'Vw' (m ³)	2,176,000,000	Time at height band B	357	1426	675	1672	3423	1310	1145	
Rotor swept volume 'V _r ' (m ³)	1,941,003	Time at height band C	120	1230	81	1716	402	825	846	
		Time at height band D	0	150	0	59	193	311	0	
		Total Time at PCH	507	2941	846	3673	4230	2315	2223	
Flight activity per unit time and area				1	2	3	4	5	8	14 Total
Observation effort	Obsevation time (seconds) * hectare		23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0
Flying time at risk height	Effort at each VP / FRA		2.17E-05	5.22E-05	9.39E-06	4.14E-05	5.42E-05	2.46E-05	4.44E-05	2.48E-04
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height		1.05E-06	6.12E-06	1.76E-06	7.64E-06	8.80E-06	4.82E-06	4.62E-06	3.48E-05
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000034809							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		166.68							
FRAw	Estimated bird time*(rotor diameter/recording height band)		106.68							
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		342.57							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.23							
Number of transits 'n't'	'n'/t'		1462.66							
E										
Probability of collision (Band model)			0.060							
Calculation of number collisions				No avoidance			Avoidance 99.5%			
				Collisions per year			74.49		0.372	
				Equivalent to 1 bird every x (years)			0.01		2.7	
				Over 25 years			1862.2		9.31	



C.27c CRM: Red-throated Diver – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3.5	m	r/R	c/C	α	collide		contribution	collide	
Pitch (degrees)	12		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision) from radius r
BirdLength	0.69	m	0.025	0.575	8.19	26.03	0.95	0.00119	25.19	0.92
Wingspan	1.16	m	0.075	0.575	2.73	8.96	0.33	0.00245	8.12	0.30
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.64	6.34	0.23	0.00289	5.32	0.19
			0.175	0.860	1.17	5.43	0.20	0.00346	4.17	0.15
Bird speed	17.89	m/sec	0.225	0.994	0.91	4.87	0.18	0.00400	3.43	0.12
RotorDiam	128	m	0.275	0.947	0.74	3.96	0.14	0.00397	2.59	0.09
RotationPeriod	4.60	sec	0.325	0.899	0.63	3.32	0.12	0.00394	2.01	0.07
			0.375	0.851	0.55	2.90	0.11	0.00396	1.66	0.06
			0.425	0.804	0.48	2.60	0.09	0.00403	1.43	0.05
			0.475	0.756	0.43	2.35	0.09	0.00408	1.25	0.05
Bird aspect ratioo: β	0.59		0.525	0.708	0.39	2.15	0.08	0.00412	1.12	0.04
			0.575	0.660	0.36	1.98	0.07	0.00414	1.01	0.04
			0.625	0.613	0.33	1.82	0.07	0.00415	0.93	0.03
			0.675	0.565	0.30	1.69	0.06	0.00415	0.87	0.03
			0.725	0.517	0.28	1.57	0.06	0.00414	0.81	0.03
			0.775	0.470	0.26	1.46	0.05	0.00411	0.77	0.03
			0.825	0.422	0.25	1.36	0.05	0.00408	0.74	0.03
			0.875	0.374	0.23	1.26	0.05	0.00403	0.72	0.03
			0.925	0.327	0.22	1.17	0.04	0.00396	0.70	0.03
			0.975	0.279	0.21	1.09	0.04	0.00389	0.69	0.03
			Overall p(collision) =			Upwind	7.5%	Downwind	4.5%	
								Average	6.0%	



C.28a CRM: Red-throated Diver – Proposed Development Year 1 Breeding (April – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.69					
Number turbines	35	wingspan (m)	1.16					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	17.89					
Max chord (m)	4.2	Number daylight hours available	2816.94					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	3,024,470							
Survey Data								
		VP	1	2	3	4	5	8
	FRA (ha)		433	348	556	548	482	580
	Observation Time (hours)		45	45	45	45	45	45
	Time at height band A		219	223	105	60	672	270
	Time at height band B		2902	339	1245	1521	713	770
	Time at height band C		1064	60	885	1567	430	159
	Time at height band D		0	0	15	0	0	0
	Total Time at PCH		3966	399	2130	3088	1143	929
Flight activity per unit time and area				1	2	3	4	5
Observation effort	Obsevation time (seconds) * hectare		70146000	56376000	90072000	88776000	78084000	93960000
Flying time at risk height	Effort at each VP / FRA		5.65E-05	7.08E-06	2.36E-05	3.48E-05	1.46E-05	9.89E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's		1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01
Adjusted time at risk height	Weighted obs effort * flying time at risk height		8.31E-06	8.36E-07	4.46E-06	6.47E-06	2.39E-06	1.95E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha		0.000024413					
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active		116.91					
FRAw	Estimated bird time*(rotor diameter/recording height band)		97.42					
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*		415.98					
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)		0.27					
Number of transits 'n't'	'n'/t'		1521.86					
E								
Probability of collision (Band model)			0.060					
				Calculation of number collisions		No avoidance	Avoidance 99.5%	
				Collisions per year		77.21	0.386	
				Equivalent to 1 bird every x (years)		0.01	2.6	
				Over 25 years		1930.3	9.65	



