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Loch Toftingall BESS

Appendix 8.1: Ornithology Technical Report

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Introduction

1. This report details the ornithological survey work undertaken at the site of the proposed Loch Toftingall Battery Energy Storage System (BESS) (hereafter referred to as the 'Proposed Development') by Natural Research (Projects) Ltd (NRP) between April 2017 and April 2019. A minimum of two breeding seasons and two non-breeding seasons have been covered.
2. The objectives of the study were to:
 - ◆ Map the distribution of breeding birds, including scarce breeding species listed in Annex 1 of the EU Birds Directive (2009/147/EEC) on the Conservation of Wild Birds 1979 (the Birds Directive) or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) (WCA).
 - ◆ Quantify the level of bird flight activity by breeding, wintering and foraging birds of potential conservation importance; and
 - ◆ Record the presence and abundance of other birds of conservation importance (those listed in Biodiversity Action Plans (BAPs) or on the Red List of Birds of Conservation Concern (BoCC) (Eaton *et al.*, 2015) throughout the survey period.
3. This report is supported by Appendix 8.2: Confidential Ornithology.

Desk Study

4. The Site is 1.7 km from the Shielton Peatlands Site of Special Scientific Interest (SSSI), a component of the Caithness and Sutherland Peatlands Special Protection Area (SPA) and Ramsar site (**Figure 1**). The Caithness and Sutherland Peatlands SPA is classified for its breeding populations of black-throated diver (*Gavia arctica*), red-throated diver (*Gavia stellata*), common scoter (*Melanitta nigra*), wigeon (*Anas penelope*), golden eagle (*Aquila chrysaetos*), hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), short-eared owl (*Asio flammeus*), golden plover (*Pluvialis apricaria*), wood sandpiper (*Tringa glareola*), greenshank (*Tringa nebularia*) and dunlin (*Calidris alpina*). All of these features are described as being in Favourable condition with the exception of common scoter which is described as being in Unfavourable Declining condition and short-eared owl which has not been assessed.
5. Loch Watten SSSI, which is a constituent of the Caithness Lochs SPA and Ramsar site, is located 5.3 km from the Proposed Development boundary (**Figure 8.1**). The Caithness Lochs SPA is classified for its wintering populations of whooper swan (*Cygnus cygnus*), Greenland white-fronted goose (*Anser albifrons flavirostris*) and greylag goose (*Anser anser*) all of which are described as being in "Favourable" condition.

Study Areas and Survey Periods

6. The study area for ornithological surveys relevant to the Proposed Development is situated in an area of commercial forestry, agricultural fields, rough grazing and moorland (**Figure 8.2**).
7. Some birds range over large areas and are therefore potentially vulnerable to the effects of built developments a considerable distance away. Hence the ornithological study area encompassed a series of survey boundaries extending up to 2 km from the initial Site boundary. These boundaries defined the study area for surveys of certain species or for a particular survey method i.e., 500 m for flight activity, for breeding passerines and waders, and for wintering birds; 1 km for breeding barn owl; 2 km for skuas, breeding raptors and short-eared owl (**Figure 8.2**).
8. Following the completion of baseline surveys, a smaller Proposed Development layout was decided on, this final layout is shown in **Figure 8.3**. Baseline surveys were originally designed to cover the larger area shown in **Figure 8.2**.
9. The survey effort given in this report details all surveys undertaken, the results of all surveys are given along with results that are tailored to the study area of the final layout referred to as the 'reporting area'.

Field Survey Methods

10. The field surveyors were Alex Dodds (AD), David Lambie (DL), Duncan Cameron (DJC), Kevin Cuthbert (KC), Ronan Dugan (RD), Janice Duke (JD), Paul Higson (PH), Fiona Leckie (FL), Neil Robertson (NR), Paul Rowan (PR), Paul Stagg (PS) and Phil Swainson (PS). All surveyors are very experienced and familiar with the area and the species likely to occur there. Field surveyors completed survey work with emphasis placed on the importance of carrying out surveys in a systematic and standardised way to enable direct comparison of data from different survey periods and sites.

Flight Activity

11. Information on bird flight activity was collected during timed watches from strategic Generic Vantage Points (GVPs) using the methods described by Band *et al.* (2007). GVPs were selected through a mix of Geographic Information System (GIS) analysis and field trials, with the aim of maximising ground visibility within the 500 m flight activity survey area using the minimum number of vantage points (**Figure 8.4**).
12. Four vantage point locations were used (**Tables 1, 2a & 2b; Annex 2**). The visibility from each GVP drawn at 20 m elevation above the ground was derived using a GIS (**Figure 8.4**).

Table 1. GVP locations and dates used.		
GVP No.	Grid reference	Dates GVP utilised
1	ND 18184 54373	May 2017 to April 2019
2	ND 17447 52978	April 2017 to April 2019
3	ND 19530 53410	May 2017 to April 2019
4	ND 18913 52868	April 2017 to April 2019

13. Observers at GVPs positioned themselves to minimise their effects on bird behaviour. A viewing arc not exceeding 180° was scanned. Watches were undertaken during daylight hours by a single observer in a wide range of weather conditions, mainly in conditions of good ground visibility (>2 km) and when the cloud base was higher than most elevated parts of the survey area.
14. A minimum of 36 hours of observation has been completed from each GVP for each period of each year (April to August classed as the breeding period and September to March classed as the non-breeding period). Following consultation with NatureScot an additional six hours were completed from each GVP in April 2019 to capture additional whooper swan flight activity (**Tables 2a & 2b**). In total 596.67 hours of observation has been undertaken with 308.5 hours during the breeding season and 288.17 hours in the non-breeding season.
15. When possible, observations were stratified across three daylight periods (termed ‘early’, ‘middle’ and ‘late’) to allow for diurnal variation in activity rates. The timing of watches within each period was adjusted each month in accordance with sunrise and sunset times (**Annex 1**). A wide range of weather conditions were sampled including rain showers, cloud cover from 0 to 100 % and wind speeds up to Beaufort Force 7 (**Annex 3**).

Table 2a. Summary of monthly GVP effort in Year 1, 2017 to 2018 (data are hours of observation).

GVP No.	Breeding						Non-Breeding							
	2017						2018							
	Apr	May	Jun	Jul	Aug	Total	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
1	-	9.00	9.00	9.00	9.00	36.00	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00
2	6.00	8.00	8.00	6.00	6.00	34.00	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00
3	-	9.00	9.00	9.00	9.00	36.00	6.00	6.00	5.00	3.00	5.17	5.00	6.00	36.17
4	6.00	8.00	8.00	6.00	6.00	34.00	6.00	6.00	5.00	3.00	5.00	5.00	6.00	36.00

Table 2b. Summary of monthly GVP effort in Year 2, 2018 to 2019 (data are hours of observation).

GVP No.	Breeding						Non-Breeding								Breeding
	2018						2019								
	Apr	May	Jun	Jul	Aug	Total	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total	Apr
1	8.00	8.00	8.00	6.00	6.00	36.00	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00	6.00
2	8.50	8.00	8.00	6.00	6.00	36.50	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00	6.00
3	8.00	8.00	8.00	6.00	6.00	36.00	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00	6.00
4	8.00	8.00	8.00	6.00	6.00	36.00	6.00	6.00	5.00	4.00	4.00	5.00	6.00	36.00	6.00

16. During each watch three hierarchical recording methods were used, as follows:

- Focal bird sampling – timed. The viewing arc was scanned constantly until a *Target A species*¹ was detected in flight. Once detected, the bird was followed until it ceased flying or was lost from view, with the duration of the flight recorded to the nearest second. The route followed by the bird was plotted in the field onto a 1:25,000 scale map, with the direction of flight indicated regardless of whether or not the bird was within the survey area. The bird’s flying elevation above the ground was estimated at the point of detection and at 15 second intervals, thereafter, using a countdown timer with an audible alarm. Height bands to classify flying elevation were less than 10 m, 10 m to 30 m, 30 m to 50 m, 50m to 100 m, 100 m to 150 m and greater than 150 m. Where simultaneous flight activity by a number of birds was observed and it was not possible to plot individual flight lines, areas of flight activity were plotted on the field maps.
- Focal bird sampling – untimed. The same scanning procedure as described above was used. However, flights of *Target B species*² were not timed, instead the flight path was mapped and flying elevation was recorded at the start and when it changed during the recorded bout. Where a flock was observed a central flight line representative of the route was estimated.
- Activity Summaries. At the end of each five-minute period flight activity within the survey area by species of lesser conservation importance (*Target C species*)³ was summarised. The number of birds recorded in any one period was the minimum number of individuals that could account for the activity observed. The height, direction and number of individuals involved in notable bird movements were recorded.

¹ *Target A species* were drawn from those listed in Annex 1 of the Birds Directive and Schedule 1 of the WCA. See Annex 6 for a full list.

² *Target B species* were migratory birds of conservation importance, in this instance geese and certain waders. See Annex 6 for a full list.

³ See Annex 6.

17. Data were entered in the field onto recording sheets and later transferred to Microsoft Excel spreadsheets. Maps of flight activity by Target Species were compiled for each watch. Each flying bout was numbered and cross-referenced to the relevant flight path on the map.

Flight Activity – Migratory Period Watches

18. Using the same methodology described above, additional watches to record migratory movements of swans, geese and waders at a landscape scale were completed during one spring and one autumn period. Three Migration Watch Point (MWP) locations were utilised individually during different periods (**Table 3; Figure 8.2**). These locations gave good broad spatial coverage of the Site in respect of birds moving on a predominantly north-south axis. Observations were made for 36 hours between September and November 2017 (autumn) and for 36 hours between March and May 2018 (spring) totalling 72 hours. (**Table 3; Annex 4**). A range of weather conditions were sampled with an emphasis on days that were conducive to migration (**Annex 5**).

Table 3. Summary of monthly MWP effort 2018 (data are hours of observation).									
MWP No.	Location	2017			Total	2018			Total
		Sept	Oct	Nov		Mar	Apr	May	
A	ND 17617 52936	9.00	5.50	11.00	25.50				
B	ND 17447 52978		10.50		10.50				
C	ND 18184 54373					9.00	21.00	6.00	36.00

Scarce Breeding Birds

19. Priority was given to detecting the species considered, after inspection of the available habitats, most likely to breed in the area: osprey (*Pandion haliaetus*), hen harrier, barn owl (*Tyto alba*), short-eared owl, merlin, golden plover and greenshank.

20. In addition to the survey effort on GVP watches and the Breeding Birds of Open Ground Surveys, a total of 67.25 hours were spent searching for evidence of Scarce Breeding Birds in 2017 and 2018 (**Table 4**).

21. Surveys were undertaken within suitable habitat which was located within the 2 km survey buffer for osprey, hen harrier, merlin and short-eared owl, the 1 km survey buffer for barn owl and the 500 m buffer for greenshank (**Figure 8.2**).

22. Any evidence of potential breeding was recorded including adults present in breeding habitat, territorial display, nest building, adults carrying prey items, active or recently used nests and fledged young. All activity and nest locations were marked on OS 1:25,000 maps with details of the sighting including age, sex and behaviour.

Osprey

23. Survey methods in Hardey *et al.* (2013) were followed. Emphasis was given to large, mature trees, particularly conifers that were prominent within the landscape and also known artificial nesting platforms. Watches were made over likely areas and any territorial activity recorded.

Hen harrier

24. Survey methods in Hardey *et al.* (2013) were followed, with emphasis given to any stands of tall heather or other rank vegetation with searches made for signs of occupancy and watches for territorial activity.

Barn owl

25. Survey methods based on Hardey *et al.* (2013) were followed. Systematic searches for potential nest and roost sites were undertaken. Emphasis was placed on searching for birds, nests, pellets, feathers and faecal splash in potentially suitable buildings within 1 km of the Proposed Development.

Short-eared owl

26. Survey methods in Hardey *et al.* (2013) were followed. Emphasis was given to stands of tall heather and other rank vegetation, with searches made for signs of occupancy and watches for territorial activity.

Merlin

27. Survey methods in Hardey *et al.* (2013) were followed, with emphasis given to any stands of tall heather, boulders, hummocks, bushes and trees including old crows nests (which could be re-used by merlin) were checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces).

Greenshank

28. Survey methods in Gilbert *et al.* (1998) were followed, with emphasis given to searching all waterbodies, including lochs, lochans, pool complexes and rivers. Searches were also undertaken in young plantation and open forest.

Table 4. Details of Scarce Breeding Birds surveys 2017 & 2018.											
Date	Start	Finish	Duration (hrs)	Observer	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Direction	Wind Force	Precipitation*	Visibility (km)	Target Spp.
18/04/2017	1200	1300	1.00	FL	6	1000	NW	3	nil	20	SE HH
18/04/2017	1530	1900	3.50	FL	10	1000	SW	3	nil	20	SE HH
18/04/2017	1530	1800	2.50	RD	8	3000	SW	2	nil	10	SE HH
19/04/2017	0945	1045	1.00	FL	10	700	W	1	nil	20	SE HH
20/04/2017	1100	1200	1.00	FL	10	700	SW	4	nil	20	SE HH
14/06/2017	1645	1745	1.00	FL	10	1000	SW	3	ILR	20	OP GK
15/06/2017	1600	1800	2.00	FL	8	1000	E	1	nil	20	SE HH
16/06/2017	1240	1400	1.33	FL	9	1000	W	1	nil	20	OP GK
24/05/2017	1400	1700	3.00	DL	1	1000	E	2	nil	5	Raptors
24/05/2017	1930	2230	3.00	DL	0	-	E	1	nil	5	HH
25/05/2017	0430	0730	3.00	DL	3	2000	SE	1	nil	5	HH
24/06/2017	0820	1020	2.00	NR	5	1000	SW	3	IHR	10	Raptors
10/07/2017	1150	1450	3.00	NR	10	1000	SW	1	IHR	10	HH SE GK ML
15/07/2017	0845	1145	3.00	NR	10	500	SW	2	ILR	5	HH SE GK ML
16/04/2018	1040	1740	7.00	NR	5	700	SE	3	nil	10	HH
25/04/2018	1010	1310	3.00	JD	7	1000	S	1	nil	15	HH
25/04/2018	1530	1830	3.00	JD	7	500	W	3	nil	2	RH
03/05/2018	0945	1240	2.92	AD	10	800	SW	3	nil	10	HH
03/05/2018	1300	1605	3.08	AD	10	800	SW	3	ILR	10	HH
22/05/2018	0950	1020	0.50	NR	10	1000	NE	3	nil	20	RH
22/05/2018	1020	1120	1.00	NR	10	1000	NE	3	nil	20	GK
22/05/2018	1125	1550	4.42	NR	10	1000	NE	3	nil	20	HH
26/06/2018	1400	1700	3.00	NR	7	1000	N	2	nil	20	HH
29/06/2018	0900	1030	1.50	PR	10	1500	SW	3	ILR	2	HH
29/06/2018	1100	1230	1.50	PR	10	2000	SW	3	nil	5	RH OP GK
18/07/2018	0955	1555	6.00	NR	9	1000	WNW	2	ILR	20	OP

*Precipitation codes: Continuous/Intermittent + Light/Heavy + Rain/Snow/Hail/Fog

Breeding Birds of Open Ground Survey

29. Surveys were completed using a four-visit adapted Brown & Shepherd (1993) method for upland waders. These visits were completed between April and early July 2017 in open ground within a 500 m survey boundary (**Figure 8.2**). Selected bird species were surveyed, namely those included on Annex 1 of the Birds Directive, Schedule 1 of the WCA, Red-listed BoCC and those listed on the UK and local BAPs together with selected other species (see **Annex 7** for a full list).
30. Surveys were completed four times between April and July to allow for differences in detection rate between early and late breeding species. Fieldwork was not undertaken in conditions considered likely to affect bird detection, for example, strong winds (greater than Beaufort Force 4), persistent precipitation, poor visibility (less than 300 m) or in unusually hot or cold temperatures. Surveys were undertaken for a total of 17 hours (**Table 5**).
31. The survey aimed to cover the ground systematically with a constant search effort. All points within the survey areas were approached closely typically to within 100 m. Patches of scrub, isolated trees, rocky outcrops and streams were investigated closely and surveyors paused at regular intervals to scan and listen for calling and singing birds. Careful attention was given to recording behaviour indicative of breeding with care taken to avoid counting the same individual more than once.
32. The location and activity of birds were mapped onto enlarged 1:25,000 scale OS maps using standard BTO codes (Marchant, 1983). The position of each bird was mapped at the point of first detection and flight lines recorded. At the end of each visit, a summary map was compiled showing the locations of each identified territory or breeding pair. The following evidence was considered diagnostic of breeding: song, courtship or territorial display; territorial dispute; nest building and hole excavation; agitated behaviour by adult bird(s) indicative of the presence of a nearby nest or young (e.g., repetitive alarm calling, distraction display); adult(s) carrying food; presence of newly fledged young; adult(s) removing faecal sac.
33. Where a number of breeding individuals were present and it was not possible to determine the exact number of breeding pairs, a method was devised to allow the number of discrete territories to be estimated. Registrations of individual birds were deemed to represent discrete breeding territories / pairs if the distance between them was more than 250 m (500 m for curlew, 200 m for small passerines). Whilst it is recognised that these distances are arbitrary and the territory size varies both inter- and intra- specifically, this approach produces a standardised index of abundance based on the distance that members of a breeding pair are likely to move

during the survey period. In cases where two individuals were considered to constitute a pair of birds, the location of the pair was placed centrally by convention.

34. Population estimates were derived by comparing the summary maps for the four survey visits. Again, a method was devised whereby discrete territories could be estimated. Territories plotted during each visit were considered to be separate from one another if they were located more than 1000 m apart (500 m for snipe, common sandpiper and skylark, 300 m for other small passerines). These distances were chosen to reflect the distances birds could plausibly move between survey dates. The locations of territories mapped in more than one survey period were plotted centrally.

Table 5. Details of surveys of Breeding Birds of Open Ground conducted in 2017.											
Date	Start	Finish	Dur. (hrs)	Obs.	Cloud Cover (10 th)	Cloud base (m)	Wind Dir.	Wind Force	Precip*	Vis. (km)	Visit
18/04/17	1645	1900	2.25	FL	10	1000	SW	2	nil	20	1
19/04/17	0840	1030	1.83	FL	10	700	W	1	nil	20	1
19/04/17	1245	1315	0.50	FL	10	700	nil	0	nil	20	1
04/05/17	1045	1330	2.75	FL	5	700	E	1	nil	20	2
07/05/17	0915	1005	0.83	FL	10	600	NNE	1	nil	10	2
16/06/17	0940	1240	3.00	FL	9	1000	W	1	nil	20	3
16/06/17	1400	1440	0.67	FL	9	1000	W	1	nil	20	3
06/07/17	0900	1415	5.25	FL	10	600	SE	1	ILR	10	4

*Precipitation Codes: Continuous / Intermittent + Light / Heavy + Rain / Snow / Hail / Eog

Winter Walkover Surveys

35. Walkover surveys were undertaken in March 2018 and between October 2018 to March 2019. **(Table 6)**. Surveys were designed to record any important assemblages of migrant and wintering birds on the site and within a 500 m study area **(Figure 8.2)**.
36. Survey routes meandered to encompass as much ground as practical. Where practicable surveyors used a different route to maximise the eventual spatial coverage of the site and paused to scan for birds. Walkover surveys totalling 15.75 hours were undertaken and a range of weather conditions sampled, although wind speeds of over Beaufort Force 5 were avoided to improve aural detection of species **(Table 6)**.

Table 6. Survey details for Winter Walkovers, 2018 and 2019.											
Date	Start	Finish	Duration (hrs)	Obs.	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Dir.	Wind Force	Precip*	Visibility (km)	
20/03/2018	1315	1615	3.00	PR	5	1000	NW	3	nil	20	

Table 6. Survey details for Winter Walkovers, 2018 and 2019.										
Date	Start	Finish	Duration (hrs)	Obs.	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Dir.	Wind Force	Precip*	Visibility (km)
15/10/2018	1140	1440	3.00	PS	3	1000	SW	2	nil	10
22/11/2018	0755	0820	0.42	NR	10	500	SE	3	nil	20
22/11/2018	1050	1410	3.33	NR	10	400	SE	3	CLR	10
21/01/2019	1030	1130	1.00	PS	10	1000	SE	4	nil	10
24/01/2019	1030	1100	0.50	PS	10	1000	nil	0	nil	10
30/01/2019	1025	1055	0.50	PS	10	1000	SW	2	ILR	5
05/02/2019	1325	1355	0.50	PS	2	1000	ESE	3	nil	5
19/02/2019	1020	1050	0.50	PS	4	1000	nil	0	nil	10
19/02/2019	1330	1400	0.50	PS	10	1000	nil	0	nil	10
22/02/2019	1400	1430	0.50	PS	10	1000	SE	1	nil	10
13/03/2019	1230	1315	0.75	NR	5	1000	NW	5	nil	20
13/03/2019	1615	1730	1.25	NR	10	1000	NW	3	ILR	10

*Precipitation codes: Continuous/Intermittent + Light/Heavy + Rain/Snow/Hail/Fog

Hen Harrier Winter Roost Watches

37. Roost surveys were undertaken following the methods detailed in Gilbert *et al.* (1998) and Hardey *et al.* (2013). Dusk watches for signs of winter roosting by hen harriers were carried out over suitable habitats where possible within the 2 km survey buffer in September and November 2017 for a total of 4.5 hours (**Table 7**). Observations of roosting hen harriers were also made from other surveys.