C.28b CRM: Red-throated Diver – Proposed Development Year 2 Breeding (April – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.69							
Number turbines	35	wingspan (m)	1.16							
Rotor diameter	150	flapping (0) or gliding (1)	0							
Hub height (m)	105	Assumed flight speed (m/s)	17.89							
Max chord (m)	4.2	Number daylight hours available	2816.77							
Rotor depth	4.2	Maximum recording height (m)	200							
Pitch (degrees)	12	Minimum recording height (m)	20							
Rotation period (secs)	4.7									
Turbine operation time 85%	0.85									
Avoidance Rate 99.5%	0.005									
Rotor radius ²	5625.00									
Combined rotor swept area	618500.93									
Collision Risk volume 'Vw' (m ³)	2,550,000,000									
Rotor swept volume 'V _r ' (m ³)	3,024,470									
Survey Data										
	VP	1	2	3	4	5	8	14		
FRA (ha)		433	348	556	548	482	580	290		
Observation Time (hours)		15	45	45	45	45	45	48		
Time at height band A		30	285	90	285	405	180	232		
Time at height band B		357	1426	675	1672	3423	1310	1145		
Time at height band C		120	1230	81	1716	402	825	846		
Time at height band D		0	150	0	59	193	311	0		
Total Time at PCH		477	2656	756	3388	3825	2135	1991		
Flight activity per unit time and area										
		1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	23382000	56376000	90072000	88776000	78084000	93960000	50112000	480762000.0	
Flying time at risk height	Effort at each VP / FRA	2.04E-05	4.71E-05	8.39E-06	3.82E-05	4.90E-05	2.27E-05	3.97E-05	2.26E-04	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	4.86E-02	1.17E-01	1.87E-01	1.85E-01	1.62E-01	1.95E-01	1.04E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	9.92E-07	5.52E-06	1.57E-06	7.05E-06	7.96E-06	4.44E-06	4.14E-06	3.17E-05	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000031675								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	151.67								
FRAw	Estimated bird time*(rotor diameter/recording height band)	126.40								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	539.69								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.27								
Number of transits 'ntr'	'n'/'t'	1974.44								
E										
Probability of collision (Band model)		0.060								
Calculation of number collisions							No avoidance	Avoidance 99.5%		
Collisions per year							100.18	0.501		
Equivalent to 1 bird every x (years)							0.01	2.0		
Over 25 years							2504.4	12.52		



C.28c CRM: Red-throated Diver – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	0.69	m	0.025	0.575	7.14	25.64	0.91	0.00114	24.64	0.88
Wingspan	1.16	m	0.075	0.575	2.38	8.88	0.32	0.00238	7.88	0.28
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.43	6.38	0.23	0.00285	5.16	0.18
			0.175	0.860	1.02	5.54	0.20	0.00346	4.03	0.14
Bird speed	17.89	m/sec	0.225	0.994	0.79	5.03	0.18	0.00404	3.29	0.12
RotorDiam	150	m	0.275	0.947	0.65	4.10	0.15	0.00403	2.45	0.09
RotationPeriod	4.70	sec	0.325	0.899	0.55	3.50	0.12	0.00406	1.93	0.07
			0.375	0.851	0.48	3.10	0.11	0.00414	1.61	0.06
			0.425	0.804	0.42	2.78	0.10	0.00421	1.37	0.05
			0.475	0.756	0.38	2.52	0.09	0.00426	1.20	0.04
Bird aspect ratioo: β	0.59		0.525	0.708	0.34	2.30	0.08	0.00430	1.06	0.04
			0.575	0.660	0.31	2.11	0.08	0.00433	0.96	0.03
			0.625	0.613	0.29	1.94	0.07	0.00433	0.87	0.03
			0.675	0.565	0.26	1.80	0.06	0.00433	0.81	0.03
			0.725	0.517	0.25	1.66	0.06	0.00431	0.76	0.03
			0.775	0.470	0.23	1.54	0.06	0.00427	0.72	0.03
			0.825	0.422	0.22	1.43	0.05	0.00422	0.70	0.02
			0.875	0.374	0.20	1.33	0.05	0.00415	0.70	0.03
			0.925	0.327	0.19	1.23	0.04	0.00407	0.72	0.03
			0.975	0.279	0.18	1.14	0.04	0.00398	0.72	0.03
Overall p(collision) =					Upwind	7.7%	Downwind	4.3%		
					Average	6.0%				



C.29a CRM: White-tailed Eagle – Consented Site Year 1 Breeding (February – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.8					
Number turbines	36	wingspan (m)	2.3					
Rotor diameter	128	flapping (0) or gliding (1)	1					
Hub height (m)	81	Assumed flight speed (m/s)	10.2					
Max chord (m)	3.5	Number daylight hours available	3565.18					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 95%	0.05							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,991,960							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		66	66	66	63	63	63	
Time at height band A		86	14	45	75	60	0	
Time at height band B		120	60	220	150	300	150	
Time at height band C		0	60	180	105	120	0	
Time at height band D		0	157	1240	0	343	0	
Total Time at PCH		206	134	445	330	480	150	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	102880800	82684800	132105600	124286400	109317600	131544000	#####
Flying time at risk height	Effort at each VP / FRA	2.00E-06	1.62E-06	3.37E-06	2.66E-06	4.39E-06	1.14E-06	1.52E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.51E-01	1.21E-01	1.93E-01	1.82E-01	1.60E-01	1.93E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	3.02E-07	1.96E-07	6.52E-07	4.83E-07	7.03E-07	2.20E-07	2.56E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000002556						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	15.49						
FRAw	Estimated bird time*(rotor diameter/recording height band)	9.91						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	32.67						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42						
Number of transits 'ntr'	'n'/'t'	77.49						
E								
Probability of collision (Band model)		0.085						
Calculation of number collisions					No avoidance		Avoidance 95%	
Collisions per year							5.58	0.279
Equivalent to 1 bird every x (years)							0.18	3.6
Over 25 years							139.5	6.97



C.29b CRM: White-tailed Eagle – Consented Site Year 2 Breeding (February – August 2019)