Table 7. Survey details of checks for Hen Harrier Winter Roosts in 2017.										
Date	Start	Finish	Duration (hrs)	Obs.	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Dir.	Wind Force	Precip*	Vis. (km)
14/09/17	1645	1915	2.5	DC	10	400	NW	5	IHR	3
22/11/17	1405	1600	1.92	DC	10	700	SW	2	nil	3

*Precipitation codes: Continuous/Intermittent + Light/Heavy + Rain/Snow/Hail/Fog

Loch Toftingall Waterfowl Surveys

38. A combination of generic and species-specific surveys was undertaken using the methodologies described in Gilbert *et al.* (1998). Surveys were made in each month between April 2017 and April 2019 of waterfowl using Loch Toftingall (**Table 8**) including searches for breeding birds during the breeding season. Surveys were carried out for a total of 126.4 hours.

Table 8. Survey details for Loch Toftingall Waterfowl Surveys.										
Date	Start	Finish	Duration (hrs)	Obs.	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Dir.	Wind Force	Precip*	Visibility (km)
17/04/2017	1440	1740	3.00	FL	3	1000	N	3	nil	10
19/04/2017	0900	1200	3.00	RD	10	1000	SW	1	nil	10
06/05/2017	1600	1900	3.00	FL	5	600	NE	1	nil	20
07/05/2017	1025	1225	2.00	FL	10	600	NNE	1	nil	10
08/05/2017	0615	0915	3.00	FL	10	500	NNE	1	nil	20
05/06/2017	1445	1745	3.00	NR	10	500	SE	3	nil	5
16/06/2017	0440	0740	3.00	DL	8	1000	W	0	nil	10
21/06/2017	1125	1325	2.00	NR	9	1000	S	3	nil	10
05/07/2017	1410	1710	3.00	NR	1	2000	SE	3	nil	10
11/07/2017	1815	2115	3.00	PS	7	1000	NW	1	nil	20
08/08/2017	1205	1505	3.00	DJC	7	1000	NE	4	nil	6
10/08/2017	0650	0950	3.00	DJC	6	700	WSW	4	nil	6
11/09/2017	1500	1800	3.00	DJC	10	500	WNW	6	nil	4
12/09/2017	1530	1830	3.00	DJC	10	500	WNW	2	nil	6
05/10/2017	0825	0925	1.00	DJC	4	1000	NW	5	ILR	6
07/10/2017	1245	1545	3.00	DJC	10	500	W	4	ILR	4
23/11/2017	1300	1500	2.00	DJC	5	600	WSW	4	ILS	4
24/11/2017	0925	1125	2.00	DJC	2	900	WSW	3	nil	4
06/12/2017	0925	1125	2.00	DJC						
09/01/2018	1000	1545	5.75	DJC						
10/01/2018	1130	1420	2.83	DJC	8	500	SE	2	nil	4
13/02/2018	1440	1710	2.50	NR	2	800	SW	2	nil	10
22/02/2018	0910	1140	2.50	NR	5	1000	SW	4	nil	20
07/03/2018	1125	1425	3.00	NR	8	500	S	3	nil	10
15/03/2018	0755	1055	3.00	KC	10	700	SE	6	nil	5
02/04/2018	0940	1000	0.33	JD	7	1000	S	1	nil	2
11/04/2018	0945	1215	2.50	PR	5	1000	SE	4	nil	20
24/04/2018	1835	2105	2.50	PR	7	1000	nil	0	nil	10
08/05/2018	0545	0815	2.50	PR	7	1000	S	2	nil	20
23/05/2018	1900	1910	0.17	JD	3	500	S	2	nil	2
18/06/2018	1840	1900	0.33	JD	4	1000	NE	3	nil	2
25/06/2018	1130	1400	2.50	PS	4	1000	nil	0	nil	5
13/07/2018	0605	0905	3.00	PR	8	500	SW	2	nil	20
17/07/2018	1540	1840	3.00	PS	10	500	nil	0	ILR	5
08/08/2018	1735	2035	3.00	PR	8	500	SW	2	nil	20
29/08/2018	1010	1310	3.00	NR	2	1000	SW	2	nil	20
07/09/2018	0655	0955	3.00	NR	10	1000	NW	1	CLR	10

Table 8. Survey details for Loch Toftingall Waterfowl Surveys.										
Date	Start	Finish	Duration (hrs)	Obs.	Cloud Cover (10 ^{ths})	Cloud Base (m)	Wind Dir.	Wind Force	Precip*	Visibility (km)
19/09/2018	0750	1050	3.00	NR	10	700	SW	4	nil	20
03/10/2018	1440	1740	3.00	NR	10	400	SE	2	ILR	5
10/10/2018	1150	1450	3.00	PR	1	1000	SW	3	nil	20
08/11/2018	0745	1045	3.00	NR	1	1000	S	1	nil	20
23/11/2018	0805	1035	2.50	NR	10	600	E	2	nil	10
02/12/2018	1345	1545	2.00	PS	10	1000	nil	0	nil	5
14/12/2018	1045	1245	2.00	NR	7	1000	SE	4	nil	20
21/01/2019	1130	1330	2.00	PS	10	1000	SSE	4	nil	5
24/01/2019	0830	1030	2.00	PS	10	1000	nil	0	nil	10
05/02/2019	1050	1320	2.50	PS	0	-	SE	3	nil	10
23/02/2019	1520	1750	2.50	PR	10	1000	S	3	nil	10
16/03/2019	0645	0945	3.00	NR	10	500	SW	2	nil	10
20/03/2019	1010	1020	0.17	JD	8	1000	S	2	nil	2
05/04/2019	1530	1540	0.17	JD	1	1000	SE	1	nil	2
12/04/2019	1330	1340	0.17	JD	9	1000	SE	2	nil	2

*Precipitation codes: Continuous/Intermittent + Light/Heavy + Rain/Snow/Hail/Fog

Field Survey Results

Divers

Occurrence and Status

39. **Black-throated diver** and **red-throated diver** were recorded during baseline surveys. Both species are listed on Annex 1 of the Birds Directive and Schedule 1 of the WCA and are qualifying interests of the Caithness and Sutherland Peatlands SPA.

Abundance and Distribution

40. **Black-throated diver** was recorded in June and July 2017 with observations of a single bird on Loch Toftingall and four flights involving a total of five birds (**Figures 8.5 & 8.6**). No observations were made during the 2018 breeding season. There was no evidence of breeding within the study area during baseline surveys.

41. **Red-throated diver** was recorded regularly throughout the 2017 and 2018 breeding seasons, and in March 2019, with all observations being of birds either on Loch Toftingall or commuting to and from here (**Figures 8.5 & 8.6**). There was no evidence of breeding within the study area during baseline surveys.

Flight activity recorded during GVPs

42. Three **black-throated diver** flights involving four birds were recorded during GVP surveys for a total duration of 545 seconds (**Figure 8.5; Table 9**).

43. Eleven **red-throated diver** flights involving fourteen birds were recorded during GVP surveys for a total duration of 1,685 seconds (**Figure 8.5; Table 9**).

Table 9. Flight activity and elevation by diver species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Flight duration (s)	Total flying time (s)	Time in height category (s)					
						<10m	10-30m	30-50m	50-100m	100-150m	>150m
Black-throated diver	Apr-Aug	1	2	157	314				314		
		2	1	174	174					174	
		4	1	57	57		19	38			
	Total		4	388	545		19	38	314	174	
Red-throated diver	Apr-Aug	4	2	220	440					440	
			2	26	52					52	
			1	30	30	15	15				
			1	31	31	16	16				
			1	9	9	9					
			1	90	90	30	15	15	30		
			2	280	560			560			
			1	30	30	30					
			1	30	30	30					
			1	90	90	15	45	30			
	Sep-Mar	4	1	323	323		92	31	200		
	Total		14	1159	1685	145	183	636	230	492	

Wildfowl

Occurrence and Status

44. **Whooper swan, greylag goose, pink-footed goose** and **wigeon** were recorded during baseline surveys. Whooper swan is found on Annex 1 of the Birds Directive and is a qualifying species for the Caithness Lochs SPA. Greylag goose and wigeon are qualifying species for the Caithness Lochs SPA. Pink-footed goose are a regular winter migratory species and as such are afforded protection under the Birds Directive.

45. **Goldeneye** was recorded breeding within the study area. Goldeneye is a scarce breeding species in Scotland and is a red-listed Bird of Conservation Concern.

46. Teal, mallard and tufted duck were recorded breeding on Loch Toftingall and other other wildfowl species including mute swan, Canada goose, goosander and pochard were recorded on Toftingall Loch during Waterfowl Surveys but no breeding activity was recorded (**Table 10**).

Abundance and Distribution

47. **Whooper swans** were recorded regularly during baseline surveys with flocks of between one and 27 individuals. Most observations were of birds on or commuting to and from Loch Toftingall during the non-breeding period. A maximum of three birds were present between May and August 2017, but no breeding behaviour was recorded during baseline surveys (**Figures 8.8 & 8.9**).
48. Two flocks of **greylag geese**, consisting of two and seven birds, were recorded on Loch Toftingall with all other birds recorded being in flight. Birds were recorded in all months except July and August with the majority recorded during the non-breeding period (**Figures 8.8 & 8.10**).
49. All observations of **pink-footed goose** were of birds in flight with no birds observed feeding or roosting within the study area. Flock sizes ranged from one to 220 birds and were recorded during February, March, April, October, November and December. (**Figures 8.8 & 8.10**).
50. **Wigeon** was recorded once during baseline surveys in November 2017. A flock of eight individuals were seen on Loch Toftingall (**Table 10**). No birds were recorded using Loch Toftingall during the breeding season.
51. **Goldeneye** bred within the study area with a male observed in May 2017 and a maximum of four adults and five juveniles recorded in August 2017. Adults were observed in March, April and August 2018 but no evidence of breeding was recorded (**Table 10**).

Table 10. Loch Toftingall Wildfowl Survey results.							
Date	Species	Time	Number	Sex	Age	Behaviour	Comments
17/04/17	Whooper swan	1440	3			Feeding	On loch all watch
17/04/17	Tufted duck	1440	24			Feeding	On loch all watch
17/04/17	Red-throated diver	1445	2			Vocalise	On loch all watch
17/04/17	Little grebe	1445	2				On loch all watch
17/04/17	Teal	1540	4				Flushed
19/04/17	Whooper swan	0900	3			Feeding	Present all watch
19/04/17	Tufted duck	0900	19			Feeding	Present all watch
19/04/17	Little grebe	0906	2			Feeding	Present all watch
19/04/17	Teal	0923	1			Feeding	Present all watch
19/04/17	Greylag goose	0934	2			Flying	Landed on loch
19/04/17	Goldeneye	0938	1			Feeding	
19/04/17	Goldeneye	1013	2			Feeding	Present all watch
06/05/17	Mute swan	1600	2	MF	2A	Feeding	On loch all watch
06/05/17	Canada goose	1620	4				Flew in to bathe
06/05/17	Little grebe	1620	1			Vocalise	Calling from sedge bed. Heard all watch
07/05/17	Little grebe	1025	1			Feeding	

Table 10. Loch Toftingall Wildfowl Survey results.

Date	Species	Time	Number	Sex	Age	Behaviour	Comments
07/05/17	Mute swan	1025	2	MF	2A	Feeding	
07/05/17	Goldeneye	1025	1	M			
07/05/17	Teal	1025	4				
08/05/17	Mute swan	0615	2	MF		Territorial, feeding	Very territorial, chased 3 MS roosting in bay area
08/05/17	Mute swan	0615	3			Feeding, roost	
08/05/17	Little grebe	0615	3			Vocalise, territorial	At N end sedgebed
08/05/17	Tufted duck	0640	2	MF		Flying	Flew in to N end
08/05/17	Whooper swan	0915	3			Feeding	
05/06/17	Mute swan		6			Feeding	On loch feeding / loafing
05/06/17	Tufted duck		8	6M 2F		Feeding	On loch feeding / loafing
16/06/17	Tufted duck	0445	15	9M 6F		Feeding, loafing	Loafing
16/06/17	Mute swan	0445	2			Loafing	Loafing
21/06/17	Tufted duck	1130	35				Raft - mainly Males
21/06/17	Mute swan	1130	6			Feeding	on loch
05/07/17	Mute swan	1415	2				
05/07/17	Tufted duck	1440	25				Mainly males
05/07/17	Little grebe	1550	2				
11/07/17	Tufted duck	1820	1	F		Chick tend	With 6 chicks
11/07/17	Tufted duck	1830	9		9A	Chick tend	With 4 chicks
11/07/17	Little grebe	1845	2				
11/07/17	Teal	1915	2				
11/07/17	Mute swan	1915	2				
08/08/17	Whooper swan	1205	2				
08/08/17	Tufted duck	1205	49		33A + 16JUV		
08/08/17	Little grebe	1205	5				
08/08/17	Teal	1205	6				
08/08/17	Goldeneye	1205	7		2A + 5JUV		
17/04/17	Tufted duck	1440	24			Feeding	On loch all watch
08/08/17	Tufted duck	1205	1				
08/08/17	Red-throated diver	1404	1				Heard only
08/08/17	Red-throated diver	1408	1				Heard only
10/08/17	Whooper swan		2				
10/08/17	Teal		8		4A + 4JUV		
10/08/17	Little grebe		6				
10/08/17	Goldeneye		9		4A + 5JUV		
11/09/17	Little grebe		15				
11/09/17	Whooper swan		1				
11/09/17	Goldeneye		7				
11/09/17	Tufted duck		9				
12/09/17	Little grebe		8				
12/09/17	Goldeneye		6				
12/09/17	Tufted duck		8				
12/09/17	Teal		8				
05/10/17	Whooper swan		2				
05/10/17	Little grebe		4				
05/10/17	Tufted duck		10				

Table 10. Loch Toftingall Wildfowl Survey results.							
Date	Species	Time	Number	Sex	Age	Behaviour	Comments
07/10/17	Whooper swan		7				
07/10/17	Little grebe		5				
07/10/17	Teal		2				
23/11/17	Wigeon		8				
23/11/17	Teal		7				
23/11/17	Goldeneye		6				
23/11/17	Tufted duck		3				
24/11/17	Goldeneye		5				
24/11/17	Teal		20				
24/11/17	Tufted duck		2				
06/12/17	Whooper swan		6				
06/12/17	Mute swan		2				
06/12/17	Teal		56				
06/12/17	Tufted duck		23				
06/12/17	Goldeneye		18				
10/01/18	Teal	1130	1	F			Flew off south
13/02/18	Whooper swan	1440	5				
13/02/18	Goldeneye	1445	2	MF			
13/02/18	Tufted duck	1445	2				
13/02/18	Teal	1540	3	3M			
22/02/18	Whooper swan	0910	5			Feeding	
22/02/18	Goldeneye	0915	5				
22/02/18	Tufted duck	0920	25				
07/03/18	Goldeneye	1130	4	MF			
07/03/18	Teal	1230	2	2M			
15/03/18	Tufted duck	0800	50				East side of loch sheltering
15/03/18	Goldeneye	0800	8	5M 3F			
02/04/18	Mute swan	0940	4				
02/04/18	Whooper swan	0940	2				
02/04/18	Tufted duck	0940	11	M			
02/04/18	Tufted duck	0940	9	F			
02/04/18	Goldeneye	0940	2	M			
02/04/18	Goldeneye	0940	3	F			
11/04/18	Goldeneye	0940	6				On loch
11/04/18	Tufted duck	0940	8				On loch
11/04/18	Whooper swan	0940	7				On loch
24/04/18	Tufted duck	1835	27				On loch
24/04/18	Teal	1835	2	MF			On loch
24/04/18	Mute swan	2105	2	MF			On loch
08/05/18	Mute swan	0545	2				
08/05/18	Tufted duck		8	4M 4F			
08/05/18	Greylag goose		7				Flew off - recorded at VP4
08/05/18	Red-throated diver	0815	2				Fishing
23/05/18	Tufted duck	1900	8	4M 4F			
23/05/18	Mute swan	1900	2	MF			
18/06/18	Tufted duck	1850	1	F			
25/06/18	Tufted duck	1130	24	19M 5F			
25/06/18	Little grebe	1137	2				

Table 10. Loch Toftingall Wildfowl Survey results.

Date	Species	Time	Number	Sex	Age	Behaviour	Comments
25/06/18	Red-throated diver	1221	2				
13/07/18	Tufted duck	0605	30				
13/07/18	Little grebe	0605	1				
13/07/18	Red-throated diver	0905	2		A		during VP landed on loch. Remained fishing
17/07/18	Red-throated diver	1540	2			Feeding	
17/07/18	Teal	1651	2				
17/07/18	Tufted duck	1713	30				
08/08/18	Little grebe	1745	3				
08/08/18	Goldeneye	1750	1	F			
08/08/18	Tufted duck	1750	13				
29/08/18	Tufted duck	1015	20				
29/08/18	Little grebe	1105	4				
07/09/18	Tufted duck	0700	3			Feeding	
19/09/18	Whooper swan	0755	2		2A	Feeding	
19/09/18	Tufted duck	0815	10				
19/09/18	Little grebe	0945	1				
19/09/18	Goldeneye	0945	1	F			
03/10/18	Tufted duck	1450	10				
03/10/18	Teal	1450	4				
03/10/18	Little grebe	1450	4				
03/10/18	Goldeneye	1720	2				
10/10/18	Tufted duck	1150	15				
10/10/18	Little grebe	1150	2				
08/11/18	Whooper swan	0750	18			Flying	Flew off during VP
08/11/18	Goldeneye	0755	10				
08/11/18	Tufted duck	0755	90				
23/11/18	Whooper swan	0815	7		4A+3J		
23/11/18	Goldeneye	0900	20				
23/11/18	Pochard	0900	20				
23/11/18	Tufted duck	0900	240				
02/12/18	Whooper swan	1345	2			Roost	Present throughout
02/12/18	Goldeneye	1345	7				Present throughout
02/12/18	Tufted duck	1430	2				
14/12/18	Whooper swan	1100	2		2A		
14/12/18	Goldeneye	1100	20				
14/12/18	Pochard	1100	7				
14/12/18	Tufted duck	1100	50				
23/02/19	Goldeneye		12	6M 6F			
16/03/19	Teal	0650	10				
16/03/19	Tufted duck	0650	40				
16/03/19	Goldeneye	0655	15				
16/03/19	Whooper swan	0655	3		2A 1SUB		
16/03/19	Red-throated diver	0735	1				Flew off later - see VP
16/03/19	Greylag goose	0750	20				
16/03/19	Little grebe	0930	1				
20/03/19	Tufted duck	1010	22				
20/03/19	Mute swan	1012	5				
05/04/19	Tufted duck	1530	17				On loch

Table 10. Loch Toftingall Wildfowl Survey results.

Date	Species	Time	Number	Sex	Age	Behaviour	Comments
05/04/19	Goosander	1530	3	2M 1F			On loch

Flight activity recorded during GVPs

52. Twenty-one flights of **whooper swan** involving 105 birds were recorded during GVP watches
(**Figure 8.8; Table 11**).

53. Seventy-four flights by **greylag goose** were recorded during GVP watches involving 1,556 birds
(**Figure 8.7; Table 11**).

54. Fourteen flights by **pink-footed goose** were recorded during GVP watches involving 742 birds
(**Figure 8.7; Table 11**).

Table 11. Flight activity and elevation by swan and goose species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Greylag goose	Apr-Aug	1	2				*	*	
			2						*
			6					*	
			13		*	*	*		
			3		*	*			
			6					*	
		2	12						*
			1		*	*			
			210				*		
			50				*		
			10				*		
			5				*		
		3	45					*	
			25				*		
			3			*	*		
		4	40				*	*	*
			9					*	*
			7				*	*	
			2	*	*				
			2	*	*				
			1			*			
			1	*	*	*			
			5					*	
			6					*	
			2	*	*	*			
			2	*	*	*	*		
			5	*	*	*			
		2	*	*					

Table 11. Flight activity and elevation by swan and goose species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Greylag goose	Apr-Aug	4	2				*		
			2			*			
	1	45			*				
		5				*			
		21				*	*	*	
		110						*	
		35			*				
		20		*					
		6			*				
		2	41			*			
			9			*			
			50		*	*			
			16			*	*		
			40				*		
			40				*		
			9				*		
	3	1						*	*
		7			*				
		35							*
		1		*					
		2		*					
		8			*				
		11						*	
		33			*				
			*	*					
		7		*					
		9					*		
		49	*	*	*				
		12		*					
		8			*				
		2			*				
		50			*				
		4			*	*			
	40			*	*	*			
	115						*	*	
	4	65			*				
		22		*					
		20					*		
		7				*			
		14				*	*	*	
		21				*			
		23					*	*	
4							*		
8						*			

Table 11. Flight activity and elevation by swan and goose species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Height category						
				<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Greylag goose	Sep-Mar	4	30				*			
			20	*	*	*				
	Total		1556	*	*	*	*	*	*	
Pink-footed goose	Apr-Aug	1	16					*	*	
			71						*	
		2	30					*		
			150					*		
		3	130						*	
			7						*	
	1		1		*					
	Sep-Mar	2	11			*	*			
			51			*				
		3	70						*	
			55	*	*	*	*			
		4	120				*			
			25				*			
	5							*		
	Total		742	*	*	*	*		*	
	Unidentified goose spp.	Apr-Aug	1	2				*		
				200						*
3			90		*	*	*			
Sep-Mar		1	75				*			
			220							
		2	30			*				
			30		*					
		3	15				*			
			1100			*				
		300	*	*						
4		30						*		
Total			2092	*	*	*	*		*	
Whooper swan		Apr-Aug	2	2				*		
	2			*	*	*				
	4		1	*	*	*				
			1	*						
	Sep-Mar	1	6		*					
			9					*		
		2	5		*	*				
			1			*				
			2			*	*			
		27			*	*				
3	3		*	*						
	3	*								

Table 11. Flight activity and elevation by swan and goose species recorded during GVP watches (April 2017 to April 2019).										
Species	Period	VP No.	No. birds	Height category						
				<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Whooper swan	Sep-Mar	3	5	*						
			4		*					
		4	1	*						
			2	*	*					
			5	*	*					
			2	*	*					
			6	*						
			13	*	*					
			5	*						
		Total		105	*	*	*	*	*	

55. Eleven flights by unidentified goose species were recorded, involving 2,092 birds, were recorded during GVP watches (**Figure 8.7; Table 11**).