Wind Farm Parameters		Bird Parameters								
WFP (ha)	1700	length (m)	0.8							
Number turbines	36	wingspan (m)	2.3							
Rotor diameter	128	flapping (0) or gliding (1)	1							
Hub height (m)	81	Assumed flight speed (m/s)	10.2							
Max chord (m)	3.5	Number daylight hours available	3563.84							
Rotor depth	3.5	Maximum recording height (m)	200							
Pitch (degrees)	7.5	Minimum recording height (m)	0							
Rotation period (secs)	4.6									
Turbine operation time 85%	0.85									
Avoidance Rate 95%	0.05									
Rotor radius ²	4096.00									
Combined rotor swept area	463246.59									
Collision Risk volume 'Vw' (m ³)	2,176,000,000									
Rotor swept volume 'V _r ' (m ³)	1,991,960									
Survey Data										
	VP	1	2	3	4	5	8	14		
FRA (ha)		433	348	556	548	482	580	290		
Observation Time (hours)		27	66	63	63	66	60	48		
Time at height band A		0	39	0	180	0	0	0		
Time at height band B		0	15	135	117	120	45	0		
Time at height band C		0	355	390	0	0	420	0		
Time at height band D		0	0	195	0	94	328	0		
Total Time at PCH		0	409	525	297	120	465	0		
Flight activity per unit time and area										
		1	2	3	4	5	8	14	Total	
Observation effort	Obsevation time (seconds) * hectare	42087600	82684800	126100800	124286400	114523200	125280000	50112000	665074800.0	
Flying time at risk height	Effort at each VP / FRA	0.00E+00	4.95E-06	4.16E-06	2.39E-06	1.05E-06	3.71E-06	0.00E+00	1.63E-05	
Weighted by observation effort										
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	6.33E-02	1.24E-01	1.90E-01	1.87E-01	1.72E-01	1.88E-01	7.53E-02	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	6.15E-07	7.89E-07	4.47E-07	1.80E-07	6.99E-07	0.00E+00	2.73E-06	
Occupancy Rate										
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000002731								
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	16.54								
FRAw	Estimated bird time*(rotor diameter/recording height band)	10.59								
Rotor Transits										
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	34.89								
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42								
Number of transits 'ntr'	'n'/'t'	82.77								
E										
Probability of collision (Band model)		0.085								
Calculation of number collisions							No avoidance	Avoidance 95%		
Collisions per year							5.96	0.298		
Equivalent to 1 bird every x (years)							0.17	3.4		
Over 25 years							149.0	7.45		



C.29c CRM: White-tailed Eagle – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	contribution		collide	contribution	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r	
BirdLength	0.8	m	0.025	0.575	4.67	16.41	1.00	0.00125	15.88	1.00	0.00125
Wingspan	2.3	m	0.075	0.575	1.56	5.64	0.36	0.00271	5.12	0.33	0.00245
F: Flapping (0) or gliding (+1)	1		0.125	0.702	0.93	3.96	0.25	0.00316	3.32	0.21	0.00265
			0.175	0.860	0.67	3.36	0.21	0.00376	2.57	0.16	0.00288
Bird speed	10.2	m/sec	0.225	0.994	0.52	3.00	0.19	0.00432	2.09	0.13	0.00301
RotorDiam	128	m	0.275	0.947	0.42	2.45	0.16	0.00430	1.58	0.10	0.00278
RotationPeriod	4.60	sec	0.325	0.899	0.36	2.06	0.13	0.00427	1.23	0.08	0.00257
			0.375	0.851	0.31	2.11	0.13	0.00505	1.33	0.09	0.00319
			0.425	0.804	0.27	1.93	0.12	0.00525	1.20	0.08	0.00326
			0.475	0.756	0.25	1.79	0.11	0.00544	1.10	0.07	0.00334
Bird aspect ratioo: β	0.35		0.525	0.708	0.22	1.67	0.11	0.00560	1.02	0.07	0.00343
			0.575	0.660	0.20	1.57	0.10	0.00576	0.96	0.06	0.00354
			0.625	0.613	0.19	1.48	0.09	0.00590	0.92	0.06	0.00366
			0.675	0.565	0.17	1.40	0.09	0.00603	0.88	0.06	0.00380
			0.725	0.517	0.16	1.33	0.08	0.00614	0.85	0.05	0.00395
			0.775	0.470	0.15	1.26	0.08	0.00624	0.83	0.05	0.00412
			0.825	0.422	0.14	1.20	0.08	0.00633	0.81	0.05	0.00430
			0.875	0.374	0.13	1.14	0.07	0.00640	0.80	0.05	0.00449
			0.925	0.327	0.13	1.09	0.07	0.00646	0.81	0.05	0.00477
			0.975	0.279	0.12	1.04	0.07	0.00650	0.81	0.05	0.00506
			Overall p(collision) =			Upwind	10.1%		Downwind	6.9%	
							Average	8.5%			



C.30a CRM: White-tailed Eagle – Proposed Development Year 1 Breeding (February – August 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.8					
Number turbines	35	wingspan (m)	2.3					
Rotor diameter	150	flapping (0) or gliding (1)	1					
Hub height (m)	105	Assumed flight speed (m/s)	10.2					
Max chord (m)	4.2	Number daylight hours available	3565.18					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)								
Turbine operation time 85%	0.85	Survey Data						
Avoidance Rate 95%	0.05	VP	1	2	3	4	5	8
Rotor radius ²	5625.00	FRA (ha)	433	348	556	548	482	580
Combined rotor swept area	618500.93	Observation Time (hours)	66	66	66	63	63	63
Collision Risk volume 'Vw' (m ³)	2,550,000,000	Time at height band A	86	14	45	75	60	0
Rotor swept volume 'V _r ' (m ³)	3,092,505	Time at height band B	120	60	220	150	300	150
		Time at height band C	0	60	180	105	120	0
		Time at height band D	0	157	1240	0	343	0
		Total Time at PCH	120	120	400	255	420	150
Flight activity per unit time and area		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	102880800	82684800	132105600	124286400	109317600	131544000	#####
Flying time at risk height	Effort at each VP / FRA	1.17E-06	1.45E-06	3.03E-06	2.05E-06	3.84E-06	1.14E-06	1.27E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.51E-01	1.21E-01	1.93E-01	1.82E-01	1.60E-01	1.93E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	1.76E-07	1.76E-07	5.86E-07	3.73E-07	6.15E-07	2.20E-07	2.15E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000002146						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	13.00						
FRAw	Estimated bird time*(rotor diameter/recording height band)	10.84						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	47.31	Calculation of number collisions			No avoidance		Avoidance 95%
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.49	Collisions per year			7.38		0.369
Number of transits 'n't'	'n'/t'	96.51	Equivalent to 1 bird every x (years)			0.14		2.7
E			Over 25 years			184.4		9.22
Probability of collision (Band model)		0.090						