Flight activity recorded during MWP

56. Three flights by **whooper swan** were recorded during MWP surveys involving 24 birds (**Figure 8.8; Table 12**).

57. Fifteen flights by **greylag goose** were recorded involving 237 birds (**Figure 8.7; Table 12**).

58. Four flights by **pink-footed goose** were recorded involving 257 birds (**Figure 8.7; Table 12**).

59. Three flights by unidentified geese were recorded involving 284 birds (**Figure 8.7; Table 12**).

Table 12. Flight activity and elevation by swan and goose species recorded during MWP watches (Autumn 2017 and Spring 2018).										
Species	Period	MWP No.	No. birds	Height category						
				<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Greylag goose	Spring	C	2			*				
	Spring total		2			*				
	Autumn	A	7						*	
			19				*	*		
			9						*	
			14			*	*	*		
			21						*	
			4			*				
			16			*	*	*	*	
			B	1				*		
				3			*			
				115					*	
				1			*			

Table 12. Flight activity and elevation by swan and goose species recorded during MWP watches (Autumn 2017 and Spring 2018).									
Species	Period	MWP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Greylag goose	Autumn	B	20				*		
			3		*				
			4		*				
	Autumn total		237		*	*	*	*	*
Pink-footed goose	Spring	C	10					*	
			17			*	*	*	
			10				*	*	
	Spring total		37			*	*	*	*
	Autumn	A	220						*
	Autumn total		220						*
Unidentified goose spp.	Spring	C	4						*
	Spring total		4						*
	Autumn	A	200						*
			80						*
	Autumn total		280						*
Whooper swan	Spring	C	2				*		
	Spring total		2				*		
	Autumn	B	9			*			
			13		*				
	Autumn total		22		*	*			

Scarce Breeding Raptors and Owls

Occurrence and Status

60. Sightings of **hen harrier**, **rough-legged buzzard** (*Buteo lagopus*), **osprey**, **merlin**, **peregrine**, **white-tailed eagle** and **barn owl** were recorded. All these are listed on Annex 1 of the Birds Directive, and Schedule 1 of the WCA except rough-legged buzzard. Hen harrier and merlin are red-listed Birds of Conservation Concern. Other raptors of lesser conservation concern were also recorded including common buzzard (*Buteo buteo*), common kestrel (*Falco tinnunculus*) and sparrowhawk (*Accipiter nisus*).

Abundance and Distribution

61. **Hen harrier** was recorded during both non-breeding seasons and both breeding seasons, although the majority of observations were made during the non-breeding season with only five observations in July and none in June. No breeding behaviour was observed within the study area. Roosting birds (or birds exhibiting pre-roosting behaviour) were observed within the study area during September, October, November, December and January (**Appendix 8.2: Confidential Figure 8.2; Figures 8.10 & 8.11; Tables 13 & 14**).

62. Single wintering **rough-legged buzzards** were recorded within the study area in April 2017 and then regularly in both non-breeding periods. (**Figures 8.11 & 8.12**).
63. **Peregrine** was recorded on three occasions in the non-breeding period. No evidence of breeding was recorded within the study area (**Figure 8.10**).
64. **Merlin** was recorded infrequently throughout the survey period with no evidence of breeding within the study area (**Figures 8.10 & 8.11**).
65. **Osprey** was regularly recorded during both breeding periods with birds regularly recorded fishing at Loch Toftingall and recorded commuting to and from the loch. A nest location was located outside of the study area (**Appendix 8.2: Confidential Figure 8.1; Figures 8.10 & 8.11**).
66. A single juvenile **white-tailed eagle** flew south over Loch Toftingall in November 2017 (**Figure 8.10**).
67. A **barn owl** nest was found in a ruined building within the study area (**Appendix 8.2: Confidential Figure 8.1**).

Flight activity recorded during GVPs

68. Eighty-nine flights by **hen harrier** were recorded during GVP watches involving 90 birds (**Figure 8.10; Table 13**).
69. Sixty flights by **osprey** were recorded during GVP watches involving 65 birds (**Figure 8.10; Table 13**).
70. Nineteen **rough-legged buzzard** flights were recorded during GVP watches, all involving the same single bird (**Figure 8.10; Table 13**).
71. Three **peregrine** flights were recorded during GVP watches, all involving single juvenile birds (**Figure 8.10; Table 13**).
72. Six **merlin** flights were recorded during GVP watches, all involving single birds (**Figure 8.10; Table 13**).

Table 13. Flight activity and elevation by scarce raptor species recorded during GVP watches (April 2017 to April 2019).										
Species	Period	VP No.	No. birds	Total flying time (s)	Time in height category (s)					
					<10m	10-30m	30-50m	50-100m	100-150m	>150m
Hen harrier	Apr-Aug	1	1	50	33	17				
			1	112		112				

Table 13. Flight activity and elevation by scarce raptor species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Total flying time (s)	Time in height category (s)					
					<10m	10-30m	30-50m	50-100m	100-150m	>150m
Hen harrier	Apr-Aug	1	1	216	216					
			1	81	81					
			1	75		75				
		2	1	143		95	48			
			1	49			49			
		3	1	9	9					
			1	18	18					
			1	97	97					
			1	189	189					
		3	1	242	227	15				
			1	129	129					
			1	31	31					
			1	21	21					
			1	31		31				
			1	94	94					
		4	1	171	171					
			1	12		12				
			1	42	21	21				
			2	80	40	40				
			1	59			59			
			1	9	9					
	1		107	107						
	1		120	120						
	1		104		35	69				
	1	260			61	61	31	107		
	Sep-Mar	1	1	219	219					
			1	209	177	32				
			1	37	37					
			1	217	93	124				
			1	214	183	31				
			1	168	168					
			1	159	143	16				
			1	145	145					
			1	348	348					
			1	19		19				
			1	12	12					
			1	73	73					
			1	123	123					
			1	105	105					
		1	82	82						
		2	1	265	265					
			1	24	24					
1			276	215	61					
1			48	48						
1			28	28						
1			166		166					
3	1	288	243	45						
	1	254	254							
	1	110	110							

Table 13. Flight activity and elevation by scarce raptor species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Total flying time (s)	Time in height category (s)					
					<10m	10-30m	30-50m	50-100m	100-150m	>150m
Hen harrier	Sep-Mar	3	1	59	59					
			1	68	68					
			1	139	139					
			1	57	57					
			1	8	8					
			1	3	3					
			1	506	506					
			1	172	141	31				
			1	148	148					
			1	227	227					
			1	245	245					
			1	71		71				
			1	194	178	16				
			1	250	250					
			1	66	66					
			1	61	61					
			1	315	315					
			1	72	72					
			1	93	93					
			1	334	228	106				
			1	10	10					
			1	45	45					
			1	306	306					
			1	145	145					
			1	163	163					
			1	164	164					
			1	132	132					
	1	225	225							
	1	13	13							
	1	28	28							
1	35	35								
1	124	124								
1	780	780								
1	78	78								
1	69	69								
		4	1	35		35				
			1	78			78			
	Total		90	11686	9917	1206	364	61	31	107
Merlin	Apr-Aug	1	1	12	12					
		4	1	170	77	93				
			1	300		300				
	Sep-Mar	3	1	124	108	16				
		1	43		43					
	Total		6	694	212	467	15			
Osprey	Apr-Aug	1	1	273			106	91	76	
			1	319			197	122		
			1	213			213			
			1	169	108	61				
			1	312	140	172				

Table 13. Flight activity and elevation by scarce raptor species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Total flying time (s)	Time in height category (s)					
					<10m	10-30m	30-50m	50-100m	100-150m	>150m
Osprey	Apr-Aug	1	1	303		91	106	106		
			1	285		180	75	30		
			1	90		30		60		
			1	90		30	60			
			2	1050					600	450
			1	60		60				
			1	95		95				
			2	126		126				
			3	540		270	270			
			1	118			84	34		
		2	1	118		17	17	17	67	
			1	140			140			
			1	195			15	60	45	75
			1	58		19	39			
			1	142			142			
			1	32		16	16			
			1	168	137	31				
			1	38		19	19			
		3	1	135		105	30			
			1	268		16	126	126		
			1	54	18	18	18			
			1	18		18				
			1	168		46	76	46		
		4	1	86			34	52		
			1	197				182	15	
			1	852			91	411	228	122
			1	35	35					
			1	168			168			
			1	18		18				
			1	22		22				
			1	185		77	77	31		
			1	12		12				
			1	212		30	30	76	76	
			1	165				105	60	
			1	600	45	30	270	255		
			1	32				32		
			1	330	15		180	75	60	
			1	330			195	60	75	
			1	48			48			
			1	186		31	155			
			1	360			360			
			1	105	30	75				
1	90		30	60						
1	105		15	90						
1	810		15	30	75	690				
1	525					120	405			
1	195		195							
1	120	15	75	30						
2	1200		690	510						
1	508			292	216					

Table 13. Flight activity and elevation by scarce raptor species recorded during GVP watches (April 2017 to April 2019).											
Species	Period	VP No.	No. birds	Total flying time (s)	Time in height category (s)						
					<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Osprey	Apr-Aug	4	1	765	75	630	60				
			1	1500			210	690	300	300	
	Sep-Mar	4	1	388		62	171	155			
			1	13	13						
	Total			65	15757	709	3547	4705	3842	2007	947
Peregrine	Sep-Mar	4	3	1	24			24			
			1	51	51						
			1	34	34						
	Total			3	109	85		24			
Rough-legged buzzard	Apr-Aug	1	1	8		8					
			1	12			12				
			1	103				103			
			1	878			15	106	242	515	
			1	125			47	47	31		
	Sep-Mar	1	1	48	48						
			1	32	32						
			1	101	84	17					
			1	171	171						
			1	12	12						
			1	16	16						
			1	21	21						
			1	18		18					
			1	18	18						
			1	83	17	33	33				
			1	113		113					
			1	245			107	92	46		
			2	1	153		15	123	15		
				1	5	5					
	Total			19	2162	424	204	337	363	319	515
White-tailed eagle	Sep-Mar	1	1	417		293	124				
	Total			1	417		293	124			

Incidental flight activity

73. Twenty-four flights by **hen harrier** were recorded during the course of other surveys during the study period (**Figure 8.11**).

74. Thirteen flights by **rough-legged buzzard** were recorded during the course of other surveys during the survey period (**Figure 8.11**).

75. Three flights by **merlin** were recorded during the course of other surveys during the study period (**Figure 8.11**).

76. Forty-one flights by **osprey** were recorded during the course of other surveys during the study period (**Figure 8.11**).

Hen Harrier Winter Roosts

77. Eight sightings of roosting hen harrier were recorded during all surveys including those timed to attempt to observe possible roost behaviour. Male, female and ‘ringtail’ (unidentified female or juvenile brown) birds were seen. (**Appendix 8.2: Confidential Figure 8.2; Table 14**).

Table 14. Observations of roosting hen harriers made during all surveys.					
Date	Time	Survey Type	No. birds	Age/Sex	Behaviour
14/09/2017	18:12	FVP	1	Adult Male	Roost
03/10/2017	16:38	GVP	1	2 nd year Male	From post to roost
03/10/2017	16:46	GVP	1	Ringtail	Into roost area
22/11/2017	08:36	GVP	1	Ringtail	Out of roost
06/12/2017	12:45	GVP	1	Adult female	Lost above roost area
06/12/2017	14:40	GVP	1	2nd year Male	Into roost
09/01/2018	11:21	GVP	1	2nd year Male	In roost area not seen leaving again
19/01/2018	11.22	NON	1	Male	Roost

Waders

Occurrence and Status

78. **Curlew** (*Numenius arquata*), **golden plover** (*Pluvialis apricaria*), **greenshank** (*Tringa nebularia*), **whimbrel** (*Numenius phaeopus*), **lapwing** (*Vanellus vanellus*), **woodcock** (*Scolopax rusticola*) and **ringed plover** (*Charadrius hiaticula*) were recorded. **Greenshank** and **whimbrel** are listed on Schedule 1 of the WCA, and **Golden plover** is listed on Annex 1 of the Birds Directive. **Curlew** is a red-listed Bird of Conservation Concern and is also listed on IUCN ‘Red list – ‘Near Threatened’ (IUCN, 2021). **Lapwing, whimbrel, woodcock** and **ringed plover** are red-listed Bird of Conservation Concern. Snipe (*Gallinago gallinago*) and common sandpiper (*Actitis hypoleucos*), waders of lesser conservation concern, were also recorded (**Figures 8.12, 8.13 & 8.15; Tables 15, 16 & 18**).

Abundance and Distribution

79. Small numbers of **curlew** were present in the breeding season (with records in March, April, May, June and July). Although three territories were recorded within the survey area no territories were found within 500 m of the Proposed Development (**Figure 8.15; Table 18**).

80. **Golden plover** were present through much of the year, with records in January, February, March, April, May, August, September, October and November. No breeding activity was recorded within the study area.

81. Migrant **Greenshank** were observed on three occasions between August and October and a single **whimbrel** was observed in August.
82. **Lapwing** were seen in February, March, April, May, June, July, August, September and December. Although three territories were recorded within the survey area no territories were found within 500 m of the Proposed Development (**Figure 8.15; Table 18**).

Flight activity recorded during GVPs

83. One hundred and thirteen **curlew** flights involving 144 birds were recorded (**Figure 8.12; Table 15**).
84. Twenty **golden plover** flights involving 1289 birds were recorded. None of these flights were recorded within 500 m of the Proposed Development (**Figure 8.12; Table 15**).
85. Two **greenshank** flights involving 5 birds were recorded. None of these flights were recorded within 500 m of the Proposed Development (**Figure 8.12; Table 15**).
86. One **whimbrel** flight involving a single bird was recorded. This flight was not recorded within 500 m of the Proposed Development (**Figure 8.12; Table 15**).

Table 15. Flight activity and elevation by wader species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Curlew	Apr-Aug	1	1		*				
			1	*					
			1	*					
			1	*	*				
			1	*	*				
			1	*					
			1	*	*				
			1	*					
			1	*					
			1	*	*				
			2		*	*			
			1		*				
			1	*					
			2		*	*	*		
			2	*	*				
			1	*	*	*			
			1	*	*				
			1	*					
			1	*					
			2		*				
2	*								

Table 15. Flight activity and elevation by wader species recorded during GVP watches (April 2017 to April 2019).

Species	Period	VP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Curlew	Apr-Aug	1	1	*	*				
			1		*	*			
			1	*					
			1	*	*				
			1		*				
			1	*	*				
			1	*					
			1	*	*				
			1	*					
			1	*					
			1	*	*				
			1	*					
			1	*	*				
			1	*					
			2	*					
			1	*	*				
			1	*					
			3	*	*				
			1	*	*				
			1				*	*	
			1					*	
		1	*	*					
		1	*	*					
		3					*		
		2	*	*					
		1		*					
		1	*						
		2	*						
		1	*						
		1	*						
		1	*						
		2	*	*					
		1	*						
		1	*						
		2	*						
		4					*	*	
		1	*	*					
		4	*	*					
		1		*					
		2	*						
		1	*	*		*			
		1	*	*					
		1	*			*			
		1	*	*					
		3		*					
1	*			*					
1		*							
1	*	*							
2	*	*		*					
1		*							
3	*	*							
1		*							
3	*	*		*					
1	*								
1	*								

Table 15. Flight activity and elevation by wader species recorded during GVP watches (April 2017 to April 2019).										
Species	Period	VP No.	No. birds	Height category						
				<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Curlew	Apr-Aug	3	1	*						
			1	*						
			1	*						
			1	*						
			1	*						
			1	*						
			1	*						
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			1	*	*					
			2	*	*					
			1	*	*					
			1	*	*					
	1	*	*							
	Sep-Mar	4	1			*				
Total			144	*	*	*	*			
Golden plover	Apr-Aug	1	300					*	*	
			120						*	
			27	*	*					
			6					*	*	
			4				*			
			120		*					
			80	*	*	*				
			11		*					
			69	*	*	*				
			40		*	*	*	*		
		Sep-Mar	2	200	*	*	*	*		
	4			*	*	*	*			
	45			*	*					
	22					*	*			
	150								*	
	5					*	*			
	20						*			
	Sep-Mar	3	14	*	*					
25			*	*						
	Sep-Mar	3	27		*					
Total			1289	*	*	*	*	*	*	
Greenshank	Apr-Aug	3	1	*						
	Sep-Mar	3	4	*						
	Total			5	*					
Whimbrel	Apr-Aug	3	1	*						
	Total			1	*					

Flight activity recorded during MWP

87. Twenty-four **curlew** flights were recorded involving 34 birds (**Figure 8.12; Table 16**).

88. Sixteen **golden plover** flights were recorded involving 993 birds (**Figure 8.12; Table 16**).

89. One **greenshank** flight was recorded (**Figure 8.12; Table 16**).

Table 16. Flight activity and elevation by wader species recorded during MWP watches.

Species	Period	VP No.	No. birds	Height category						
				<10m	10-30m	30-50m	50-100m	100-150m	>150m	
Curlew	Spring	C	1	*						
			2		*					
			1	*						
			2	*	*					
			2				*			
			1	*	*					
			1	*						
			1		*					
			2			*				
			2			*				
			2	*						
			1	*	*					
			1		*					
			2		*					
			2			*				
			1	*	*					
			1	*	*					
			2	*	*					
			1	*	*					
			1	*	*					
1	*	*								
Spring total			34	*	*	*	*			
Golden plover	Spring	C	22						*	
			130	*	*	*				
			90	*	*	*	*			
			40	*	*	*	*			
			60		*	*				
			40				*			
			120			*	*	*		
			120					*	*	
			120					*	*	
			30		*	*				
	30	*	*	*						
	Spring total			802	*	*	*	*	*	*
	Golden plover	Autumn	A	12	*	*	*			
12				*	*					
110				*	*	*	*			
40				*	*	*	*			
Golden plover	Autumn	C	17	*						
Autumn total			191	*	*	*	*			
Greenshank	Autumn	B	1		*					
			Autumn total			1		*		

Skuas

Occurrence and Status

90. **Arctic skua** (*Stercorarius parasiticus*) and **great skua** (*Stercorarius skua*) were recorded; **arctic skua** is a red-listed Bird of Conservation Concern.

Abundance and Distribution

91. **Arctic skua** was recorded in flight once in May 2017 and three times in July 2018. There was no evidence of breeding within the study area during baseline surveys.

92. **Great skua** was recorded in flight once in June 2017 and once in August 2018. There was no evidence of breeding within the study area during baseline surveys.

Flight activity recorded during GVPs

93. Four **arctic skua** flights involving five birds, were recorded (**Figure 8.14; Table 17**).

94. Two **great skua** flights involving four birds were recorded (**Figure 8.14; Table 17**).

Table 17. Flight activity and elevation by skua species recorded during GVP watches.									
Species	Period	VP No.	No. birds	Height category					
				<10m	10-30m	30-50m	50-100m	100-150m	>150m
Arctic Skua	Apr-Aug	1	1					*	
		3	1					*	
			1					*	*
	4	2					*	*	
	Total		5					*	*
Great Skua	Apr-Aug	2	1					*	
		4	3					*	
	Total		4					*	

Other Species of Interest

95. Although 13 skylark (*Alauda arvensis*) territories were recorded within the study area no territories were found within 500 m of the Proposed Development (**Table 18**). Buzzard (*Buteo buteo*), herring gull (*Larus argentatus*), lapwing and raven (*Corvus corax*) were the species recorded most often during the GVP watches (**Table 19**).

Table 18. Territory abundance of selected species recorded during the breeding bird surveys.		
Species	Number of territories	
	Study Area	500 m buffer
Curlew	3	0
Lapwing	3	0
Snipe	6	0
Skylark	13	0

Table 19. The percentage of five-minute recording periods in which each species was encountered during watches from all GVPs. Total number of 5-minute recording intervals was 7160.

Species	Occurrence (%)	No. of 5-minute periods recorded
Buzzard	12.416	889
Herring gull	8.547	612
Lapwing	7.304	523
Raven	5.000	358
Kestrel	3.226	231
Curlew	2.654	190
Snipe	2.486	178
Grey heron	1.899	136
Cuckoo	1.676	120
Hen harrier	1.466	105
Oystercatcher	1.397	100
Greylag goose	1.271	91
Sparrowhawk	1.243	89
Osprey	0.950	68
Golden plover	0.768	55
Rough-legged buzzard	0.684	49
Starling	0.377	27
Great black-backed gull	0.335	24
Whooper swan	0.335	24
Common sandpiper	0.279	20
Pink-footed goose	0.265	19
Unidentified geese	0.196	14
Red-throated diver	0.154	11
Cormorant	0.154	11
Merlin	0.126	9
Redshank	0.056	4
Arctic skua	0.056	4
Fieldfare	0.056	4
Common gull	0.042	3
Mallard	0.042	3
Black-throated diver	0.042	3
Greenshank	0.042	3
Peregrine	0.042	3
Great skua	0.028	2
White-tailed eagle	0.028	2
Ringed plover	0.028	2
Hooded crow	0.014	1
Canada goose	0.014	1
Whimbrel	0.014	1
Teal	0.014	1
Iceland gull	0.014	1
Woodcock	0.014	1
Crossbill	0.014	1
Red grouse	0.014	1

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Annexes

Annex 1. Recording Periods used in Diurnal Stratification of Watches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Early GVPs finish by / Middle GVPs begin from	0930	0900	0830*	0830	0745	0730	0800	0830	0900	0930‡	0900	0930
Middle GVPs finish by / Late GVPs begin from	1500	1600	1630*	1800	1900	1900	1900	1830	1730	1630‡	1500	1430
	GMT	GMT	GMT	BST	BST	BST	BST	BST	BST	BST	GMT	GMT

*This time is GMT, when the clocks changed time was kept in line with this, within the month.