C.30b CRM: White-tailed Eagle – Proposed Development Year 2 Breeding (February – August 2019)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.8						
Number turbines	35	wingspan (m)	2.3						
Rotor diameter	150	flapping (0) or gliding (1)	1						
Hub height (m)	105	Assumed flight speed (m/s)	10.2						
Max chord (m)	4.2	Number daylight hours available	3563.84						
Rotor depth	4.2	Maximum recording height (m)	200						
Pitch (degrees)	12	Minimum recording height (m)	20						
Rotation period (secs)	4.7								
Turbine operation time 85%	0.85								
Avoidance Rate 95%	0.05								
Rotor radius ²	5625.00								
Combined rotor swept area	618500.93								
Collision Risk volume 'Vw' (m ³)	2,550,000,000								
Rotor swept volume 'V _r ' (m ³)	3,092,505								
Survey Data									
		VP	1	2	3	4	5	8	14
FRA (ha)		433	348	556	548	482	580	290	
Observation Time (hours)		27	66	63	63	66	60	48	
Time at height band A		0	39	0	180	0	0	0	
Time at height band B		0	15	135	117	120	45	0	
Time at height band C		0	355	390	0	0	420	0	
Time at height band D		0	0	195	0	94	328	0	
Total Time at PCH		0	370	525	117	120	465	0	
Flight activity per unit time and area									
		1	2	3	4	5	8	14	Total
Observation effort	Obsevation time (seconds) * hectare	42087600	82684800	126100800	124286400	114523200	125280000	50112000	665074800.0
Flying time at risk height	Effort at each VP / FRA	0.00E+00	4.47E-06	4.16E-06	9.41E-07	1.05E-06	3.71E-06	0.00E+00	1.43E-05
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	6.33E-02	1.24E-01	1.90E-01	1.87E-01	1.72E-01	1.88E-01	7.53E-02	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	5.56E-07	7.89E-07	1.76E-07	1.80E-07	6.99E-07	0.00E+00	2.40E-06
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000002401							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	14.55							
FRAw	Estimated bird time*(rotor diameter/recording height band)	12.12							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	52.93							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.49							
Number of transits 'ntr'	'n'/'t'	107.97							
E									
Probability of collision (Band model)		0.090							
Calculation of number collisions					No avoidance		Avoidance 95%		
Collisions per year							8.25		0.413
Equivalent to 1 bird every x (years)							0.12		2.4
Over 25 years							206.3		10.31



C.30c CRM: White-tailed Eagle – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
										17/10/2019
K: [1D or [3D] (0 or 1)										
NoBlades	1									
MaxChord	3									
Pitch (degrees)	4.2	m	r/R	c/C	α	collide		contribution	collide	
BirdLength	12	radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r
Wingspan	0.8	m	0.025	0.575	4.07	16.07	1.00	0.00125	15.07	0.94
F: Flapping (0) or gliding (+1)	2.3	m	0.075	0.575	1.36	5.69	0.36	0.00267	4.69	0.29
Bird speed	1		0.125	0.702	0.81	4.15	0.26	0.00325	2.92	0.18
RotorDiam	10.2	m/sec	0.225	0.994	0.45	3.38	0.21	0.00476	1.64	0.10
RotationPeriod	150	m	0.275	0.947	0.37	2.81	0.18	0.00483	1.15	0.07
Bird aspect ratioo: β	4.70	sec	0.325	0.899	0.31	2.74	0.17	0.00557	1.17	0.07
			0.375	0.851	0.27	2.49	0.16	0.00585	1.01	0.06
			0.425	0.804	0.24	2.29	0.14	0.00610	0.89	0.06
			0.475	0.756	0.21	2.13	0.13	0.00632	0.81	0.05
			0.525	0.708	0.19	1.98	0.12	0.00651	0.85	0.05
			0.575	0.660	0.18	1.86	0.12	0.00668	0.90	0.06
			0.625	0.613	0.16	1.74	0.11	0.00682	0.93	0.06
			0.675	0.565	0.15	1.64	0.10	0.00694	0.94	0.06
			0.725	0.517	0.14	1.55	0.10	0.00703	0.95	0.06
			0.775	0.470	0.13	1.46	0.09	0.00710	0.96	0.06
			0.825	0.422	0.12	1.38	0.09	0.00714	0.95	0.06
			0.875	0.374	0.12	1.31	0.08	0.00715	0.95	0.06
			0.925	0.327	0.11	1.23	0.08	0.00714	0.94	0.06
			0.975	0.279	0.10	1.16	0.07	0.00710	0.92	0.06
Overall p(collision) =					Upwind	11.4%	Downwind	6.6%		
					Average	9.0%				

C.31a CRM: White-tailed Eagle – Consented Site Year 1 Non-breeding (September 2017– January 2018)

Wind Farm Parameters		Bird Parameters							
WFP (ha)	1700	length (m)	0.8						
Number turbines	36	wingspan (m)	2.3						
Rotor diameter	128	flapping (0) or gliding (1)	1						
Hub height (m)	81	Assumed flight speed (m/s)	10.2						
Max chord (m)	3.5	Number daylight hours available	1671.41						
Rotor depth	3.5	Maximum recording height (m)	200						
Pitch (degrees)	7.5	Minimum recording height (m)	0						
Rotation period (secs)	4.6								
Turbine operation time 85%	0.85								
Avoidance Rate 95%	0.05								
Rotor radius ²	4096.00								
Combined rotor swept area	463246.59								
Collision Risk volume 'Vw' (m ³)	2,176,000,000								
Rotor swept volume 'V _r ' (m ³)	1,991,960								
Survey Data									
	VP	1	2	3	4	5	8		
FRA (ha)		433	348	556	548	482	580		
Observation Time (hours)		33	33	33	36	36	36		
Time at height band A		0	0	0	0	15	133		
Time at height band B		0	0	0	75	15	308		
Time at height band C		0	0	0	220	300	55		
Time at height band D		0	0	0	0	0	0		
Total Time at PCH		0	0	0	295	330	496		
Flight activity per unit time and area									
		1	2	3	4	5	8	Total	
Observation effort	Obsevation time (seconds) * hectare	51440400	41342400	66052800	71020800	62467200	75168000	#####	
Flying time at risk height	Effort at each VP / FRA	0.00E+00	0.00E+00	0.00E+00	4.15E-06	5.28E-06	6.60E-06	1.60E-05	
Weighted by observation effort									
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.40E-01	1.12E-01	1.80E-01	1.93E-01	1.70E-01	2.05E-01	1.0	
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	0.00E+00	0.00E+00	8.03E-07	8.98E-07	1.35E-06	3.05E-06	
Occupancy Rate									
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000003050							
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	8.67							
FRAw	Estimated bird time*(rotor diameter/recording height band)	5.55							
Rotor Transits									
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	18.28							
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42							
Number of transits 'ntr'	'n'/'t'	43.36							
E									
Probability of collision (Band model)		0.085							
Calculation of number collisions						No avoidance	Avoidance 95%		
Collisions per year						3.12	0.156		
Equivalent to 1 bird every x (years)						0.32	6.4		
Over 25 years						78.0	3.90		



C.31b CRM: White-tailed Eagle – Consented Site Year 2 Non-breeding (September 2018– January 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.8					
Number turbines	36	wingspan (m)	2.3					
Rotor diameter	128	flapping (0) or gliding (1)	1					
Hub height (m)	81	Assumed flight speed (m/s)	10.2					
Max chord (m)	3.5	Number daylight hours available	1672.82					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 95%	0.05							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	1,991,960							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		48	42	48	45	48	51	
Time at height band A		118	0	180	0	60	75	
Time at height band B		352	0	510	0	446	105	
Time at height band C		0	0	210	0	0	75	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		470	0	900	0	506	255	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	74822400	52617600	96076800	88776000	83289600	106488000	502070400.0
Flying time at risk height	Effort at each VP / FRA	6.28E-06	0.00E+00	9.37E-06	0.00E+00	6.08E-06	2.39E-06	2.41E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.05E-01	1.91E-01	1.77E-01	1.66E-01	2.12E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	9.36E-07	0.00E+00	1.79E-06	0.00E+00	1.01E-06	5.08E-07	4.24E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000004244						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	12.07						
FRAw	Estimated bird time*(rotor diameter/recording height band)	7.72						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	25.46						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.42						
Number of transits 'ntr'	'n'/'t'	60.39						
E								
Probability of collision (Band model)		0.085						
Calculation of number collisions						No avoidance	Avoidance 95%	
Collisions per year						4.35	0.217	
Equivalent to 1 bird every x (years)						0.23	4.6	
Over 25 years						108.7	5.43	



C.31c CRM: White-tailed Eagle – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA											
Only enter input parameters in green cells											
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius									
NoBlades	3	Upw ind:									
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length	
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)	
BirdLength	0.8	m	0.025	0.575	4.67	16.41	1.00	0.00125	15.88	1.00	0.00125
Wingspan	2.3	m	0.075	0.575	1.56	5.64	0.36	0.00271	5.12	0.33	0.00245
F: Flapping (0) or gliding (+1)	1		0.125	0.702	0.93	3.96	0.25	0.00316	3.32	0.21	0.00265
			0.175	0.860	0.67	3.36	0.21	0.00376	2.57	0.16	0.00288
Bird speed	10.2	m/sec	0.225	0.994	0.52	3.00	0.19	0.00432	2.09	0.13	0.00301
RotorDiam	128	m	0.275	0.947	0.42	2.45	0.16	0.00430	1.58	0.10	0.00278
RotationPeriod	4.60	sec	0.325	0.899	0.36	2.06	0.13	0.00427	1.23	0.08	0.00257
			0.375	0.851	0.31	2.11	0.13	0.00505	1.33	0.09	0.00319
			0.425	0.804	0.27	1.93	0.12	0.00525	1.20	0.08	0.00326
			0.475	0.756	0.25	1.79	0.11	0.00544	1.10	0.07	0.00334
Bird aspect ratioo: β	0.35		0.525	0.708	0.22	1.67	0.11	0.00560	1.02	0.07	0.00343
			0.575	0.660	0.20	1.57	0.10	0.00576	0.96	0.06	0.00354
			0.625	0.613	0.19	1.48	0.09	0.00590	0.92	0.06	0.00366
			0.675	0.565	0.17	1.40	0.09	0.00603	0.88	0.06	0.00380
			0.725	0.517	0.16	1.33	0.08	0.00614	0.85	0.05	0.00395
			0.775	0.470	0.15	1.26	0.08	0.00624	0.83	0.05	0.00412
			0.825	0.422	0.14	1.20	0.08	0.00633	0.81	0.05	0.00430
			0.875	0.374	0.13	1.14	0.07	0.00640	0.80	0.05	0.00449
			0.925	0.327	0.13	1.09	0.07	0.00646	0.81	0.05	0.00477
			0.975	0.279	0.12	1.04	0.07	0.00650	0.81	0.05	0.00506
			Overall p(collision) =			Upwind	10.1%	Downwind		6.9%	
								Average	8.5%		