‡ This time is BST, when the clocks changed time was kept in line with this, within the month

Annex 2. Generic Vantage Point Survey Information

*Watch ID relates to Appendix 3 Weather Details for GVP Watches

Date	Observer	VP	Start	End	Duration	Watch ID*
19/04/2017	FL	GVP2	1330	1630	3.00	TOF_170419_001
20/04/2017	RD	GVP2	0850	1150	3.00	TOF_170420_001
17/04/2017	RD	GVP4	1440	1740	3.00	TOF_170417_001
19/04/2017	RD	GVP4	0900	1200	3.00	TOF_170419_002
06/05/2017	FL	GVP4	1600	1900	3.00	TOF_170506_001
07/05/2017	FL	GVP4	1025	1225	2.00	TOF_170507_004
08/05/2017	FL	GVP4	0615	0745	1.50	TOF_170508_002
08/05/2017	FL	GVP4	0745	0915	1.50	TOF_170508_003
04/05/2017	FL	GVP1	0615	0745	1.50	TOF_170504_001
04/05/2017	FL	GVP1	0745	0915	1.50	TOF_170504_002
05/05/2017	FL	GVP1	1350	1650	3.00	TOF_170505_001
09/05/2017	FL	GVP1	0850	1150	3.00	TOF_170509_001
05/05/2017	FL	GVP2	1035	1235	2.00	TOF_170505_002
07/05/2017	FL	GVP2	0615	0745	1.50	TOF_170507_001
07/05/2017	FL	GVP2	0745	0915	1.50	TOF_170507_002
08/05/2017	FL	GVP2	1340	1640	3.00	TOF_170508_001
04/05/2017	FL	GVP3	1330	1630	3.00	TOF_170504_003
05/05/2017	FL	GVP3	0615	0745	1.50	TOF_170505_003
05/05/2017	FL	GVP3	0745	0915	1.50	TOF_170505_004
07/05/2017	FL	GVP3	1300	1600	3.00	TOF_170507_003
06/06/2017	NR	GVP1	1025	1325	3.00	TOF_170606_001
14/06/2017	NR	GVP1	0405	0705	3.00	TOF_170614_002
25/06/2017	NR	GVP1	1255	1555	3.00	TOF_170625_001
05/06/2017	NR	GVP2	1820	2120	3.00	TOF_170605_001
19/06/2017	NR	GVP2	0930	1230	3.00	TOF_170619_001
24/06/2017	NR	GVP2	0555	0755	2.00	TOF_170624_001
07/06/2017	NR	GVP3	1255	1555	3.00	TOF_170607_001
15/06/2017	NR	GVP3	0920	1220	3.00	TOF_170615_002
25/06/2017	NR	GVP3	1745	2045	3.00	TOF_170625_002
05/06/2017	NR	GVP4	1445	1745	3.00	TOF_170605_002
16/06/2017	NR	GVP4	0440	0740	3.00	TOF_170616_004
21/06/2017	NR	GVP4	1125	1325	2.00	TOF_170621_001
10/07/2017	NR	GVP1	1545	1845	3.00	TOF_170710_001
15/07/2017	PR	GVP1	0855	1155	3.00	TOF_170715_001
17/07/2017	NR	GVP1	1755	1900	1.08	TOF_170717_001
17/07/2017	NR	GVP1	1900	2055	1.92	TOF_170717_002
03/07/2017	NR	GVP2	1245	1545	3.00	TOF_170703_001
13/07/2017	NR	GVP2	0555	0800	2.08	TOF_170713_001
13/07/2017	NR	GVP2	0800	0855	0.92	TOF_170713_002
07/07/2017	NR	GVP3	1005	1305	3.00	TOF_170707_001
14/07/2017	NR	GVP3	0750	1050	3.00	TOF_170714_001
19/07/2017	NR	GVP3	0610	0800	1.83	TOF_170719_001
19/07/2017	NR	GVP3	0800	0910	1.17	TOF_170719_002
05/07/2017	NR	GVP4	1410	1710	3.00	TOF_170705_001
11/07/2017	PS	GVP4	1815	1900	0.75	TOF_170711_001
11/07/2017	PS	GVP4	1900	2115	2.25	TOF_170711_002

Date	Observer	VP	Start	End	Duration	Watch ID*
08/08/2017	DJC	GVP1	0800	0830	0.50	TOF_170808_001
08/08/2017	DJC	GVP1	0830	1100	2.50	TOF_170808_002
09/08/2017	DJC	GVP1	1345	1645	3.00	TOF_170809_001
23/08/2017	NR	GVP1	0640	0830	1.83	TOF_170823_001
23/08/2017	NR	GVP1	0830	0940	1.17	TOF_170823_002
09/08/2017	DJC	GVP2	1700	1830	1.50	TOF_170809_002
09/08/2017	DJC	GVP2	1830	2000	1.50	TOF_170809_003
10/08/2017	DJC	GVP2	1420	1720	3.00	TOF_170810_001
08/08/2017	DJC	GVP3	1700	1830	1.50	TOF_170808_003
08/08/2017	DJC	GVP3	1830	2000	1.50	TOF_170808_004
09/08/2017	DJC	GVP3	1005	1305	3.00	TOF_170809_004
10/08/2017	DJC	GVP3	1015	1045	0.50	TOF_170810_002
10/08/2017	DJC	GVP3	1110	1340	2.50	TOF_170810_003
08/08/2017	DJC	GVP4	1205	1505	3.00	TOF_170808_005
10/08/2017	DJC	GVP4	0650	0820	1.50	TOF_170810_004
10/08/2017	DJC	GVP4	0820	0950	1.50	TOF_170810_005
13/09/2017	DJC	GVP1	1525	1655	1.50	TOF_170913_001
13/09/2017	DJC	GVP1	1730	1900	1.50	TOF_170913_002
14/09/2017	DJC	GVP1	1305	1605	3.00	TOF_170914_001
12/09/2017	DJC	GVP2	1110	1410	3.00	TOF_170912_001
13/09/2017	DJC	GVP2	0725	0855	1.50	TOF_170913_003
13/09/2017	DJC	GVP2	0855	1025	1.50	TOF_170913_004
12/09/2017	DJC	GVP3	0725	0855	1.50	TOF_170912_002
12/09/2017	DJC	GVP3	0855	1025	1.50	TOF_170912_003
11/09/2017	DJC	GVP4	1500	1730	2.50	TOF_170911_001
11/09/2017	DJC	GVP4	1730	1800	0.50	TOF_170911_002
12/09/2017	DJC	GVP4	1730	1830	1.00	TOF_170912_004
12/09/2017	DJC	GVP4	1530	1730	2.00	TOF_170912_005
14/09/2017	DJC	GVP3	0910	1210	3.00	TOF_170914_002
04/10/2017	DJC	GVP1	1205	1505	3.00	TOF_171004_001
07/10/2017	DJC	GVP1	0810	0910	1.00	TOF_171007_001
17/10/2017	NR	GVP1	0755	0955	2.00	TOF_171017_001
04/10/2017	DJC	GVP2	1520	1630	1.17	TOF_171004_002
04/10/2017	DJC	GVP2	1630	1720	0.83	TOF_171004_003
05/10/2017	DJC	GVP2	1530	1630	1.00	TOF_171005_001
17/10/2017	NR	GVP2	1025	1325	3.00	TOF_171017_002
03/10/2017	DJC	GVP3	1500	1630	1.50	TOF_171003_001
03/10/2017	DJC	GVP3	1630	1800	1.50	TOF_171003_002
05/10/2017	DJC	GVP3	0950	1250	3.00	TOF_171005_002
05/10/2017	DJC	GVP4	0825	0925	1.00	TOF_171005_003
05/10/2017	DJC	GVP4	1315	1515	2.00	TOF_171005_004
07/10/2017	DJC	GVP4	1245	1545	3.00	TOF_171007_002
20/11/2017	DJC	GVP1	1605	1705	1.00	TOF_171120_001
23/11/2017	DJC	GVP1	0930	1200	2.50	TOF_171123_001
24/11/2017	DJC	GVP1	1150	1320	1.50	TOF_171124_001
20/11/2017	DJC	GVP2	1300	1500	2.00	TOF_171120_002
21/11/2017	DJC	GVP2	0955	1155	2.00	TOF_171121_001
24/11/2017	DJC	GVP2	0755	0855	1.00	TOF_171124_002
22/11/2017	DJC	GVP3	0805	0905	1.00	TOF_171122_001
22/11/2017	DJC	GVP3	0905	1105	2.00	TOF_171122_002
22/11/2017	DJC	GVP3	1205	1405	2.00	TOF_171122_003

Date	Observer	VP	Start	End	Duration	Watch ID*
23/11/2017	DJC	GVP4	1300	1500	2.00	TOF_171123_002
23/11/2017	DJC	GVP4	1500	1600	1.00	TOF_171123_003
24/11/2017	DJC	GVP4	0925	1125	2.00	TOF_171124_003
07/12/2017	DJC	GVP1	0810	0910	1.00	TOF_171207_001
07/12/2017	DJC	GVP1	0910	1010	1.00	TOF_171207_002
07/12/2017	DJC	GVP1	1205	1405	2.00	TOF_171207_003
05/12/2017	DJC	GVP2	1300	1430	1.50	TOF_171205_001
05/12/2017	DJC	GVP2	1430	1530	1.00	TOF_171205_002
07/12/2017	DJC	GVP2	1020	1150	1.50	TOF_171207_004
06/12/2017	DJC	GVP3	1220	1420	2.00	TOF_171206_001
06/12/2017	DJC	GVP3	1420	1520	1.00	TOF_171206_002
06/12/2017	DJC	GVP4	0825	0925	1.00	TOF_171206_003
06/12/2017	DJC	GVP4	0925	1125	2.00	TOF_171206_004
08/01/2018	DJC	GVP1	1400	1500	1.00	TOF_180108_001
08/01/2018	DJC	GVP1	1500	1600	1.00	TOF_180108_002
12/01/2018	DJC	GVP1	0845	0930	0.75	TOF_180112_001
12/01/2018	DJC	GVP1	0930	1045	1.25	TOF_180112_002
09/01/2018	DJC	GVP2	0825	0925	1.00	TOF_180109_001
10/01/2018	DJC	GVP2	1430	1500	0.50	TOF_180110_001
10/01/2018	DJC	GVP2	1500	1530	0.50	TOF_180110_002
12/01/2018	DJC	GVP2	1050	1250	2.00	TOF_180112_003
09/01/2018	DJC	GVP3	1120	1350	2.50	TOF_180109_002
10/01/2018	DJC	GVP3	0850	0930	0.67	TOF_180110_003
10/01/2018	DJC	GVP3	0930	1130	2.00	TOF_180110_004
09/01/2018	DJC	GVP4	1000	1100	1.00	TOF_180109_003
09/01/2018	DJC	GVP4	1415	1500	0.75	TOF_180109_004
09/01/2018	DJC	GVP4	1500	1545	0.75	TOF_180109_005
10/01/2018	DJC	GVP4	1140	1410	2.50	TOF_180110_005
14/02/2018	NR	GVP1	1320	1620	3.00	TOF_180214_001
16/02/2018	NR	GVP1	1125	1325	2.00	TOF_180216_001
14/02/2018	NR	GVP2	0835	1135	3.00	TOF_180214_002
22/02/2018	NR	GVP2	1210	1410	2.00	TOF_180222_001
13/02/2018	NR	GVP3	0920	1220	3.00	TOF_180213_001
16/02/2018	NR	GVP3	1400	1600	2.00	TOF_180216_002
13/02/2018	NR	GVP4	1440	1600	1.33	TOF_180213_002
13/02/2018	NR	GVP4	1600	1710	1.17	TOF_180213_003
22/02/2018	NR	GVP4	0910	1140	2.50	TOF_180222_002
07/03/2018	NR	GVP1	0755	1055	3.00	TOF_180307_001
15/03/2018	KC	GVP1	1550	1850	3.00	TOF_180315_001
16/03/2018	KC	GVP2	0645	0945	3.00	TOF_180316_001
21/03/2018	PR	GVP2	1425	1725	3.00	TOF_180321_001
20/03/2018	PR	GVP3	1005	1305	3.00	TOF_180320_001
28/03/2018	NR	GVP3	0650	0950	3.00	TOF_180328_001
07/03/2018	NR	GVP4	1125	1425	3.00	TOF_180307_002
15/03/2018	KC	GVP4	0755	1055	3.00	TOF_180315_002
03/04/2018	PS	GVP1	0925	1225	3.00	TOF_180403_001
11/04/2018	PR	GVP1	0645	0915	2.50	TOF_180411_001
13/04/2018	NR	GVP1	1605	1835	2.50	TOF_180413_001
24/04/2018	PS	GVP2	0940	1240	3.00	TOF_180424_001
12/04/2018	PS	GVP2	0610	0840	2.50	TOF_180412_001
01/04/2018	PS	GVP2	1425	1725	3.00	TOF_180401_001

Date	Observer	VP	Start	End	Duration	Watch ID*
02/04/2018	JD	GVP3	1330	1630	3.00	TOF_180402_001
15/04/2018	PS	GVP3	1745	2015	2.50	TOF_180415_001
25/04/2018	JD	GVP3	0730	1000	2.50	TOF_180425_001
02/04/2018	JD	GVP4	1000	1300	3.00	TOF_180402_002
11/04/2018	PR	GVP4	0945	1215	2.50	TOF_180411_002
24/04/2018	PR	GVP4	1835	2105	2.50	TOF_180424_002
03/05/2018	JD	GVP1	0555	0855	3.00	TOF_180503_001
15/05/2018	PS	GVP1	1500	1730	2.50	TOF_180515_001
28/05/2018	PS	GVP1	1600	1830	2.50	TOF_180528_001
03/05/2018	JD	GVP2	0925	1225	3.00	TOF_180503_002
07/05/2018	PR	GVP2	1640	1910	2.50	TOF_180507_001
29/05/2018	PS	GVP2	1940	2210	2.50	TOF_180529_001
02/05/2018	PS	GVP3	0540	0840	3.00	TOF_180502_001
07/05/2018	PR	GVP3	1340	1610	2.50	TOF_180507_002
23/05/2018	JD	GVP3	1600	1830	2.50	TOF_180523_001
03/05/2018	JD	GVP4	1300	1600	3.00	TOF_180503_003
08/05/2018	PR	GVP4	0545	0815	2.50	TOF_180508_001
23/05/2018	JD	GVP4	1900	2130	2.50	TOF_180523_002
07/06/2018	NR	GVP1	1020	1320	3.00	TOF_180607_001
15/06/2018	NR	GVP1	0440	0710	2.50	TOF_180615_001
19/06/2018	PR	GVP1	1905	2135	2.50	TOF_180619_001
05/06/2018	NR	GVP2	0525	0825	3.00	TOF_180605_001
18/06/2018	JD	GVP2	1530	1800	2.50	TOF_180618_001
28/06/2018	PS	GVP2	1455	1725	2.50	TOF_180628_001
01/06/2018	PS	GVP3	1230	1530	3.00	TOF_180601_001
11/06/2018	PS	GVP3	1830	2130	3.00	TOF_180611_001
19/06/2018	PS	GVP3	1255	1455	2.00	TOF_180619_002
01/06/2018	PS	GVP4	0900	1200	3.00	TOF_180601_002
18/06/2018	JD	GVP4	1900	2130	2.50	TOF_180618_002
25/06/2018	PS	GVP4	1130	1400	2.50	TOF_180625_001
12/07/2018	NR	GVP1	1640	1940	3.00	TOF_180712_001
17/07/2018	PS	GVP1	1910	2210	3.00	TOF_180717_001
05/07/2018	NR	GVP2	0635	0935	3.00	TOF_180705_001
23/07/2018	PS	GVP2	1430	1730	3.00	TOF_180723_001
06/07/2018	PR	GVP3	0850	1150	3.00	TOF_180706_001
23/07/2018	PS	GVP3	1800	2100	3.00	TOF_180723_002
13/07/2018	PR	GVP4	0605	0905	3.00	TOF_180713_001
17/07/2018	PS	GVP4	1540	1840	3.00	TOF_180717_002
07/08/2018	PR	GVP1	1035	1335	3.00	TOF_180807_001
30/08/2018	PR	GVP1	0620	0920	3.00	TOF_180830_001
02/08/2018	PS	GVP2	1620	1920	3.00	TOF_180802_001
29/08/2018	NR	GVP2	0640	0940	3.00	TOF_180829_001
13/08/2018	PS	GVP3	1540	1840	3.00	TOF_180813_001
30/08/2018	PR	GVP3	1000	1300	3.00	TOF_180830_002
08/08/2018	PR	GVP4	1735	2035	3.00	TOF_180808_001
29/08/2018	NR	GVP4	1010	1310	3.00	TOF_180829_002
06/09/2018	NR	GVP1	1105	1405	3.00	TOF_180906_001
26/09/2018	NR	GVP1	1635	1935	3.00	TOF_180926_001
05/09/2018	NR	GVP2	1440	1740	3.00	TOF_180905_001
17/09/2018	NR	GVP2	1645	1945	3.00	TOF_180917_001
06/09/2018	NR	GVP3	0720	1020	3.00	TOF_180906_002

Date	Observer	VP	Start	End	Duration	Watch ID*
18/09/2018	NR	GVP3	1400	1700	3.00	TOF_180918_001
07/09/2018	NR	GVP4	0655	0955	3.00	TOF_180907_001
19/09/2018	NR	GVP4	0750	1050	3.00	TOF_180919_001
08/10/2018	PR	GVP1	1205	1505	3.00	TOF_181008_001
25/10/2018	PR	GVP1	0810	1110	3.00	TOF_181025_001
03/10/2018	NR	GVP2	1110	1410	3.00	TOF_181003_001
15/10/2018	PS	GVP2	0810	1110	3.00	TOF_181015_001
09/10/2018	PR	GVP3	1025	1325	3.00	TOF_181009_001
17/10/2018	NR	GVP3	1515	1815	3.00	TOF_181017_001
03/10/2018	NR	GVP4	1440	1740	3.00	TOF_181003_002
10/10/2018	PR	GVP4	1150	1450	3.00	TOF_181010_001
08/11/2018	NR	GVP1	1045	1315	2.50	TOF_181108_001
20/11/2018	NR	GVP1	1325	1555	2.50	TOF_181120_001
06/11/2018	NR	GVP2	1400	1630	2.50	TOF_181106_001
23/11/2018	NR	GVP2	1105	1335	2.50	TOF_181123_001
06/11/2018	NR	GVP3	1040	1310	2.50	TOF_181106_002
22/11/2018	NR	GVP3	0820	1050	2.50	TOF_181122_001
08/11/2018	NR	GVP4	0745	1015	2.50	TOF_181108_002
23/11/2018	NR	GVP4	0805	1035	2.50	TOF_181123_002
06/12/2018	JD	GVP1	0845	1045	2.00	TOF_181206_001
14/12/2018	NR	GVP1	0815	1015	2.00	TOF_181214_001
06/12/2018	JD	GVP2	1115	1315	2.00	TOF_181206_002
13/12/2018	NR	GVP2	1045	1245	2.00	TOF_181213_001
02/12/2018	PS	GVP3	1115	1315	2.00	TOF_181202_001
13/12/2018	NR	GVP3	1335	1535	2.00	TOF_181213_002
02/12/2018	PS	GVP4	1345	1545	2.00	TOF_181202_002
14/12/2018	NR	GVP4	1045	1245	2.00	TOF_181214_002
21/01/2019	PS	GVP1	1400	1600	2.00	TOF_190121_001
30/01/2019	PS	GVP1	1115	1315	2.00	TOF_190130_001
24/01/2019	PS	GVP2	1350	1550	2.00	TOF_190124_001
30/01/2019	PS	GVP2	0825	1025	2.00	TOF_190130_002
21/01/2019	PS	GVP3	0830	1030	2.00	TOF_190121_002
24/01/2019	PS	GVP3	1100	1300	2.00	TOF_190124_002
21/01/2019	PS	GVP4	1130	1330	2.00	TOF_190121_003
24/01/2019	PS	GVP4	0830	1030	2.00	TOF_190124_003
19/02/2019	PS	GVP1	0745	1015	2.50	TOF_190219_001
22/02/2019	PS	GVP1	1100	1330	2.50	TOF_190222_001
05/02/2019	PS	GVP2	0750	1020	2.50	TOF_190205_001
19/02/2019	PS	GVP2	1100	1330	2.50	TOF_190219_002
22/02/2019	PS	GVP3	1430	1700	2.50	TOF_190222_002
23/02/2019	PR	GVP3	1220	1450	2.50	TOF_190223_001
05/02/2019	PS	GVP4	1050	1320	2.50	TOF_190205_002
23/02/2019	PR	GVP4	1520	1750	2.50	TOF_190223_002
15/03/2019	NR	GVP1	0745	1045	3.00	TOF_190315_001
21/03/2019	JD	GVP1	1530	1830	3.00	TOF_190321_001
14/03/2019	NR	GVP2	1520	1820	3.00	TOF_190314_001
20/03/2019	JD	GVP2	1340	1640	3.00	TOF_190320_001
13/03/2019	NR	GVP3	1315	1615	3.00	TOF_190313_001
20/03/2019	JD	GVP3	0640	0940	3.00	TOF_190320_002
16/03/2019	NR	GVP4	0645	0945	3.00	TOF_190316_001
20/03/2019	JD	GVP4	1010	1310	3.00	TOF_190320_003