C.32a CRM: White-tailed Eagle – Proposed Development Year 1 Non-breeding (September 2017– January 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.8					
Number turbines	35	wingspan (m)	2.3					
Rotor diameter	150	flapping (0) or gliding (1)	1					
Hub height (m)	105	Assumed flight speed (m/s)	10.2					
Max chord (m)	4.2	Number daylight hours available	1671.41					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 95%	0.05							
Rotor radius ²	5625.00	Survey Data						
Combined rotor swept area	618500.93	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,550,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	3,092,505	Observation Time (hours)	33	33	33	36	36	36
		Time at height band A	0	0	0	0	15	133
		Time at height band B	0	0	0	75	15	308
		Time at height band C	0	0	0	220	300	55
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	0	0	0	295	315	363
Flight activity per unit time and area			1	2	3	4	5	8 Total
Observation effort		Obsevation time (seconds) * hectare	51440400	41342400	66052800	71020800	62467200	75168000 #####
Flying time at risk height		Effort at each VP / FRA	0.00E+00	0.00E+00	0.00E+00	4.15E-06	5.04E-06	4.83E-06 1.40E-05
Weighted by observation effort								
Weighted obs effort		Effort at each VP / sum of all effort at all VP's	1.40E-01	1.12E-01	1.80E-01	1.93E-01	1.70E-01	2.05E-01 1.0
Adjusted time at risk height		Weighted obs effort * flying time at risk height	0.00E+00	0.00E+00	0.00E+00	8.03E-07	8.57E-07	9.88E-07 2.65E-06
Occupancy Rate								
Summed Occupancy rate		Sum of weighted average flight activity per visible ha	0.000002648					
Estimated bird time 'b' in risk area		Summed Occupancy rate*windfarm polygon*hours active	7.52					
FRAw		Estimated bird time*(rotor diameter/recording height band)	6.27					
Rotor Transits								
Bird occupancy of rotor swept volume ('b')		Estimated bird time * (rotor swept volume / collision risk volume)*	27.37					
Bird transit time (t)		(rotor depth+bird length)/flight speed(m/s)	0.49					
Number of transits 'n't'		'n'/'t'	55.84					
E								
Probability of collision (Band model)			0.090					
Calculation of number collisions				No avoidance			Avoidance 95%	
Collisions per year							4.27	0.213
Equivalent to 1 bird every x (years)							0.23	4.7
Over 25 years							106.7	5.33



C.32b CRM: White-tailed Eagle – Proposed Development Year 2 Non-breeding (September 2018– January 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	0.8					
Number turbines	35	wingspan (m)	2.3					
Rotor diameter	150	flapping (0) or gliding (1)	1					
Hub height (m)	105	Assumed flight speed (m/s)	10.2					
Max chord (m)	4.2	Number daylight hours available	1672.82					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 95%	0.05							
Rotor radius ²	5625.00	Survey Data						
Combined rotor swept area	618500.93	VP	1	2	3	4	5	8
Collision Risk volume 'Vw' (m ³)	2,550,000,000	FRA (ha)	433	348	556	548	482	580
Rotor swept volume 'V _r ' (m ³)	3,092,505	Observation Time (hours)	48	42	48	45	48	51
		Time at height band A	118	0	180	0	60	75
		Time at height band B	352	0	510	0	446	105
		Time at height band C	0	0	210	0	0	75
		Time at height band D	0	0	0	0	0	0
		Total Time at PCH	352	0	720	0	446	180
Flight activity per unit time and area		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	74822400	52617600	96076800	88776000	83289600	106488000	502070400.0
Flying time at risk height	Effort at each VP / FRA	4.70E-06	0.00E+00	7.49E-06	0.00E+00	5.35E-06	1.69E-06	1.92E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.49E-01	1.05E-01	1.91E-01	1.77E-01	1.66E-01	2.12E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	7.01E-07	0.00E+00	1.43E-06	0.00E+00	8.88E-07	3.59E-07	3.38E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000003382						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	9.62						
FRAw	Estimated bird time*(rotor diameter/recording height band)	8.01						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	34.99						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.49						
Number of transits 'ntr'	'n'/'t'	71.38						
E								
Probability of collision (Band model)		0.090						
Calculation of number collisions				No avoidance		Avoidance 95%		
Collisions per year						5.45		0.273
Equivalent to 1 bird every x (years)						0.18		3.7
Over 25 years						136.4		6.82



C.32c CRM: White-tailed Eagle – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12	radius	chord	alpha		p(collision)	from radius r		p(collision)	from radius r
BirdLength	0.8	m	0.025	0.575	4.07	16.07	1.00	0.00125	15.07	0.94
Wingspan	2.3	m	0.075	0.575	1.36	5.69	0.36	0.00267	4.69	0.29
F: Flapping (0) or gliding (+1)	1		0.125	0.702	0.81	4.15	0.26	0.00325	2.92	0.18
			0.175	0.860	0.58	3.66	0.23	0.00400	2.15	0.13
Bird speed	10.2	m/sec	0.225	0.994	0.45	3.38	0.21	0.00476	1.64	0.10
RotorDiam	150	m	0.275	0.947	0.37	2.81	0.18	0.00483	1.15	0.07
RotationPeriod	4.70	sec	0.325	0.899	0.31	2.74	0.17	0.00557	1.17	0.07
			0.375	0.851	0.27	2.49	0.16	0.00585	1.01	0.06
			0.425	0.804	0.24	2.29	0.14	0.00610	0.89	0.06
			0.475	0.756	0.21	2.13	0.13	0.00632	0.81	0.05
Bird aspect ratioo: β	0.35		0.525	0.708	0.19	1.98	0.12	0.00651	0.85	0.05
			0.575	0.660	0.18	1.86	0.12	0.00668	0.90	0.06
			0.625	0.613	0.16	1.74	0.11	0.00682	0.93	0.06
			0.675	0.565	0.15	1.64	0.10	0.00694	0.94	0.06
			0.725	0.517	0.14	1.55	0.10	0.00703	0.95	0.06
			0.775	0.470	0.13	1.46	0.09	0.00710	0.96	0.06
			0.825	0.422	0.12	1.38	0.09	0.00714	0.95	0.06
			0.875	0.374	0.12	1.31	0.08	0.00715	0.95	0.06
			0.925	0.327	0.11	1.23	0.08	0.00714	0.94	0.06
			0.975	0.279	0.10	1.16	0.07	0.00710	0.92	0.06
Overall p(collision) =					Upwind	11.4%	Downwind	6.6%		
					Average	9.0%				