Date	Observer	VP	Start	End	Duration	Watch ID*
08/04/2019	JD	GVP1	1230	1530	3.00	TOF_190408_001
12/04/2019	JD	GVP1	1700	2000	3.00	TOF_190412_001
08/04/2019	JD	GVP2	1600	1900	3.00	TOF_190408_002
12/04/2019	JD	GVP2	1000	1300	3.00	TOF_190412_002
05/04/2019	JD	GVP3	1200	1500	3.00	TOF_190405_001
08/04/2019	JD	GVP3	0900	1200	3.00	TOF_190408_003
05/04/2019	JD	GVP4	1530	1830	3.00	TOF_190405_002
12/04/2019	JD	GVP4	1330	1630	3.00	TOF_190412_003

Annex 3. Weather Details for GVP Watches

Precipitation Codes: Continuous / Intermittent + Light / Heavy + Rain / Snow / Hail / Eog

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170419_001	0	10	700	nil	0	nil	20
TOF_170419_001	1	5	1000	W	1	nil	20
TOF_170419_001	2	4	1000	W	1	nil	20
TOF_170419_001	3	7	1000	nil	0	nil	20
TOF_170420_001	0	9	3000	W	3	nil	10
TOF_170420_001	1	10	3000	W	3	nil	10
TOF_170420_001	2	10	2000	W	4	nil	10
TOF_170420_001	3	10	2000	W	4	nil	10
TOF_170417_001	0	3	1000	N	3	nil	10
TOF_170417_001	1	3	1000	N	3	nil	10
TOF_170417_001	2	3	1000	N	2	nil	10
TOF_170417_001	3	3	1000	N	2	nil	10
TOF_170419_002	0	10	1000	SW	2	nil	10
TOF_170419_002	1	10	1000	SW	2	nil	10
TOF_170419_002	2	10	1000	SW	1	nil	10
TOF_170419_002	3	10	1000	SW	1	nil	10
TOF_170506_001	0	5	600	NE	1	nil	20
TOF_170506_001	1	2	1000	NE	1	nil	20
TOF_170506_001	2	2	1000	NE	1	nil	20
TOF_170506_001	3	0	1000	NE	1	nil	20
TOF_170507_004	0	10	600	NNE	1	nil	10
TOF_170507_004	1	10	600	NNE	2	nil	10
TOF_170508_002	0	10	500	NNE	1	nil	20
TOF_170508_002	1	10	500	NNE	1	nil	20
TOF_170508_003	0	10	500	NNE	1	nil	20
TOF_170508_003	1	10	500	NNE	1	nil	20
TOF_170504_001	0	10	600	E	1	nil	10
TOF_170504_001	1	10	700	E	1	nil	10
TOF_170504_002	0	10	700	E	1	nil	10
TOF_170504_002	1	10	700	E	1	nil	10
TOF_170505_001	0	1	2000	NE	2	nil	20
TOF_170505_001	1	1	2000	NE	2	nil	20
TOF_170505_001	2	3	1500	NE	2	nil	20
TOF_170505_001	3	3	1500	NE	3	nil	20
TOF_170509_001	0	9	700	nil	0	nil	20
TOF_170509_001	1	9	700	NNW	1	nil	20
TOF_170509_001	2	8	800	NNW	1	nil	20
TOF_170509_001	3	8	700	NNW	1	nil	20
TOF_170505_002	0	2	400	NE	2	nil	20
TOF_170505_002	1	2	2000	NE	1	nil	20
TOF_170505_002	2	3	2000	NE	1	nil	20
TOF_170507_001	0	10	500	NNE	1	nil	5
TOF_170507_001	1	10	500	NNE	1	nil	5
TOF_170507_002	0	10	500	NNE	1	nil	5
TOF_170507_002	1	10	600	NNE	1	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170508_001	0	9	1000	NNE	1	nil	20
TOF_170508_001	1	9	1000	NNE	1	nil	20
TOF_170508_001	2	8	1000	NNE	1	nil	20
TOF_170508_001	3	8	1000	NNE	1	nil	20
TOF_170504_003	0	0	-	NE	2	nil	20
TOF_170504_003	1	0	-	NE	2	nil	20
TOF_170504_003	2	0	-	NE	1	nil	20
TOF_170505_003	0	10	100	nil	0	CLF	0.1
TOF_170505_003	1	10	100	nil	0	ILF	2
TOF_170505_004	0	9	200	nil	0	ILF	2
TOF_170505_004	1	7	200	nil	0	nil	3
TOF_170507_003	0	10	600	NNE	2	nil	20
TOF_170507_003	1	9	600	NNE	2	nil	20
TOF_170507_003	2	9	600	NNE	3	nil	20
TOF_170606_001	0	10	400	NE	3	CLR	3
TOF_170606_001	1	10	400	NE	3	CLR	3
TOF_170606_001	2	10	400	NE	3	CHR	3
TOF_170606_001	3	10	500	NE	3	CLR	3
TOF_170614_002	0	10	1000	SW	2	nil	20
TOF_170614_002	1	10	1000	SW	1	nil	20
TOF_170614_002	2	10	1000	SW	1	nil	20
TOF_170614_002	3	8	2000	SW	1	nil	20
TOF_170625_001	0	10	1000	NW	3	nil	10
TOF_170625_001	1	9	1000	NW	3	nil	10
TOF_170625_001	2	9	1000	NW	3	nil	10
TOF_170625_001	3	10	1000	NW	3	nil	10
TOF_170605_001	0	10	700	E	3	nil	10
TOF_170605_001	1	10	700	E	3	nil	10
TOF_170605_001	2	10	500	E	3	nil	5
TOF_170605_001	3	10	400	E	3	CLR	2
TOF_170619_001	0	10	400	NW	1	ILR	10
TOF_170619_001	1	10	400	NW	1	CLR	10
TOF_170619_001	2	10	600	W	1	ILR	15
TOF_170619_001	3	10	600	W	2	nil	15
TOF_170624_001	0	1	1000	SW	3	nil	20
TOF_170624_001	1	2	1000	SW	4	nil	20
TOF_170624_001	2	5	1000	SW	4	ILR	20
TOF_170607_001	0	9	1000	NW	4	nil	10
TOF_170607_001	1	9	1000	NW	5	nil	10
TOF_170607_001	2	10	1000	NW	5	nil	10
TOF_170607_001	3	10	1000	NW	4	ILR	10
TOF_170615_002	0	8	2000	SW	2	nil	10
TOF_170615_002	1	7	2000	SW	2	nil	10
TOF_170615_002	2	9	2000	SW	2	IHR	10
TOF_170615_002	3	10	2000	SW	2	ILR	10
TOF_170625_002	0	7	1000	NW	3	nil	10
TOF_170625_002	1	8	1000	NW	3	nil	10
TOF_170625_002	2	8	1000	NW	3	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170625_002	3	9	1000	NW	3	nil	10
TOF_170605_002	0	10	500	SE	3	nil	5
TOF_170605_002	1	10	500	SE	3	nil	5
TOF_170605_002	2	10	500	SE	3	nil	5
TOF_170605_002	3	10	500	SE	3	nil	5
TOF_170616_004	0	8	1000	W	0	nil	10
TOF_170616_004	1	7	1000	nil	0	nil	10
TOF_170616_004	2	4	1000	W	2	nil	10
TOF_170616_004	3	6	1000	W	1	nil	10
TOF_170621_001	0	9	1000	S	3	nil	10
TOF_170621_001	1	9	1000	S	3	nil	10
TOF_170621_001	2	9	1000	S	3	nil	10
TOF_170710_001	0	9	1000	SW	2	nil	10
TOF_170710_001	1	9	1000	SW	1	nil	10
TOF_170710_001	2	9	1000	S	1	nil	10
TOF_170710_001	3	10	1000	S	1	nil	10
TOF_170715_001	0	10	1000	SSW	2	nil	5
TOF_170715_001	1	10	1000	SSW	1	IHR	5
TOF_170715_001	2	10	1000	SW	1	ILR	3
TOF_170715_001	3	10	600	SW	2	CHR	3
TOF_170717_001	0	1	1000	NW	4	nil	20
TOF_170717_001	1	0	1000	NW	3	nil	20
TOF_170717_002	0	0	-	NW	2	nil	10
TOF_170717_002	1	0	-	NW	2	nil	10
TOF_170703_001	0	9	1000	W	4	nil	10
TOF_170703_001	1	9	1000	NW	4	nil	10
TOF_170703_001	2	9	1000	NW	3	nil	10
TOF_170713_001	0	8	1000	nil	0	nil	20
TOF_170713_001	1	9	1000	nil	0	nil	20
TOF_170713_001	2	9	1000	NW	1	nil	20
TOF_170713_001	3	10	1000	NW	1	nil	20
TOF_170713_002	0	9	1000	nil	0	nil	20
TOF_170713_002	1	10	1000	NW	1	nil	20
TOF_170707_001	0	10	1000	NW	1	nil	10
TOF_170707_001	1	10	1000	NW	1	nil	10
TOF_170707_001	2	9	1000	NW	2	nil	10
TOF_170707_001	3	10	1000	NW	3	nil	10
TOF_170714_001	0	7	1000	NW	2	nil	20
TOF_170714_001	1	8	1000	NW	2	nil	20
TOF_170714_001	2	9	1000	NW	3	nil	20
TOF_170714_001	3	10	1000	NW	3	ILR	20
TOF_170719_001	0	10	300	SE	3	nil	10
TOF_170719_001	1	8	300	SE	4	nil	10
TOF_170719_001	2	9	300	SE	4	nil	10
TOF_170719_002	0	9	300	SE	4	nil	10
TOF_170719_002	1	8	300	SE	4	nil	10
TOF_170705_001	0	1	2000	SE	3	nil	10
TOF_170705_001	1	1	2000	SE	3	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170705_001	2	1	2000	SE	3	nil	10
TOF_170711_001	0	8	1000	W	2	nil	20
TOF_170711_001	1	7	1000	NW	2	nil	20
TOF_170711_002	0	7	1000	NW	2	nil	20
TOF_170711_002	1	6	1000	N	1	nil	20
TOF_170711_002	2	6	1000	NW	1	nil	20
TOF_170808_001	0	10	600	N	3	nil	6
TOF_170808_002	0	10	600	N	3	nil	6
TOF_170808_002	1	10	600	N	3	nil	6
TOF_170808_002	2	10	600	N	3	nil	6
TOF_170809_001	0	10	600	NNW	4	nil	6
TOF_170809_001	1	10	600	NNW	5	nil	6
TOF_170809_001	2	9	600	NNW	5	nil	6
TOF_170809_001	3	9	600	NNW	5	nil	6
TOF_170823_001	0	10	500	SE	3	nil	5
TOF_170823_001	1	10	500	SE	3	nil	5
TOF_170823_001	2	10	500	SE	3	nil	5
TOF_170823_002	0	10	500	SE	3	nil	5
TOF_170823_002	1	10	500	SE	4	ILR	5
TOF_170809_002	0	5	600	NNW	5	nil	6
TOF_170809_002	1	3	600	NNW	5	nil	6
TOF_170809_003	0	7	600	NNW	5	nil	6
TOF_170809_003	1	5	600	NNW	5	nil	6
TOF_170810_001	0	9	700	WSW	4	nil	6
TOF_170810_001	1	10	700	WSW	4	nil	6
TOF_170810_001	2	8	700	WSW	4	nil	6
TOF_170810_001	3	7	700	WSW	3	nil	6
TOF_170808_003	0	4	1000	N	4	nil	6
TOF_170808_003	1	1	1000	N	4	nil	6
TOF_170808_004	0	4	1000	N	4	nil	6
TOF_170808_004	1	4	1000	N	3	nil	6
TOF_170809_004	0	10	600	N	4	nil	4
TOF_170809_004	1	9	600	N	4	ILR	3
TOF_170809_004	2	9	600	NNW	3	ILR	3
TOF_170809_004	3	9	600	NNW	5	nil	4
TOF_170810_002	0	10	700	WSW	5	nil	4
TOF_170810_003	0	8	700	WSW	5	nil	4
TOF_170810_003	1	7	700	WSW	5	nil	6
TOF_170810_003	2	8	700	WSW	5	nil	6
TOF_170808_005	0	8	1000	NE	4	nil	6
TOF_170808_005	1	6	1000	NE	4	nil	6
TOF_170808_005	2	7	1000	NE	4	nil	6
TOF_170808_005	3	9	1000	NE	4	nil	6
TOF_170810_004	0	4	700	WSW	3	nil	6
TOF_170810_004	1	5	700	WSW	4	nil	6
TOF_170810_005	0	4	700	WSW	4	nil	6
TOF_170810_005	1	8	700	WSW	5	nil	6
TOF_170913_001	0	6	600	WNW	4	nil	6

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170913_001	1	5	600	WNW	4	nil	6
TOF_170913_002	0	3	600	WNW	4	nil	6
TOF_170913_002	1	2	600	WNW	4	nil	6
TOF_170914_001	0	8	500	NW	5	nil	6
TOF_170914_001	1	9	500	NW	5	IHR	4
TOF_170914_001	2	10	500	NW	5	IHR	4
TOF_170914_001	3	10	400	NW	5	IHR	4
TOF_170912_001	0	5	500	WNW	3	nil	6
TOF_170912_001	1	5	500	WNW	3	IHR	4
TOF_170912_001	2	10	500	NW	4	IHR	6
TOF_170912_001	3	10	500	NW	4	IHR	6
TOF_170913_003	0	10	600	W	2	nil	6
TOF_170913_003	1	6	600	W	2	nil	6
TOF_170913_004	0	5	600	WNW	3	nil	6
TOF_170913_004	1	6	600	WNW	3	nil	6
TOF_170912_002	0	3	600	NW	3	nil	6
TOF_170912_002	1	9	500	NW	3	nil	6
TOF_170912_003	0	10	500	NW	3	nil	6
TOF_170912_003	1	10	500	WNW	3	ILR	6
TOF_170911_001	0	10	500	W	6	nil	4
TOF_170911_001	1	9	500	W	6	nil	4
TOF_170911_001	2	10	500	NW	5	nil	4
TOF_170911_002	0	10	500	NW	6	CLR	2
TOF_170912_004	0	10	500	WNW	3	nil	6
TOF_170912_004	1	10	500	WNW	2	nil	6
TOF_170912_005	0	10	500	WNW	3	nil	6
TOF_170912_005	1	10	500	WNW	3	nil	6
TOF_170912_005	2	10	500	WNW	3	nil	6
TOF_170914_002	0	8	500	NW	4	nil	6
TOF_170914_002	1	10	500	NW	4	IHR	4
TOF_170914_002	2	9	500	NW	4	IHR	4
TOF_170914_002	3	9	500	NW	4	IHR	4
TOF_171004_001	0	7	1000	W	6	nil	6
TOF_171004_001	1	5	1000	SW	6	IHR	6
TOF_171004_001	2	7	1000	SW	5	IHR	6
TOF_171004_001	3	8	1000	SW	5	IHR	6
TOF_171007_001	0	10	500	W	4	IHR	3
TOF_171007_001	1	10	500	W	4	IHR	3
TOF_171017_001	0	10	300	NW	2	CLR	5
TOF_171017_001	1	10	300	NW	1	ILR	3
TOF_171017_001	2	10	300	N	2	CLR	3
TOF_171004_002	0	6	1000	WSW	5	nil	6
TOF_171004_002	1	6	1000	WSW	5	IHR	6
TOF_171004_003	0	5	1000	WSW	5	nil	6
TOF_171004_003	1	5	1000	WSW	4	nil	6
TOF_171005_001	0	10	1000	WNW	6	nil	6
TOF_171005_001	1	9	1000	NW	6	IHR	6
TOF_171017_002	0	10	400	N	3	CLR	5

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_171017_002	1	10	300	N	3	CLR	3
TOF_171017_002	2	10	300	N	3	CLR	3
TOF_171017_002	3	10	500	N	4	ILR	10
TOF_171003_001	0	8	1000	W	6	nil	6
TOF_171003_001	1	8	1000	W	6	nil	6
TOF_171003_002	0	8	1000	W	6	nil	6
TOF_171003_002	1	5	1000	W	5	nil	6
TOF_171005_002	0	6	1000	NW	6	ILR	6
TOF_171005_002	1	7	1000	NW	6	ILR	6
TOF_171005_002	2	9	1000	WNW	6	ILR	6
TOF_171005_002	3	9	1000	NW	6	ILR	6
TOF_171005_003	0	4	1000	NW	5	nil	6
TOF_171005_003	1	4	1000	WNW	5	ILR	6
TOF_171005_004	0	10	1000	NW	6	nil	6
TOF_171005_004	1	9	1000	NW	6	IHR	4
TOF_171005_004	2	8	1000	NW	6	IHR	6
TOF_171007_002	0	8	500	W	4	nil	6
TOF_171007_002	1	10	500	W	4	IHR	3
TOF_171007_002	2	10	500	W	4	ILR	4
TOF_171007_002	3	10	500	WNW	4	ILR	4
TOF_171120_001	0	10	600	NE	3	nil	3
TOF_171120_001	1	10	600	NE	3	nil	3
TOF_171123_001	0	10	500	SW	3	nil	6
TOF_171123_001	1	10	500	SW	3	ILS	6
TOF_171123_001	2	10	500	SW	3	ILS	6
TOF_171124_001	0	2	1000	WSW	4	nil	6
TOF_171124_001	1	2	1000	WSW	4	nil	6
TOF_171120_002	0	10	600	NNE	3	ILR	4
TOF_171120_002	1	10	600	NE	3	ILR	4
TOF_171120_002	2	10	600	NE	3	nil	4
TOF_171121_001	0	10	400	NE	3	ILR	3
TOF_171121_001	1	10	400	NE	3	CLR	3
TOF_171121_001	2	10	400	NE	4	CHR	3
TOF_171124_002	0	3	900	WSW	3	nil	2
TOF_171122_001	0	10	700	SW	2	nil	3
TOF_171122_001	1	10	700	SW	2	nil	5
TOF_171122_002	0	10	700	SW	2	nil	5
TOF_171122_002	1	10	700	SW	2	nil	5
TOF_171122_002	2	10	700	SW	2	nil	5
TOF_171122_003	0	10	700	SW	2	nil	4
TOF_171122_003	1	10	700	SW	2	nil	4
TOF_171122_003	2	10	700	SW	2	nil	4
TOF_171123_002	0	4	700	WSW	3	nil	6
TOF_171123_002	1	5	600	WSW	4	ILS	4
TOF_171123_002	2	10	600	WSW	4	ILS	4
TOF_171123_003	0	5	600	WSW	5	ILS	2
TOF_171123_003	1	8	600	WSW	5	ILS	2
TOF_171124_003	0	1	900	WSW	4	nil	6

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_171124_003	1	1	900	WSW	4	nil	6
TOF_171124_003	2	1	900	WSW	5	nil	6
TOF_171207_001	0	8	500	W	6	ILR	1
TOF_171207_001	1	8	500	W	6	ILR	2
TOF_171207_002	0	10	400	W	7	nil	2
TOF_171207_002	1	10	500	W	7	nil	2
TOF_171207_003	0	10	500	W	7	ILR	3
TOF_171207_003	1	10	500	W	7	IHR	3
TOF_171207_003	2	9	500	W	7	IHR	3
TOF_171205_001	0	10	700	W	4	nil	6
TOF_171205_001	1	9	700	W	4	nil	6
TOF_171205_001	2	9	700	W	4	nil	6
TOF_171207_004	0	8	500	W	7	ILR	2
TOF_171207_004	1	10	500	W	7	ILR	2
TOF_171206_001	0	8	600	SSW	5	nil	4
TOF_171206_001	1	8	600	S	5	nil	4
TOF_171206_001	2	5	600	S	6	nil	5
TOF_171206_002	0	5	600	S	6	nil	4
TOF_171206_002	1	5	600	S	5	nil	4
TOF_171206_003	0	10	600	SW	4	nil	1
TOF_171206_003	1	10	600	SW	4	nil	2
TOF_171206_004	0	10	600	S	4	nil	2
TOF_171206_004	1	10	600	S	5	nil	2
TOF_171206_004	2	10	600	S	5	nil	3
TOF_180108_001	0	2	700	SW	4	nil	6
TOF_180108_001	1	4	700	SW	4	nil	6
TOF_180108_002	0	4	700	SW	4	nil	6
TOF_180108_002	1	4	700	SW	4	nil	6
TOF_180112_001	0	2	900	SW	3	nil	6
TOF_180112_001	1	4	900	SW	3	nil	6
TOF_180112_002	0	4	900	SW	3	nil	6
TOF_180112_002	1	7	900	SW	3	nil	6
TOF_180109_001	0	10	500	WSW	5	nil	2
TOF_180109_001	1	10	500	WSW	5	nil	2
TOF_180110_001	0	10	500	SE	2	nil	4
TOF_180110_002	0	10	500	SE	2	nil	4
TOF_180112_003	0	8	900	SW	3	nil	6
TOF_180112_003	1	6	500	SW	3	nil	6
TOF_180112_003	2	9	500	SW	4	nil	6
TOF_180109_002	0	10	500	SE	6	nil	3
TOF_180109_002	1	10	500	SE	6	nil	3
TOF_180109_002	2	10	500	SE	6	nil	3
TOF_180110_003	0	6	500	SE	1	nil	4
TOF_180110_003	1	6	500	SE	2	nil	4
TOF_180110_004	0	6	500	SE	2	nil	4
TOF_180110_004	1	9	500	SE	2	nil	5
TOF_180109_003	0	10	500	S	5	nil	3
TOF_180109_003	1	10	500	S	5	nil	3