C.33a CRM: Whooper Swan – Consented Site Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	1.52					
Number turbines	36	wingspan (m)	2.3					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	17.3					
Max chord (m)	3.5	Number daylight hours available	3086.73					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	2,325,498							
Survey Data								
		VP	1	2	3	4	5	8
	FRA (ha)		433	348	556	548	482	580
	Observation Time (hours)		54	54	54	54	54	54
	Time at height band A		0	0	0	0	0	0
	Time at height band B		0	62	0	0	0	1080
	Time at height band C		419	0	1431	360	180	0
	Time at height band D		0	0	0	0	0	0
	Total Time at PCH		419	62	1431	360	180	1080
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000	572896800.0
Flying time at risk height	Effort at each VP / FRA	4.98E-06	9.16E-07	1.32E-05	3.38E-06	1.92E-06	9.58E-06	3.40E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	7.31E-07	1.08E-07	2.50E-06	6.28E-07	3.14E-07	1.89E-06	6.17E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000006165						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	32.35						
FRAw	Estimated bird time*(rotor diameter/recording height band)	20.70						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	79.66						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.29						
Number of transits 'ntr'	'n'/'t'	274.52						
E								
Probability of collision (Band model)		0.094						
Calculation of number collisions						No avoidance	Avoidance 99.5%	
							21.90	0.110
	Collisions per year						0.05	9.1
	Equivalent to 1 bird every x (years)						Over 25 years	547.6
								2.74



C.33b CRM: Whooper Swan – Consented Site Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	1.52					
Number turbines	36	wingspan (m)	2.3					
Rotor diameter	128	flapping (0) or gliding (1)	0					
Hub height (m)	81	Assumed flight speed (m/s)	17.3					
Max chord (m)	3.5	Number daylight hours available	3086.91					
Rotor depth	3.5	Maximum recording height (m)	200					
Pitch (degrees)	7.5	Minimum recording height (m)	0					
Rotation period (secs)	4.6							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	4096.00							
Combined rotor swept area	463246.59							
Collision Risk volume 'Vw' (m ³)	2,176,000,000							
Rotor swept volume 'V _r ' (m ³)	2,325,498							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		52	63	66	63	69	66	
Time at height band A		5566	0	0	0	0	0	
Time at height band B		0	0	540	0	300	45	
Time at height band C		0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		5566	0	540	0	300	45	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	81057600	78926400	132105600	124286400	119728800	137808000	#####
Flying time at risk height	Effort at each VP / FRA	6.87E-05	0.00E+00	4.09E-06	0.00E+00	2.51E-06	3.27E-07	7.56E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.20E-01	1.17E-01	1.96E-01	1.84E-01	1.78E-01	2.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	8.26E-06	0.00E+00	8.01E-07	0.00E+00	4.45E-07	6.68E-08	9.57E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000009572						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	50.23						
FRAw	Estimated bird time*(rotor diameter/recording height band)	32.15						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	123.69						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.29						
Number of transits 'n't'	'n'/t'	426.26						
E								
Probability of collision (Band model)		0.094						
Calculation of number collisions							No avoidance	Avoidance 99.5%
Collisions per year							34.01	0.170
Equivalent to 1 bird every x (years)							0.03	5.9
Over 25 years							850.3	4.25



C.33c CRM: Whooper Swan – Consented Site Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind:								
MaxChord	3.5	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	7.5	radius	chord	alpha	length	p(collision)	from radius r	contribution	length	p(collision)
BirdLength	1.52	m	0.025	0.575	7.92	34.26	1.00	0.00125	33.74	1.00
Wingspan	2.3	m	0.075	0.575	2.64	11.60	0.44	0.00328	11.07	0.42
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.58	7.82	0.29	0.00368	7.17	0.27
			0.175	0.860	1.13	6.37	0.24	0.00420	5.58	0.21
Bird speed	17.3	m/sec	0.225	0.994	0.88	5.51	0.21	0.00468	4.60	0.17
RotorDiam	128	m	0.275	0.947	0.72	4.45	0.17	0.00461	3.59	0.14
RotationPeriod	4.60	sec	0.325	0.899	0.61	3.83	0.14	0.00469	3.01	0.11
			0.375	0.851	0.53	3.47	0.13	0.00490	2.69	0.10
			0.425	0.804	0.47	3.19	0.12	0.00510	2.45	0.09
			0.475	0.756	0.42	2.96	0.11	0.00530	2.27	0.09
Bird aspect ratioo: β	0.66		0.525	0.708	0.38	2.77	0.10	0.00548	2.12	0.08
			0.575	0.660	0.34	2.61	0.10	0.00566	2.01	0.08
			0.625	0.613	0.32	2.47	0.09	0.00583	1.91	0.07
			0.675	0.565	0.29	2.35	0.09	0.00599	1.84	0.07
			0.725	0.517	0.27	2.25	0.08	0.00614	1.77	0.07
			0.775	0.470	0.26	2.15	0.08	0.00628	1.72	0.06
			0.825	0.422	0.24	2.06	0.08	0.00642	1.68	0.06
			0.875	0.374	0.23	1.98	0.07	0.00655	1.64	0.06
			0.925	0.327	0.21	1.91	0.07	0.00667	1.61	0.06
			0.975	0.279	0.20	1.84	0.07	0.00678	1.59	0.06
Overall p(collision) =					Upwind	10.3%	Downwind	8.4%		
					Average	9.4%				

C.34a CRM: Whooper Swan – Proposed Development Year 1 Non-breeding (September 2017 – March 2018)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	1.52					
Number turbines	35	wingspan (m)	2.3					
Rotor diameter	150	flapping (0)or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	17.3					
Max chord (m)	4.2	Number daylight hours available	3086.73					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	3,537,825							
Survey Data								
		VP	1	2	3	4	5	8
	FRA (ha)		433	348	556	548	482	580
	Observation Time (hours)		54	54	54	54	54	54
	Time at height band A		0	0	0	0	0	0
	Time at height band B		0	62	0	0	0	1080
	Time at height band C		419	0	1431	360	180	0
	Time at height band D		0	0	0	0	0	0
	Total Time at PCH		419	62	1431	360	180	1080
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	84175200	67651200	108086400	106531200	93700800	112752000	572896800.0
Flying time at risk height	Effort at each VP / FRA	4.98E-06	9.16E-07	1.32E-05	3.38E-06	1.92E-06	9.58E-06	3.40E-05
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.47E-01	1.18E-01	1.89E-01	1.86E-01	1.64E-01	1.97E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	7.31E-07	1.08E-07	2.50E-06	6.28E-07	3.14E-07	1.89E-06	6.17E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000006165						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	32.35						
FRAw	Estimated bird time*(rotor diameter/recording height band)	26.96						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	134.65						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33						
Number of transits 'ntr'	'n'/'t'	407.25						
E								
Probability of collision (Band model)		0.092						
Calculation of number collisions						No avoidance	Avoidance 99.5%	
Collisions per year						31.94	0.160	
Equivalent to 1 bird every x (years)						0.03	6.3	
Over 25 years						798.5	3.99	