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180109_004	0	10	500	SE	6	ILR	2
TOF_180109_004	1	10	500	SE	6	ILR	2
TOF_180109_005	0	10	500	SE	6	ILR	2
TOF_180109_005	1	10	500	SE	6	ILR	2
TOF_180110_005	0	7	500	SE	2	nil	4
TOF_180110_005	1	10	500	SE	2	nil	4
TOF_180110_005	2	10	500	SE	2	nil	4
TOF_180214_001	0	8	700	S	6	nil	10
TOF_180214_001	1	9	700	S	5	nil	10
TOF_180214_001	2	7	700	S	5	nil	10
TOF_180214_001	3	6	700	S	5	nil	10
TOF_180216_001	0	5	1000	SW	2	nil	20
TOF_180216_001	1	3	1000	SW	3	nil	20
TOF_180216_001	2	5	1000	SW	2	nil	20
TOF_180214_002	0	10	500	S	5	nil	15
TOF_180214_002	1	10	500	S	6	nil	15
TOF_180214_002	2	10	500	S	6	IHR	5
TOF_180214_002	3	10	500	S	6	ILR	5
TOF_180222_001	0	4	1000	SW	4	nil	20
TOF_180222_001	1	3	1000	SW	3	nil	20
TOF_180222_001	2	3	1000	SW	3	nil	20
TOF_180213_001	0	10	500	W	1	CLR	5
TOF_180213_001	1	10	500	W	1	ILR	10
TOF_180213_001	2	10	500	W	1	nil	10
TOF_180213_001	3	10	500	SW	1	nil	10
TOF_180216_002	0	5	1000	SW	3	nil	20
TOF_180216_002	1	4	1000	SW	3	nil	20
TOF_180216_002	2	6	1000	SW	3	nil	20
TOF_180213_002	0	9	800	SW	1	nil	10
TOF_180213_002	1	7	800	SW	2	nil	10
TOF_180213_003	0	2	800	SW	2	nil	10
TOF_180213_003	1	1	800	SW	1	nil	10
TOF_180222_002	0	7	1000	SW	3	nil	20
TOF_180222_002	1	5	1000	SW	4	nil	20
TOF_180222_002	2	4	1000	SW	4	nil	20
TOF_180222_002	3	4	1000	SW	3	nil	20
TOF_180307_001	0	10	300	SE	1	nil	4
TOF_180307_001	1	10	400	SE	1	nil	5
TOF_180307_001	2	10	300	SE	1	nil	3
TOF_180307_001	3	10	300	SE	1	ILR	3
TOF_180315_001	0	10	700	SE	5	nil	5
TOF_180315_001	1	10	700	SE	6	nil	5
TOF_180315_001	2	10	700	SE	6	ILR	5
TOF_180315_001	3	10	500	SE	5	ILR	3
TOF_180316_001	0	10	500	SE	5	ILR	4
TOF_180316_001	1	10	500	SE	5	nil	10
TOF_180316_001	2	10	700	SE	5	ILR	10
TOF_180316_001	3	10	500	SE	5	ILR	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180321_001	0	10	1000	WSW	4	nil	20
TOF_180321_001	1	10	1000	W	4	ILR	20
TOF_180321_001	2	8	1000	W	3	nil	20
TOF_180321_001	3	4	1000	W	3	nil	20
TOF_180320_001	0	3	1000	NNW	3	nil	20
TOF_180320_001	1	3	1000	NNW	3	nil	20
TOF_180320_001	2	3	1000	NNW	2	nil	20
TOF_180320_001	3	2	1000	NNW	3	nil	20
TOF_180328_001	0	10	500	SW	1	nil	10
TOF_180328_001	1	10	600	SW	1	nil	10
TOF_180328_001	2	10	600	SW	1	nil	10
TOF_180328_001	3	10	700	SW	1	nil	10
TOF_180307_002	0	10	400	SE	1	nil	3
TOF_180307_002	1	9	500	S	2	nil	5
TOF_180307_002	2	8	500	S	3	nil	10
TOF_180307_002	3	7	500	S	3	nil	10
TOF_180315_002	0	10	700	SE	6	nil	5
TOF_180315_002	1	10	700	SE	7	nil	5
TOF_180315_002	2	10	700	SE	6	nil	5
TOF_180315_002	3	10	700	SE	7	nil	5
TOF_180403_001	0	10	1000	E	2	nil	5
TOF_180403_001	1	10	1000	E	3	ILR	5
TOF_180403_001	2	10	1000	E	4	IHR	3
TOF_180403_001	3	10	1000	E	4	nil	5
TOF_180411_001	0	10	500	SE	2	ILR	2
TOF_180411_001	1	10	500	SE	2	nil	5
TOF_180411_001	2	10	500	SE	2	nil	5
TOF_180411_001	3	10	1000	SE	2	nil	5
TOF_180413_001	0	10	500	E	3	nil	5
TOF_180413_001	1	10	500	E	3	nil	5
TOF_180413_001	2	10	400	E	3	nil	5
TOF_180413_001	3	10	300	E	3	ILR	3
TOF_180424_001	0	8	1000	W	3	nil	10
TOF_180424_001	1	8	1000	W	3	nil	10
TOF_180424_001	2	7	1000	W	4	nil	10
TOF_180424_001	3	7	1000	W	4	nil	10
TOF_180412_001	0	3	500	E	2	nil	5
TOF_180412_001	1	1	1000	E	2	nil	5
TOF_180412_001	2	3	1000	E	3	nil	5
TOF_180412_001	3	3	1000	E	3	nil	5
TOF_180401_001	0	4	1000	SE	3	nil	15
TOF_180401_001	1	5	1000	SE	3	nil	15
TOF_180401_001	2	8	1000	W	2	nil	15
TOF_180401_001	3	7	1000	SW	1	nil	15
TOF_180402_001	0	5	1000	NE	3	nil	15
TOF_180402_001	1	9	1000	E	3	nil	15
TOF_180402_001	2	8	500	E	3	nil	15
TOF_180402_001	3	8	500	E	4	nil	15

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180415_001	0	2	1000	SE	3	nil	5
TOF_180415_001	1	1	1000	SE	3	nil	5
TOF_180415_001	2	1	1000	SE	2	nil	5
TOF_180415_001	3	1	1000	SE	2	nil	5
TOF_180425_001	0	2	1000	NW	1	nil	20
TOF_180425_001	1	3	1000	S	1	nil	20
TOF_180425_001	2	3	1000	S	1	nil	20
TOF_180425_001	3	5	1000	NW	1	nil	20
TOF_180402_002	0	8	1000	S	1	nil	2
TOF_180402_002	1	7	1000	S	1	nil	2
TOF_180402_002	2	6	1000	SE	3	nil	2
TOF_180402_002	3	4	1000	E	2	nil	2
TOF_180411_002	0	10	1000	SE	4	nil	10
TOF_180411_002	1	10	1000	SE	4	nil	10
TOF_180411_002	2	5	1000	SE	4	nil	20
TOF_180411_002	3	4	1000	SE	4	nil	20
TOF_180424_002	0	7	1000	nil	0	nil	10
TOF_180424_002	1	7	1000	nil	0	nil	10
TOF_180424_002	2	8	1000	nil	0	ILR	10
TOF_180424_002	3	9	1000	nil	0	nil	10
TOF_180503_001	0	9	1000	SE	3	nil	15
TOF_180503_001	1	10	1000	SE	3	ILR	15
TOF_180503_001	2	10	1000	S	3	ILR	15
TOF_180503_001	3	9	1000	S	3	nil	15
TOF_180515_001	0	10	1000	ESE	2	nil	10
TOF_180515_001	1	10	1000	E	3	nil	10
TOF_180515_001	2	10	1000	E	3	ILR	10
TOF_180515_001	3	10	1000	E	4	nil	10
TOF_180528_001	0	0	-	SSE	2	nil	10
TOF_180528_001	1	0	-	S	2	nil	10
TOF_180528_001	2	0	-	S	1	nil	10
TOF_180528_001	3	0	-	SE	2	nil	10
TOF_180503_002	0	9	1000	SE	3	nil	15
TOF_180503_002	1	7	500	S	3	ILR	15
TOF_180503_002	2	9	500	S	3	nil	15
TOF_180503_002	3	10	1000	S	3	nil	15
TOF_180507_001	0	9	500	SE	4	nil	20
TOF_180507_001	1	6	500	SE	4	nil	20
TOF_180507_001	2	4	1000	SE	3	nil	20
TOF_180507_001	3	2	1000	SE	3	nil	20
TOF_180529_001	0	1	1000	SW	2	nil	10
TOF_180529_001	1	3	1000	SW	1	nil	10
TOF_180529_001	2	7	1000	S	1	nil	5
TOF_180529_001	3	10	500	SW	1	nil	2
TOF_180502_001	0	10	1000	nil	0	ILR	5
TOF_180502_001	1	10	1000	nil	0	nil	5
TOF_180502_001	2	10	1000	NNW	2	nil	5
TOF_180502_001	3	10	1000	NNW	2	nil	5

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180507_002	0	10	500	SE	3	ILR	10
TOF_180507_002	1	10	500	SE	3	ILR	10
TOF_180507_002	2	10	300	SE	3	ILR	10
TOF_180507_002	3	10	300	SE	3	ILR	10
TOF_180523_001	0	0	-	SW	2	nil	15
TOF_180523_001	1	0	-	S	2	nil	15
TOF_180523_001	2	1	500	S	2	nil	15
TOF_180523_001	3	2	500	S	3	nil	15
TOF_180503_003	0	10	1000	SW	3	nil	2
TOF_180503_003	1	10	500	S	3	ILR	2
TOF_180503_003	2	10	500	SW	2	nil	2
TOF_180503_003	3	10	500	W	2	ILR	2
TOF_180508_001	0	10	1000	nil	0	nil	20
TOF_180508_001	1	10	1000	nil	0	nil	20
TOF_180508_001	2	7	1000	S	2	nil	20
TOF_180508_001	3	3	1000	S	2	nil	20
TOF_180523_002	0	3	500	S	2	nil	2
TOF_180523_002	1	3	500	S	1	nil	2
TOF_180523_002	2	3	500	SE	1	nil	2
TOF_180523_002	3	3	500	S	1	nil	2
TOF_180607_001	0	1	1000	E	3	nil	20
TOF_180607_001	1	1	1000	E	3	nil	20
TOF_180607_001	2	1	1000	E	4	nil	20
TOF_180607_001	3	1	1000	E	3	nil	20
TOF_180615_001	0	9	700	SW	3	nil	20
TOF_180615_001	1	9	800	SW	3	nil	20
TOF_180615_001	2	8	800	SW	3	nil	20
TOF_180615_001	3	9	800	SW	3	nil	20
TOF_180619_001	0	10	1000	W	3	nil	20
TOF_180619_001	1	10	1000	W	3	nil	20
TOF_180619_001	2	10	1000	W	2	nil	20
TOF_180619_001	3	10	1000	W	2	nil	20
TOF_180605_001	0	9	600	NE	1	nil	20
TOF_180605_001	1	9	700	NE	1	nil	20
TOF_180605_001	2	9	700	NE	2	nil	20
TOF_180605_001	3	7	700	NE	3	nil	20
TOF_180618_001	0	7	1000	NE	4	nil	15
TOF_180618_001	1	8	1000	NE	4	nil	15
TOF_180618_001	2	6	500	NE	4	ILR	15
TOF_180618_001	3	6	1000	NE	4	nil	15
TOF_180628_001	0	0	-	E	1	nil	5
TOF_180628_001	1	0	-	E	2	nil	5
TOF_180628_001	2	0	-	nil	0	nil	5
TOF_180628_001	3	0	-	E	2	nil	5
TOF_180601_001	0	8	1000	E	1	nil	10
TOF_180601_001	1	2	1000	E	1	nil	10
TOF_180601_001	2	3	1000	NE	1	nil	10
TOF_180601_001	3	4	1000	NE	1	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180611_001	0	9	1000	NE	2	nil	10
TOF_180611_001	1	7	1000	NE	2	nil	10
TOF_180611_001	2	4	1000	NE	2	nil	10
TOF_180611_001	3	3	1000	nil	0	nil	10
TOF_180619_002	0	9	1000	W	3	ILR	5
TOF_180619_002	1	8	1000	W	3	nil	10
TOF_180619_002	2	8	1000	NW	3	nil	10
TOF_180601_002	0	10	500	nil	0	nil	5
TOF_180601_002	1	10	500	nil	0	nil	5
TOF_180601_002	2	5	1000	nil	0	nil	5
TOF_180601_002	3	5	1000	nil	0	nil	5
TOF_180618_002	0	4	1000	NE	3	nil	2
TOF_180618_002	1	2	1000	NE	4	nil	2
TOF_180618_002	2	1	1000	NE	3	nil	2
TOF_180618_002	3	1	1000	NE	3	nil	2
TOF_180625_001	0	2	1000	nil	0	nil	5
TOF_180625_001	1	2	1000	nil	0	nil	5
TOF_180625_001	2	4	1000	nil	0	nil	5
TOF_180625_001	3	5	1000	nil	0	nil	5
TOF_180712_001	0	10	700	N	2	nil	20
TOF_180712_001	1	10	700	N	2	nil	20
TOF_180712_001	2	10	700	N	2	nil	20
TOF_180712_001	3	9	700	N	2	nil	20
TOF_180717_001	0	10	1000	E	1	nil	5
TOF_180717_001	1	10	1000	E	1	nil	5
TOF_180717_001	2	10	1000	E	0	ILR	5
TOF_180717_001	3	10	1000	E	0	ILR	5
TOF_180705_001	0	9	700	NW	3	nil	20
TOF_180705_001	1	8	1000	NW	3	nil	20
TOF_180705_001	2	4	1000	NW	3	nil	20
TOF_180705_001	3	4	1000	NW	3	nil	20
TOF_180723_001	0	4	1000	N	2	nil	10
TOF_180723_001	1	5	1000	N	2	nil	10
TOF_180723_001	2	7	1000	N	1	nil	10
TOF_180723_001	3	7	1000	N	1	nil	10
TOF_180706_001	0	8	1000	SW	2	nil	20
TOF_180706_001	1	7	1000	SW	1	nil	20
TOF_180706_001	2	8	1000	SW	2	nil	20
TOF_180706_001	3	8	1000	SW	2	nil	20
TOF_180723_002	0	8	1000	NNW	1	nil	10
TOF_180723_002	1	10	1000	NNW	0	nil	10
TOF_180723_002	2	8	1000	NNW	0	nil	10
TOF_180723_002	3	3	1000	NNW	0	nil	10
TOF_180713_001	0	8	500	nil	0	nil	20
TOF_180713_001	1	8	500	nil	0	nil	20
TOF_180713_001	2	8	500	SW	2	nil	20
TOF_180713_001	3	9	500	SW	2	nil	20
TOF_180717_002	0	10	500	nil	0	ILR	5

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180717_002	1	10	500	nil	0	ILR	5
TOF_180717_002	2	10	500	nil	0	CLR	5
TOF_180717_002	3	10	500	nil	0	nil	5
TOF_180807_001	0	8	500	SW	3	nil	20
TOF_180807_001	1	8	500	SW	3	nil	20
TOF_180807_001	2	8	500	SW	4	nil	20
TOF_180807_001	3	9	500	SW	3	nil	20
TOF_180830_001	0	3	500	W	2	nil	20
TOF_180830_001	1	4	500	W	1	nil	20
TOF_180830_001	2	2	500	W	1	nil	20
TOF_180830_001	3	2	500	W	2	nil	20
TOF_180802_001	0	10	1000	SW	2	nil	10
TOF_180802_001	1	10	1000	SW	2	nil	10
TOF_180802_001	2	10	1000	nil	0	nil	10
TOF_180802_001	3	10	1000	SW	2	nil	10
TOF_180829_001	0	2	1000	SW	2	nil	20
TOF_180829_001	1	2	1000	SW	1	nil	20
TOF_180829_001	2	1	1000	SW	2	nil	20
TOF_180829_001	3	1	1000	SW	3	nil	20
TOF_180813_001	0	10	1000	S	2	nil	10
TOF_180813_001	1	10	1000	S	2	nil	10
TOF_180813_001	2	10	1000	S	2	nil	10
TOF_180813_001	3	10	1000	S	2	nil	10
TOF_180830_002	0	4	500	W	1	nil	20
TOF_180830_002	1	5	500	W	1	nil	20
TOF_180830_002	2	7	500	W	1	nil	20
TOF_180808_001	0	7	500	SW	2	nil	20
TOF_180808_001	1	7	500	SW	2	nil	20
TOF_180808_001	2	8	500	SW	2	IHR	10
TOF_180808_001	3	8	500	SW	1	nil	20
TOF_180829_002	0	1	1000	SW	2	nil	20
TOF_180829_002	1	4	1000	SW	3	IHR	20
TOF_180829_002	2	5	1000	SW	3	nil	20
TOF_180829_002	3	7	1000	SW	2	nil	20
TOF_180906_001	0	9	1000	NW	2	nil	20
TOF_180906_001	1	9	1000	NW	2	nil	20
TOF_180906_001	2	8	1000	NW	3	nil	20
TOF_180906_001	3	8	1000	NW	3	nil	20
TOF_180926_001	0	10	800	W	3	nil	10
TOF_180926_001	1	10	800	W	3	nil	15
TOF_180926_001	2	10	800	W	3	nil	15
TOF_180926_001	3	10	800	W	2	nil	15
TOF_180905_001	0	8	1000	S	3	nil	20
TOF_180905_001	1	9	1000	S	3	nil	20
TOF_180905_001	2	9	1000	S	3	nil	20
TOF_180917_001	0	10	400	SE	3	CLR	5
TOF_180917_001	1	10	400	SE	2	CLR	5
TOF_180917_001	2	10	500	SE	3	ILR	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180917_001	3	10	500	SE	4	nil	10
TOF_180906_002	0	2	1000	W	1	nil	20
TOF_180906_002	1	3	1000	NW	1	nil	20
TOF_180906_002	2	3	1000	NW	1	nil	20
TOF_180906_002	3	4	1000	NW	2	nil	20
TOF_180918_001	0	10	400	NE	1	CLR	5
TOF_180918_001	1	10	300	N	1	CLR	5
TOF_180918_001	2	10	400	N	1	ILR	5
TOF_180918_001	3	10	400	N	1	nil	10
TOF_180907_001	0	9	1000	NW	1	nil	20
TOF_180907_001	1	9	1000	NW	1	ILR	20
TOF_180907_001	2	10	1000	NW	1	CLR	10
TOF_180907_001	3	10	500	NW	2	CLR	5
TOF_180919_001	0	8	700	SW	3	nil	20
TOF_180919_001	1	10	700	SW	4	nil	20
TOF_180919_001	2	10	700	SW	4	nil	20
TOF_180919_001	3	10	400	SW	4	ILR	10
TOF_181008_001	0	9	1000	SW	2	nil	20
TOF_181008_001	1	9	1000	SW	2	nil	20
TOF_181008_001	2	10	500	SW	2	nil	20
TOF_181008_001	3	10	500	SW	2	nil	20
TOF_181025_001	0	10	500	NW	3	ILR	20
TOF_181025_001	1	10	500	NW	3	ILR	20
TOF_181025_001	2	9	500	NW	3	nil	20
TOF_181025_001	3	9	500	NW	2	ILR	20
TOF_181003_001	0	10	500	S	3	ILR	10
TOF_181003_001	1	10	500	S	3	ILR	10
TOF_181003_001	2	10	500	SE	3	CLR	5
TOF_181003_001	3	10	400	SE	3	CLR	5
TOF_181015_001	0	8	1000	W	0	nil	10
TOF_181015_001	1	6	1000	W	2	nil	10
TOF_181015_001	2	2	1000	W	2	nil	10
TOF_181015_001	3	1	1000	SW	2	nil	10
TOF_181009_001	0	9	500	SW	1	nil	10
TOF_181009_001	1	9	500	SW	1	nil	10
TOF_181009_001	2	10	500	SW	1	nil	10
TOF_181009_001	3	10	500	SW	1	nil	10
TOF_181017_001	0	3	1000	W	4	nil	20
TOF_181017_001	1	4	1000	W	3	nil	20
TOF_181017_001	2	5	1000	W	3	nil	20
TOF_181017_001	3	6	1000	SW	2	nil	20
TOF_181003_002	0	10	400	SE	2	CLR	5
TOF_181003_002	1	10	400	SE	2	ILR	5
TOF_181003_002	2	10	400	SE	2	ILR	5
TOF_181003_002	3	10	400	SE	1	ILR	5
TOF_181010_001	0	1	1000	SW	3	nil	20
TOF_181010_001	1	1	1000	SW	3	nil	20
TOF_181010_001	2	1	1000	SW	3	nil	20

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_181010_001	3	1	1000	SSW	2	nil	20
TOF_181108_001	0	1	1000	SE	2	nil	20
TOF_181108_001	1	2	1000	SE	2	nil	20
TOF_181108_001	2	4	800	SE	4	nil	20
TOF_181108_001	3	5	800	SE	3	nil	20
TOF_181120_001	0	9	800	E	3	nil	20
TOF_181120_001	1	9	800	E	3	ILR	20
TOF_181120_001	2	9	800	E	3	nil	20
TOF_181120_001	3	9	800	E	2	nil	20
TOF_181106_001	0	10	300	SE	4	nil	5
TOF_181106_001	1	10	300	SE	4	nil	5
TOF_181106_001	2	10	300	SE	4	nil	10
TOF_181106_001	3	10	300	SE	4	nil	10
TOF_181123_001	0	10	600	E	2	nil	20
TOF_181123_001	1	9	600	E	2	nil	20
TOF_181123_001	2	9	600	E	2	nil	20
TOF_181123_001	3	9	600	E	2	nil	20
TOF_181106_002	0	10	300	SE	3	nil	4
TOF_181106_002	1	10	300	SE	4	nil	4
TOF_181106_002	2	10	300	SE	4	nil	3
TOF_181106_002	3	10	300	SE	4	nil	4
TOF_181122_001	0	10	500	SE	3	nil	20
TOF_181122_001	1	10	400	SE	3	ILR	10
TOF_181122_001	2	10	400	SE	3	nil	20
TOF_181122_001	3	10	400	SE	3	ILR	10
TOF_181108_002	0	1	1000	S	2	nil	20
TOF_181108_002	1	1	1000	S	1	nil	20
TOF_181108_002	2	1	1000	S	1	nil	20
TOF_181108_002	3	1	1000	SE	2	nil	20
TOF_181123_002	0	8	500	E	1	nil	10
TOF_181123_002	1	9	600	E	1	nil	10
TOF_181123_002	2	10	600	E	2	IHR	10
TOF_181123_002	3	10	600	E	2	nil	10
TOF_181206_001	0	10	500	SE	3	ILR	20
TOF_181206_001	1	10	500	E	2	ILR	20
TOF_181206_001	2	6	1000	E	2	ILR	20
TOF_181214_001	0	7	1000	S	3	nil	20
TOF_181214_001	1	8	1000	SE	3	nil	20
TOF_181214_001	2	7	1000	SE	3	nil	20
TOF_181206_002	0	6	1000	SE	2	nil	25
TOF_181206_002	1	7	1000	SE	2	ILR	25
TOF_181206_002	2	7	1000	SE	1	nil	25
TOF_181213_001	0	9	800	SE	4	nil	20
TOF_181213_001	1	9	800	SE	5	nil	20
TOF_181213_001	2	10	800	SE	5	nil	20
TOF_181202_001	0	1	1000	nil	0	nil	10
TOF_181202_001	1	2	1000	nil	0	nil	10
TOF_181202_001	2	9	1000	nil	0	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_181213_002	0	9	800	SE	5	nil	20
TOF_181213_002	1	9	800	SE	6	nil	20
TOF_181213_002	2	9	800	SE	5	nil	20
TOF_181202_002	0	7	1000	nil	0	nil	5
TOF_181202_002	1	10	1000	nil	0	nil	5
TOF_181202_002	2	10	1000	nil	0	nil	5
TOF_181214_002	0	7	1000	SE	3	nil	20
TOF_181214_002	1	7	1000	SE	4	nil	20
TOF_181214_002	2	8	1000	SE	4	nil	20
TOF_190121_001	0	10	1000	SE	4	nil	10
TOF_190121_001	1	10	1000	SE	4	nil	10
TOF_190121_001	2	10	1000	SE	4	nil	10
TOF_190130_001	0	10	1000	SW	3	ILR	10
TOF_190130_001	1	10	1000	SW	3	nil	10
TOF_190130_001	2	10	1000	SW	2	ILR	10
TOF_190124_001	0	6	1000	nil	0	nil	10
TOF_190124_001	1	10	1000	nil	0	nil	10
TOF_190124_001	2	6	1000	nil	0	nil	10
TOF_190130_002	0	9	500	nil	0	ILR	5
TOF_190130_002	1	6	1000	SW	3	ILR	5
TOF_190130_002	2	9	1000	SW	3	nil	5
TOF_190121_002	0	10	1000	SW	3	nil	5
TOF_190121_002	1	10	1000	SW	3	nil	5
TOF_190121_002	2	10	1000	SW	3	nil	5
TOF_190124_002	0	10	1000	nil	0	nil	10
TOF_190124_002	1	9	1000	nil	0	nil	10
TOF_190124_002	2	10	1000	nil	0	nil	10
TOF_190121_003	0	10	1000	SSE	4	nil	5
TOF_190121_003	1	10	1000	SSE	4	nil	5
TOF_190121_003	2	10	1000	SSE	4	nil	5
TOF_190219_001	0	4	1000	SW	1	nil	10
TOF_190219_001	1	7	1000	SW	1	nil	10
TOF_190219_001	2	7	1000	nil	0	ILR	10
TOF_190219_001	3	9	1000	W	2	IHR	10
TOF_190222_001	0	8	1000	nil	0	nil	10
TOF_190222_001	1	10	1000	W	3	nil	10
TOF_190222_001	2	10	1000	W	3	nil	10
TOF_190222_001	3	10	1000	W	2	nil	10
TOF_190205_001	0	3	1000	nil	0	nil	10
TOF_190205_001	1	0	-	nil	0	nil	10
TOF_190205_001	2	0	-	nil	0	nil	10
TOF_190205_001	3	0	-	nil	0	nil	10
TOF_190219_002	0	5	1000	nil	0	nil	10
TOF_190219_002	1	9	1000	W	1	nil	10
TOF_190219_002	2	10	1000	nil	0	nil	10
TOF_190219_002	3	10	1000	nil	0	nil	10
TOF_190222_002	0	10	1000	SE	2	nil	10
TOF_190222_002	1	10	1000	S	1	nil	10

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_190222_002	2	10	1000	S	2	nil	10
TOF_190222_002	3	10	1000	S	1	nil	10
TOF_190223_001	0	10	1000	S	3	nil	10
TOF_190223_001	1	10	1000	S	3	nil	10
TOF_190223_001	2	10	1000	S	3	nil	10
TOF_190223_001	3	10	1000	S	3	nil	10
TOF_190205_002	0	0	-	nil	0	nil	10
TOF_190205_002	1	0	-	nil	0	nil	10
TOF_190205_002	2	0	-	SE	3	nil	10
TOF_190205_002	3	1	1000	ESE	4	nil	10
TOF_190223_002	0	10	1000	S	3	nil	10
TOF_190223_002	1	10	1000	S	3	nil	10
TOF_190223_002	2	10	1000	S	3	nil	10
TOF_190223_002	3	8	1000	S	3	nil	10
TOF_190315_001	0	9	600	W	4	CHR	10
TOF_190315_001	1	7	1000	W	4	IHR	20
TOF_190315_001	2	9	1000	W	4	IHR	10
TOF_190315_001	3	10	500	W	4	IHR	10
TOF_190321_001	0	6	1000	S	1	nil	5
TOF_190321_001	1	8	1000	S	2	nil	5
TOF_190321_001	2	5	1000	S	1	nil	5
TOF_190321_001	3	8	1000	S	3	nil	5
TOF_190314_001	0	7	700	NW	3	nil	20
TOF_190314_001	1	7	700	NW	3	nil	20
TOF_190314_001	2	6	700	NW	3	nil	20
TOF_190314_001	3	4	700	NW	2	nil	20
TOF_190320_001	0	10	1000	SW	2	nil	5
TOF_190320_001	1	10	1000	SW	3	nil	5
TOF_190320_001	2	10	1000	SW	3	nil	5
TOF_190320_001	3	9	1000	SW	3	nil	5
TOF_190313_001	0	5	1000	NW	5	nil	20
TOF_190313_001	1	6	1000	NW	4	ILR	20
TOF_190313_001	2	7	1000	NW	4	nil	20
TOF_190313_001	3	9	1000	NW	4	ILR	20
TOF_190320_002	0	10	1000	SE	1	nil	5
TOF_190320_002	1	10	1000	SE	1	nil	5
TOF_190320_002	2	10	1000	SE	1	nil	5
TOF_190320_002	3	9	1000	SE	1	nil	5
TOF_190316_001	0	10	500	SW	2	nil	10
TOF_190316_001	1	10	500	SW	2	nil	10
TOF_190316_001	2	10	500	SW	2	nil	10
TOF_190316_001	3	10	500	SW	3	nil	10
TOF_190320_003	0	8	1000	S	2	nil	2
TOF_190320_003	1	7	1000	S	2	nil	2
TOF_190320_003	2	8	1000	S	3	nil	2
TOF_190320_003	3	10	1000	S	3	nil	2
TOF_190408_001	0	10	1000	NE	2	nil	5
TOF_190408_001	1	10	1000	NE	1	nil	5

Watch ID	Hour	Cloud 10ths	Cloud Base	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_190408_001	2	10	1000	NE	1	nil	5
TOF_190408_001	3	10	1000	NE	1	nil	5
TOF_190412_001	0	0	-	SE	3	nil	5
TOF_190412_001	1	0	-	SE	3	nil	5
TOF_190412_001	2	0	-	SE	3	nil	5
TOF_190412_001	3	5	1000	SE	3	nil	5
TOF_190408_002	0	9	1000	SE	2	nil	5
TOF_190408_002	1	9	1000	SE	1	nil	5
TOF_190408_002	2	9	1000	SE	1	nil	5
TOF_190408_002	3	10	1000	SE	1	nil	5
TOF_190412_002	0	9	1000	SE	3	nil	5
TOF_190412_002	1	9	1000	SE	3	nil	5
TOF_190412_002	2	10	1000	SE	3	nil	5
TOF_190412_002	3	9	1000	SE	3	nil	5
TOF_190405_001	0	10	1000	SE	2	nil	5
TOF_190405_001	1	9	1000	SE	2	nil	5
TOF_190405_001	2	6	1000	SE	2	nil	5
TOF_190405_001	3	1	1000	SE	1	nil	5
TOF_190408_003	0	10	1000	NW	1	nil	5
TOF_190408_003	1	10	1000	NW	1	nil	5
TOF_190408_003	2	10	1000	N	2	nil	5
TOF_190408_003	3	10	1000	N	2	nil	5
TOF_190405_002	0	1	1000	SE	1	nil	2
TOF_190405_002	1	0	-	SE	1	nil	2
TOF_190405_002	2	0	-	nil	0	nil	2
TOF_190405_002	3	0	-	SE	1	nil	2
TOF_190412_003	0	9	1000	SE	2	nil	2
TOF_190412_003	1	8	1000	SE	2	nil	2
TOF_190412_003	2	5	1000	SE	3	nil	2
TOF_190412_003	3	0	-	SE	3	nil	2

Annex 4. Migration Watch Point Survey Information

*Watch ID relates to Annex 5 Weather Details for MWP Watches

Date	Observer	MWP	Start	End	Duration	Watch ID*
20/09/2017	NR	MWPA	0755	1055	3.00	TOF_170920_001
22/09/2017	NR	MWPA	1625	1925	3.00	TOF_170922_001
23/09/2017	NR	MWPA	1420	1720	3.00	TOF_170923_001
18/10/2017	NR	MWPA	1555	1825	2.50	TOF_171018_001
27/10/2017	DL	MWPA	1500	1800	3.00	TOF_171027_001
04/10/2017	DJC	MWPB	0900	1200	3.00	TOF_171004_004
07/10/2017	DJC	MWPB	0915	1215	3.00	TOF_171007_003
07/10/2017	DJC	MWPB	1605	1735	1.50	TOF_171007_004
08/10/2017	DJC	MWPB	0755	1055	3.00	TOF_171008_001
03/11/2017	NR	MWPA	0845	1045	2.00	TOF_171103_001
13/11/2017	NR	MWPA	1000	1300	3.00	TOF_171113_001
16/11/2017	NR	MWPA	0750	1050	3.00	TOF_171116_001
17/11/2017	NR	MWPA	1245	1545	3.00	TOF_171117_001
16/03/2018	KC	MWPB	1010	1110	1.00	TOF_180316_002
19/03/2018	PR	MWPB	1440	1740	3.00	TOF_180319_001
22/03/2018	PR	MWPB	0635	0935	3.00	TOF_180322_001
28/03/2018	NR	MWPB	1725	1925	2.00	TOF_180328_002
03/04/2018	PR	MWPB	1500	1800	3.00	TOF_180403_002
05/04/2018	PR	MWPB	0615	0915	3.00	TOF_180405_001
12/04/2018	PS	MWPB	0915	1215	3.00	TOF_180412_002
17/04/2018	JD	MWPB	1030	1330	3.00	TOF_180417_001
23/04/2018	PR	MWPB	1425	1725	3.00	TOF_180423_001
24/04/2018	PS	MWPB	0555	0855	3.00	TOF_180424_003
24/04/2018	JD	MWPB	1350	1650	3.00	TOF_180424_004
02/05/2018	PS	MWPB	0910	1210	3.00	TOF_180502_002
08/05/2018	PR	MWPB	0845	1145	3.00	TOF_180508_002

Annex 5. Weather Details for MWP Watches

*Precipitation Codes: Continuous / Intermittent + Light / Heavy + Rain / Snow / Hail / Fog

Watch ID	Hour	Cloud 10ths	Cloud Base (m)	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170920_001	0	9	1000	SW	1	nil	20
TOF_170920_001	1	10	1000	SW	1	nil	20
TOF_170920_001	2	10	1000	S	2	nil	20
TOF_170920_001	3	10	1000	S	2	ILR	10
TOF_170922_001	0	9	1000	SE	3	nil	20
TOF_170922_001	1	10	1000	SE	3	nil	20
TOF_170922_001	2	10	1000	SE	3	nil	20
TOF_170922_001	3	9	1000	SE	3	nil	20
TOF_170923_001	0	1	1000	S	3	nil	20
TOF_170923_001	1	1	1000	S	3	nil	20
TOF_170923_001	2	2	1000	S	3	nil	20

Watch ID	Hour	Cloud 10ths	Cloud Base (m)	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_170923_001	3	2	1000	S	2	nil	20
TOF_171018_001	0	8	800	SE	3	nil	20
TOF_171018_001	1	9	800	SE	2	nil	20
TOF_171018_001	2	9	800	SE	2	nil	20
TOF_171018_001	3	10	800	SE	2	nil	20
TOF_171027_001	0	9	900	NW	3	nil	5
TOF_171027_001	1	9	900	NW	2	nil	5
TOF_171027_001	2	8	900	NW	2	nil	5
TOF_171027_001	3	8	900	NW	2	nil	5
TOF_171004_004	0	7	1000	W	5	IHR	6
TOF_171004_004	1	6	1000	W	5	IHR	6
TOF_171004_004	2	6	1000	W	6	IHR	6
TOF_171004_004	3	5	1000	W	6	IHR	6
TOF_171007_003	0	10	500	W	4	nil	6
TOF_171007_003	1	10	500	W	4	IHR	4
TOF_171007_003	2	10	500	W	4	IHR	4
TOF_171007_003	3	10	500	W	4	IHR	3
TOF_171007_004	0	10	500	WNW	4	ILR	4
TOF_171007_004	1	8	500	WNW	4	ILR	6
TOF_171008_001	0	6	1000	WSW	2	nil	6
TOF_171008_001	1	1	1000	WSW	3	nil	6
TOF_171008_001	2	5	1000	WSW	3	nil	6
TOF_171008_001	3	8	700	WSW	3	ILR	6
TOF_171103_001	0	5	1000	SW	3	nil	20
TOF_171103_001	1	5	1000	SW	3	nil	20
TOF_171103_001	2	6	1000	SW	3	nil	20
TOF_171113_001	0	10	700	SW	2	nil	10
TOF_171113_001	1	10	700	SW	2	nil	15
TOF_171113_001	2	10	700	SW	3	nil	15
TOF_171113_001	3	10	500	SW	3	nil	15
TOF_171116_001	0	5	1000	W	4	nil	10
TOF_171116_001	1	7	1000	W	4	IHR	10
TOF_171116_001	2	7	1000	W	4	nil	10
TOF_171116_001	3	5	1000	W	4	nil	10
TOF_171117_001	0	8	1000	W	4	nil	20
TOF_171117_001	1	7	1000	W	3	nil	20
TOF_171117_001	2	8	1000	W	4	ILR	20
TOF_171117_001	3	9	1000	W	5	IHR	10
TOF_180316_002	0	10	500	SE	5	ILR	10
TOF_180316_002	1	10	500	SE	5	ILR	10
TOF_180319_001	0	8	1000	NNW	4	nil	20
TOF_180319_001	1	5	1000	NNW	4	nil	20
TOF_180319_001	2	5	1000	NNW	4	nil	20
TOF_180319_001	3	4	1000	NNW	4	nil	20
TOF_180322_001	0	9	1000	NW	2	nil	20
TOF_180322_001	1	9	1000	NW	2	nil	20
TOF_180322_001	2	8	1000	NW	2	nil	20
TOF_180322_001	3	8	1000	NW	2	nil	20

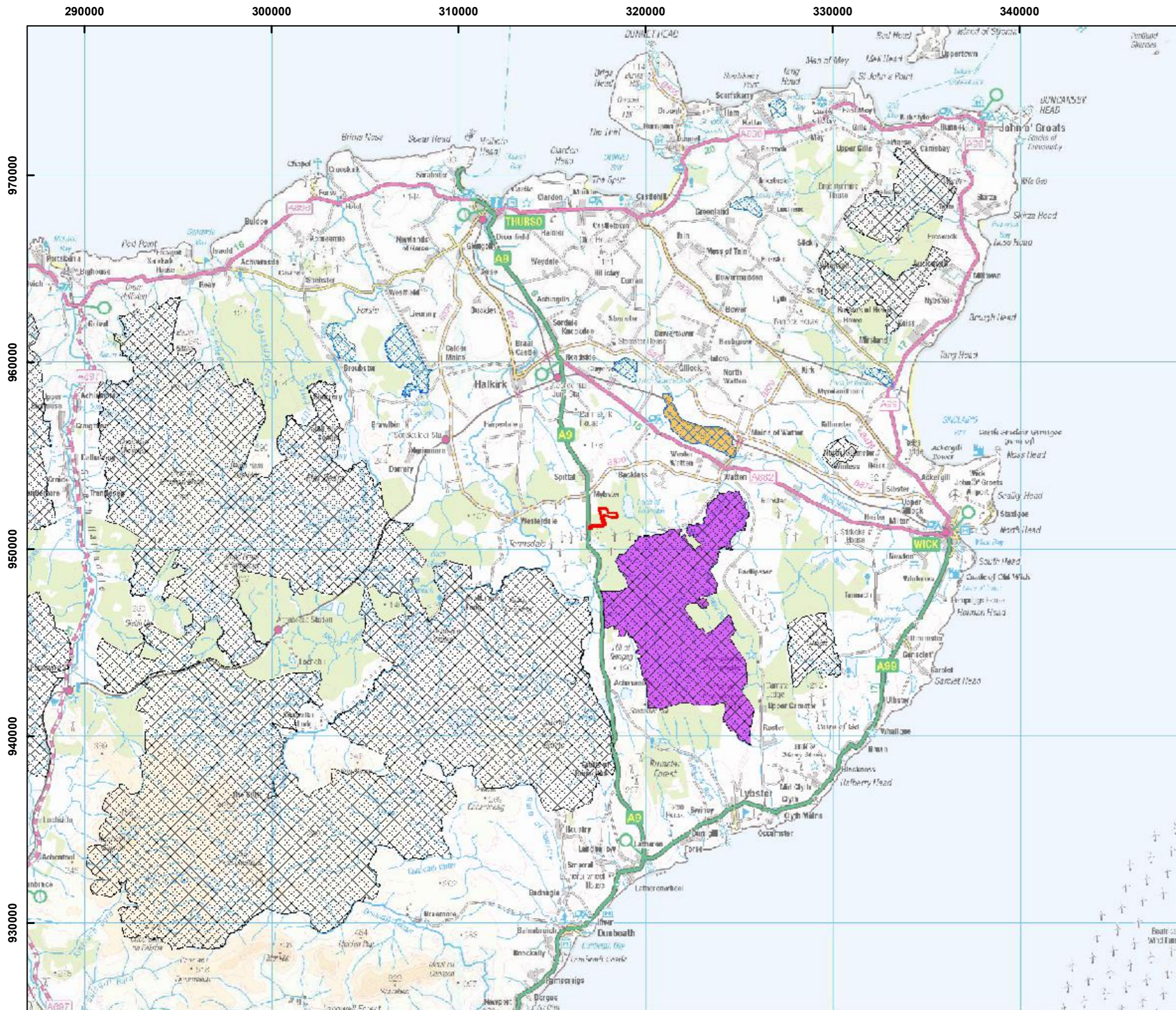
Watch ID	Hour	Cloud 10ths	Cloud Base (m)	Wind Dir.	Wind Force	Precipitation	Visibility (km)
TOF_180328_002	0	10	800	N	2	nil	20
TOF_180328_002	1	10	800	N	2	ILR	10
TOF_180328_002	2	10	800	N	2	nil	20
TOF_180403_002	0	10	500	NE	3	ILS	10
TOF_180403_002	1	10	500	NE	3	ILS	5
TOF_180403_002	2	10	1000	NE	3	ILR	10
TOF_180403_002	3	10	500	NE	3	ILR	5
TOF_180405_001	0	2	1000	NW	1	nil	20
TOF_180405_001	1	2	1000	NW	1	nil	20
TOF_180405_001	2	1	1000	NW	1	nil	20
TOF_180405_001	3	3	1000	NW	1	nil	20
TOF_180412_002	0	1	1000	E	3	nil	10
TOF_180412_002	1	1	1000	E	3	nil	10
TOF_180412_002	2	0	-	E	3	nil	10
TOF_180412_002	3	0	-	SE	4	nil	10
TOF_180417_001	0	9	1000	S	4	nil	15
TOF_180417_001	1	6	1000	S	4	nil	15
TOF_180417_001	2	4	1000	S	3	nil	15
TOF_180417_001	3	3	1000	S	4	nil	15
TOF_180423_001	0	7	1000	WSW	3	ILR	10
TOF_180423_001	1	7	1000	WSW	3	nil	10
TOF_180423_001	2	8	1000	WSW	3	ILR	10
TOF_180423_001	3	8	1000	WSW	3	nil	10
TOF_180424_003	0	9	1000	NW	2	nil	10
TOF_180424_003	1	9	1000	NW	2	nil	10
TOF_180424_003	2	6	1000	NW	2	nil	10
TOF_180424_003	3	2	1000	W	3	nil	10
TOF_180424_004	0	7	1000	SE	3	nil	15
TOF_180424_004	1	8	500	S	3	ILR	15
TOF_180424_004	2	7	500	S	2	ILR	15
TOF_180424_004	3	6	500	S	1	nil	15
TOF_180502_002	0	10	1000	WNW	2	nil	5
TOF_180502_002	1	10	1000	NW	1	nil	5
TOF_180502_002	2	10	1000	NW	1	nil	5
TOF_180502_002	3	10	1000	NW	2	nil	5
TOF_180508_002	0	6	1000	S	2	nil	20
TOF_180508_002	1	7	1000	S	2	nil	20
TOF_180508_002	2	6	1000	S	2	nil	20
TOF_180508_002	3	5	1000	S	2	nil	20