C.34b CRM: Whooper Swan – Proposed Development Year 2 Non-breeding (September 2018 – March 2019)

Wind Farm Parameters		Bird Parameters						
WFP (ha)	1700	length (m)	1.52					
Number turbines	35	wingspan (m)	2.3					
Rotor diameter	150	flapping (0) or gliding (1)	0					
Hub height (m)	105	Assumed flight speed (m/s)	17.3					
Max chord (m)	4.2	Number daylight hours available	3086.91					
Rotor depth	4.2	Maximum recording height (m)	200					
Pitch (degrees)	12	Minimum recording height (m)	20					
Rotation period (secs)	4.7							
Turbine operation time 85%	0.85							
Avoidance Rate 99.5%	0.005							
Rotor radius ²	5625.00							
Combined rotor swept area	618500.93							
Collision Risk volume 'Vw' (m ³)	2,550,000,000							
Rotor swept volume 'V _r ' (m ³)	3,537,825							
Survey Data								
	VP	1	2	3	4	5	8	
FRA (ha)		433	348	556	548	482	580	
Observation Time (hours)		52	63	66	63	69	66	
Time at height band A		5566	0	0	0	0	0	
Time at height band B		0	0	540	0	300	45	
Time at height band C		0	0	0	0	0	0	
Time at height band D		0	0	0	0	0	0	
Total Time at PCH		0	0	540	0	300	45	
Flight activity per unit time and area								
		1	2	3	4	5	8	Total
Observation effort	Obsevation time (seconds) * hectare	81057600	78926400	132105600	124286400	119728800	137808000	#####
Flying time at risk height	Effort at each VP / FRA	0.00E+00	0.00E+00	4.09E-06	0.00E+00	2.51E-06	3.27E-07	6.92E-06
Weighted by observation effort								
Weighted obs effort	Effort at each VP / sum of all effort at all VP's	1.20E-01	1.17E-01	1.96E-01	1.84E-01	1.78E-01	2.04E-01	1.0
Adjusted time at risk height	Weighted obs effort * flying time at risk height	0.00E+00	0.00E+00	8.01E-07	0.00E+00	4.45E-07	6.68E-08	1.31E-06
Occupancy Rate								
Summed Occupancy rate	Sum of weighted average flight activity per visible ha	0.000001313						
Estimated bird time 'b' in risk area	Summed Occupancy rate*windfarm polygon*hours active	6.89						
FRAw	Estimated bird time*(rotor diameter/recording height band)	5.74						
Rotor Transits								
Bird occupancy of rotor swept volume ('b')	Estimated bird time * (rotor swept volume / collision risk volume)*	28.68						
Bird transit time (t)	(rotor depth+bird length)/flight speed(m/s)	0.33						
Number of transits 'n't'	'n'/t'	86.75						
E								
Probability of collision (Band model)		0.092						
Calculation of number collisions							No avoidance	Avoidance 99.5%
Collisions per year							6.80	0.034
Equivalent to 1 bird every x (years)							0.15	29.4
Over 25 years							170.1	0.85



C.34c CRM: Whooper Swan – Proposed Development Stage 2

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA										
Only enter input parameters in green cells										
K: [1D or [3D] (0 or 1)	1	Calculation of alpha and p(collision) as a function of radius								
NoBlades	3	Upw ind: Dow nw ind:								
MaxChord	4.2	m	r/R	c/C	α	collide	length	contribution	collide	length
Pitch (degrees)	12		radius	chord	alpha	p(collision)	from radius r	contribution	p(collision)	from radius r
BirdLength	1.52	m	0.025	0.575	6.90	32.68	1.00	0.00125	31.68	1.00
Wingspan	2.3	m	0.075	0.575	2.30	11.23	0.41	0.00311	10.22	0.38
F: Flapping (0) or gliding (+1)	0		0.125	0.702	1.38	7.77	0.29	0.00358	6.54	0.24
			0.175	0.860	0.99	6.50	0.24	0.00420	5.00	0.18
Bird speed	17.3	m/sec	0.225	0.994	0.77	5.76	0.21	0.00479	4.03	0.15
RotorDiam	150	m	0.275	0.947	0.63	4.79	0.18	0.00486	3.13	0.12
RotationPeriod	4.70	sec	0.325	0.899	0.53	4.27	0.16	0.00512	2.70	0.10
			0.375	0.851	0.46	3.87	0.14	0.00536	2.39	0.09
			0.425	0.804	0.41	3.56	0.13	0.00559	2.16	0.08
			0.475	0.756	0.36	3.31	0.12	0.00580	1.99	0.07
Bird aspect ratioo: β	0.66		0.525	0.708	0.33	3.09	0.11	0.00599	1.86	0.07
			0.575	0.660	0.30	2.91	0.11	0.00618	1.76	0.06
			0.625	0.613	0.28	2.75	0.10	0.00634	1.68	0.06
			0.675	0.565	0.26	2.61	0.10	0.00649	1.62	0.06
			0.725	0.517	0.24	2.48	0.09	0.00663	1.57	0.06
			0.775	0.470	0.22	2.36	0.09	0.00675	1.54	0.06
			0.825	0.422	0.21	2.25	0.08	0.00685	1.53	0.06
			0.875	0.374	0.20	2.15	0.08	0.00694	1.54	0.06
			0.925	0.327	0.19	2.06	0.08	0.00701	1.55	0.06
			0.975	0.279	0.18	1.97	0.07	0.00707	1.56	0.06
Overall p(collision) =					Upwind	11.0%	Downwind	7.5%		
					Average	9.2%				



wood.