Annex 6 Flight Activity Survey Species Lists and BTO Codes

List A		List B		List C	
Species	BTO Code	Species	BTO Code	Species	BTO Code
Diver spp.	RH/BV	Greylag goose	GJ	Cormorant	CA
Common scoter	CX	Barnacle goose	BY	Heron	H.
White-tailed eagle	WE	White-fronted goose	EW(Euro)/NW(Grld)	Kestrel	K.
Golden eagle	EA	Pink-footed goose	PG	Buzzard	BZ
Hen harrier	HH	Brent goose	DB(Dark)/PB(Pale)	Sparrowhawk	SH
Goshawk	GI	Bean goose	BE	Red grouse	RG
Red kite	KT	Golden plover	GP	Grey partridge	P.
Osprey	OP	Dunlin	DN	Lapwing	L.
Merlin	ML	Greenshank	GK	Redshank	RK
Peregrine	PE	Whimbrel	WM	Common sandpiper	CS
Hobby	HY	Curlew	CU	Oystercatcher	OC
Barn owl	BO	Wood sandpiper	OD	Snipe	SN
Short-eared owl	SE	Tern spp.	AE/CN	Woodcock	WK
Black grouse	BK	Arctic Skua	AC	Herring gull	HG
Capercaillie	CP	Great Skua	NX	Cuckoo	CK
Nightjar	NJ			Ring ouzel	RZ
Chough	CF			Raven	RN
Whooper swan	WS				
Rare raptors	HZ/MR/RF				

Annex 7 Other Survey Species Lists and BTO Codes

List A		List B		List C			
Species	BTO Code	Species	BTO Code	Species	BTO Code	Species	BTO Code
Diver spp.	RH/BV	Greylag goose	GJ	Cormorant	CA	Song thrush	ST
Common scoter	CX	Barnacle goose	BY	Heron	H.	Grasshopper warbler	GH
White-tailed eagle	WE	White-fronted goose	EW(Euro)/NW(Grld)	Kestrel	K.	Wood warbler	WO
Golden eagle	EA	Pink-footed goose	PG	Buzzard	BZ	Spotted flycatcher	SF
Hen harrier	HH	Brent goose	DB(Dark)/PB(Pale)	Sparrowhawk	SH	Marsh/Willow tit	MT/WT
Goshawk	GI	Bean goose	BE	Red grouse	RG	Crested tit	CI
Red kite	KT	Golden plover	GP	Grey partridge	P.	Starling	SG
Osprey	OP	Dunlin	DN	Lapwing	L.	House/Tree sparrow	HS/TS
Merlin	ML	Greenshank	GK	Redshank	RK	Linnet	LI
Peregrine	PE	Whimbrel	WM	Common sandpiper	CS	Twite	TW
Hobby	HY	Curlew	CU	Oystercatcher	OC	Lesser redpoll	LR
Barn owl	BO	Wood sandpiper	OD	Snipe	SN	Crossbill/ Scottish c'bill	CR/CY
Short-eared owl	SE	Tern spp.	AE/CN	Woodcock	WK	Bullfinch	BF
Black grouse	BK	Arctic Skua	AC	Herring gull	HG	Hawfinch	HF
Capercaillie	CP	Great Skua	NX	Cuckoo	CK	Yellowhammer	Y.
Nightjar	NJ			Skylark	S.	Reed bunting	RB
Chough	CF			Tree pipit	TP	Corn bunting	CB
Whooper swan	WS			Dunnock	D.	Raven	RN
Rare raptors	HZ/MR/RF			Ring ouzel	RZ	Other wildfowl spp.	MS/MA/GD/T



Key

Site boundary

SPAs

Caithness and Sutherland Peatlands

Caithness Lochs

SSSIs

Shielton Peatlands

Loch Watten

Date produced: 29/06/2023
Source: NRP LTD

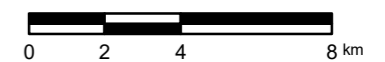
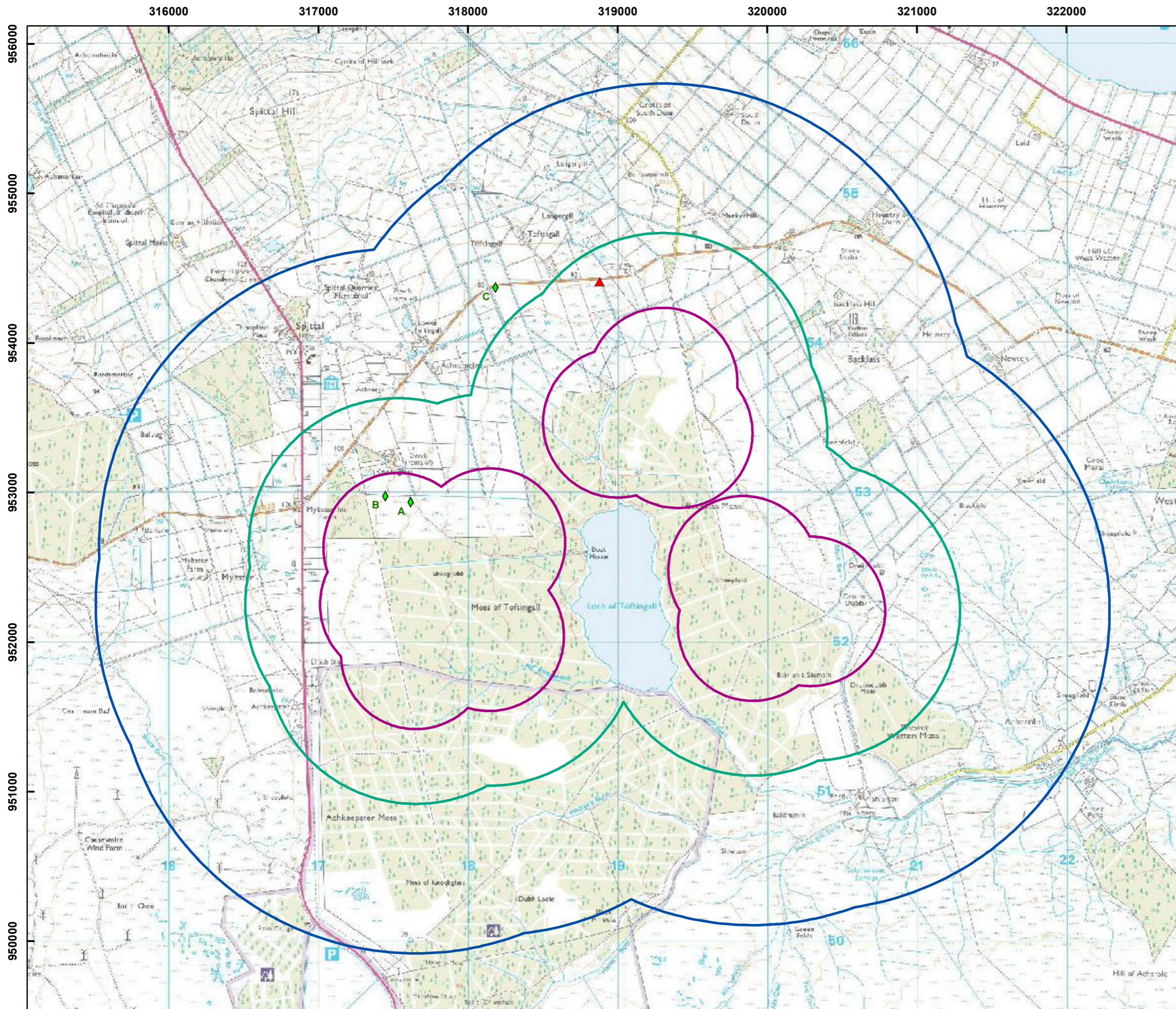


Figure 8.1.
Ornithological Designations

Toftingall Battery Energy Storage System

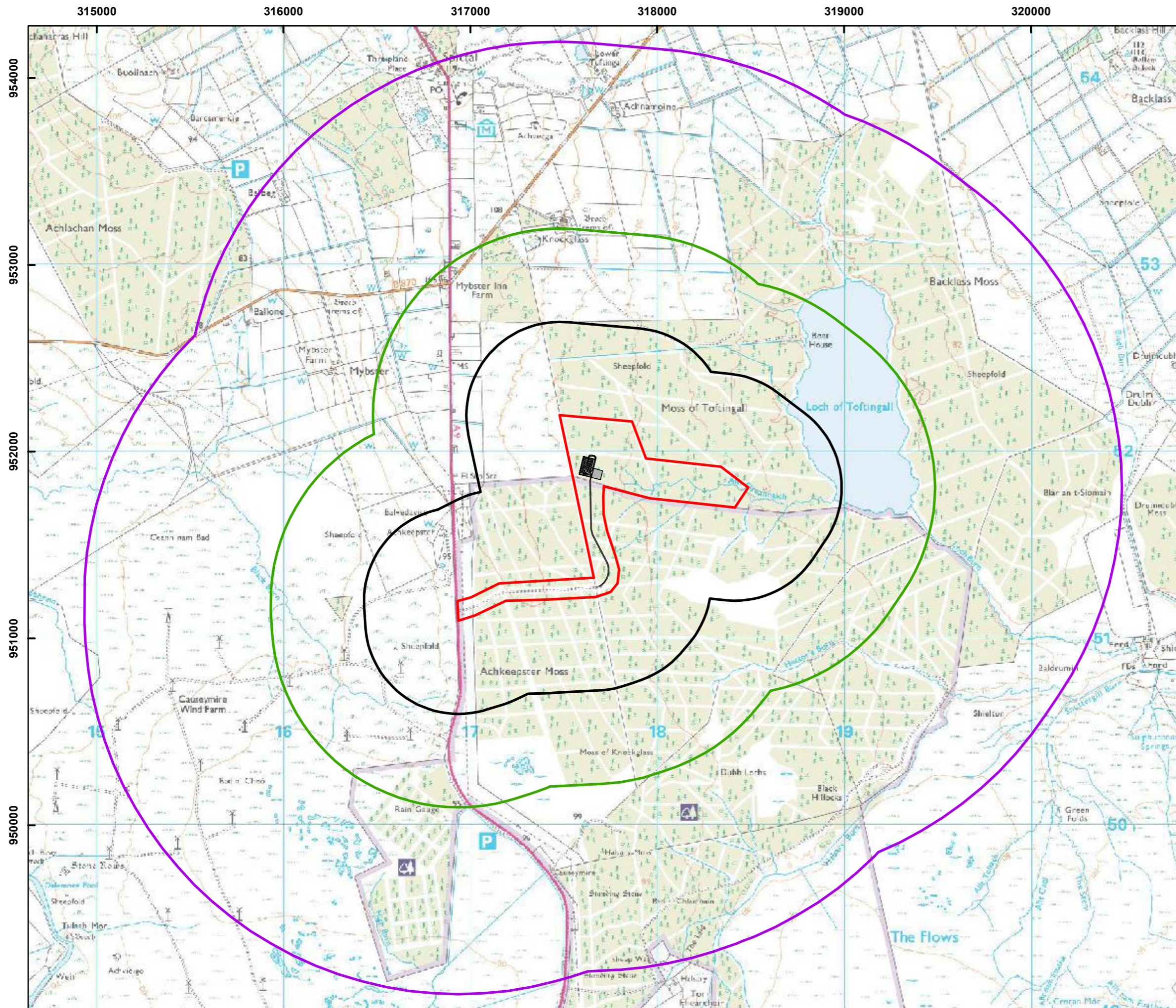


Key

- ◆ Migration watch points
- ▲ Focal vantage point
- 500m buffer
- 1km buffer
- 2km buffer

Date produced: 29/06/2023
 Source: NRP LTD


Figure 8.2.
Survey Locations and Buffers
 Toftingall Battery Energy Storage System



Key

- BESS and access track
- Site boundary
- 500m buffer
- 1km buffer
- 2km buffer

Date produced: 29/06/2023
 Source: NRP LTD



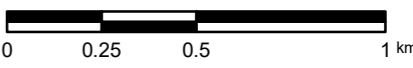
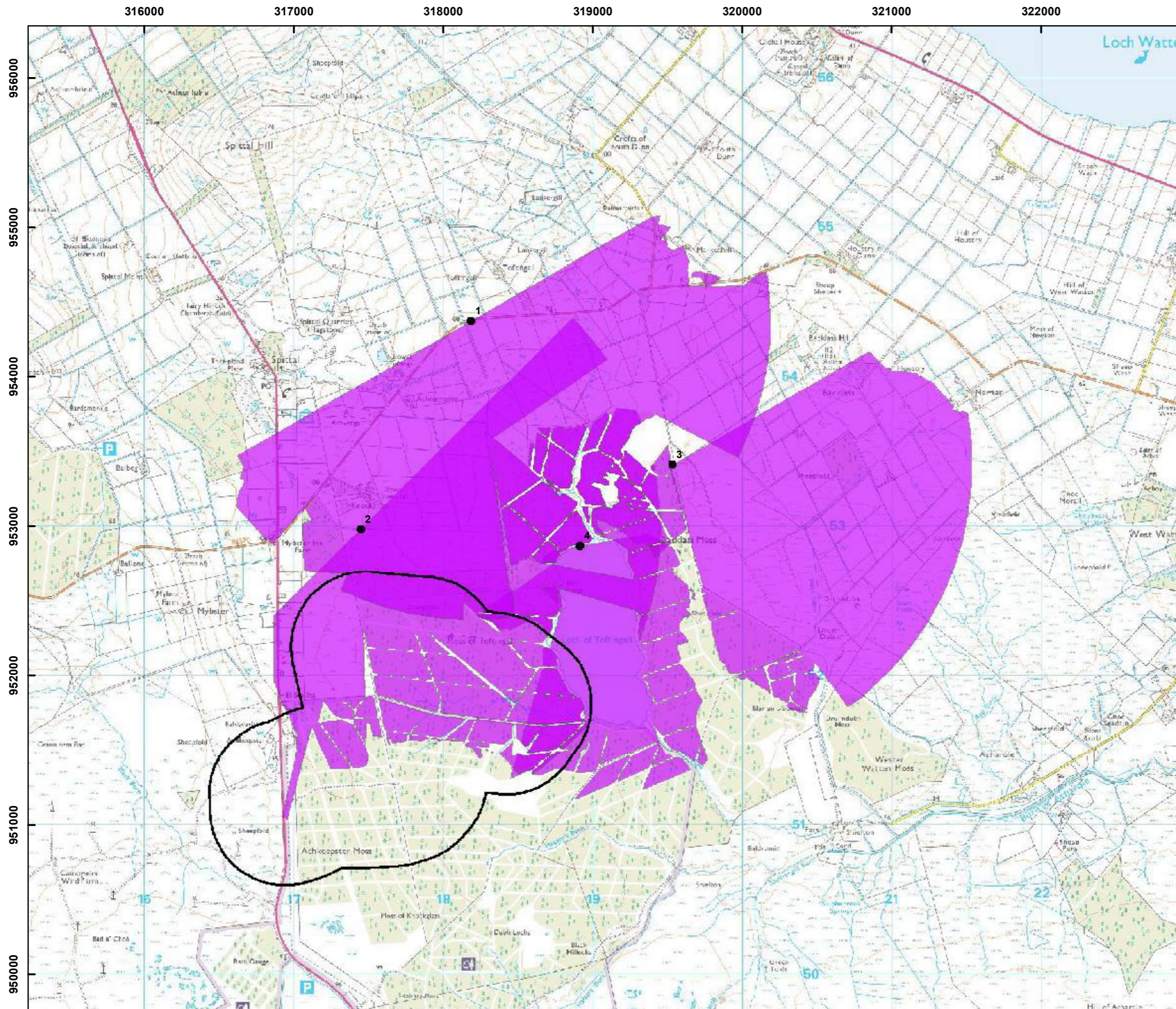


Figure 8.3.
Reporting Areas
 Toftingall Battery Energy Storage System



Key

- Generic vantage points
- 500m buffer
- Viewsheds

Date produced: 29/06/2023
 Source: NRP LTD

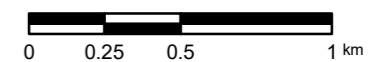
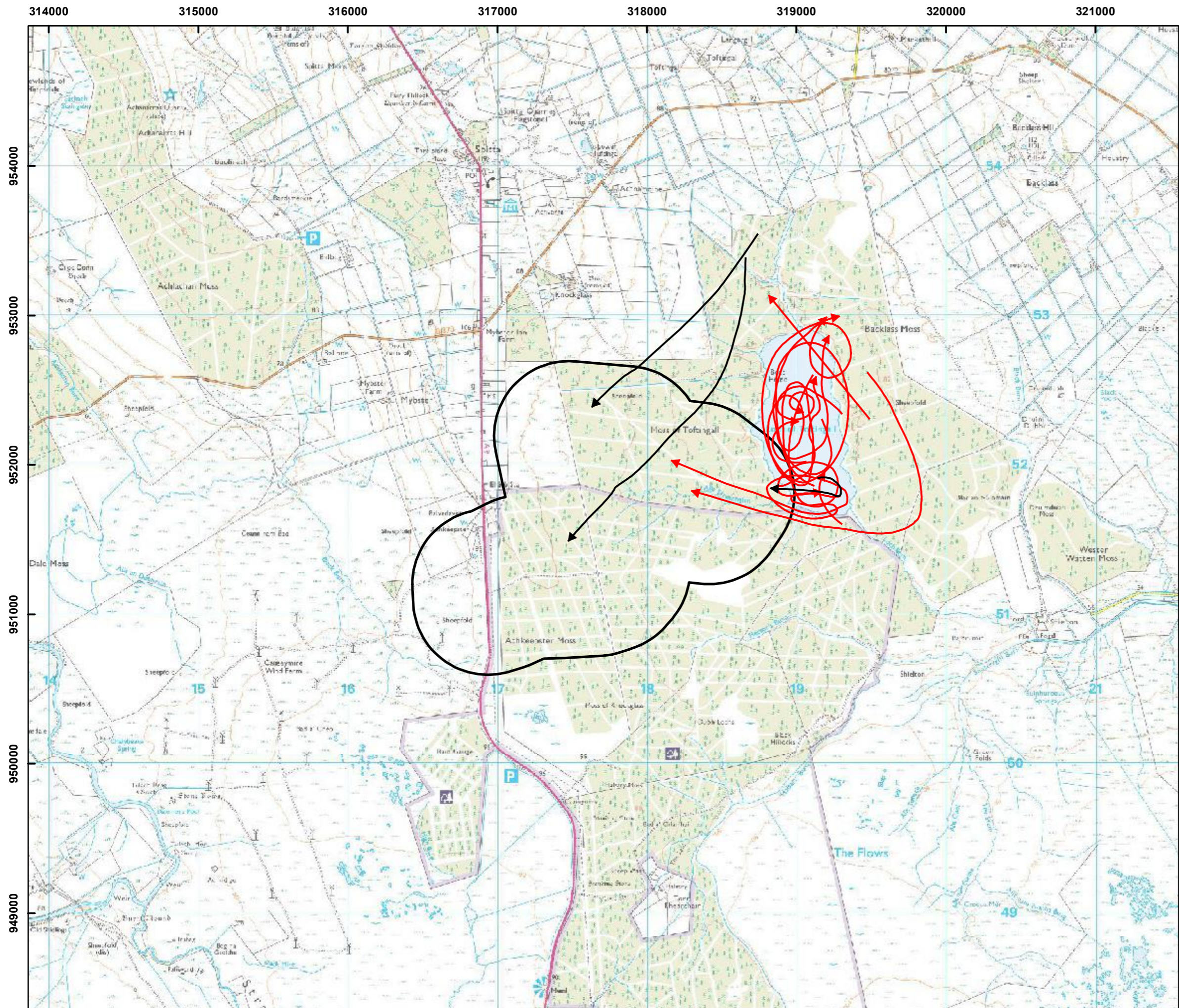


Figure 8.4.
Vantage Points and Visibility
 Toftingall Battery Energy Storage System



Key

Flight line

→ Black-throated diver

→ Red-throated diver

□ Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

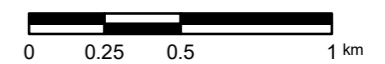
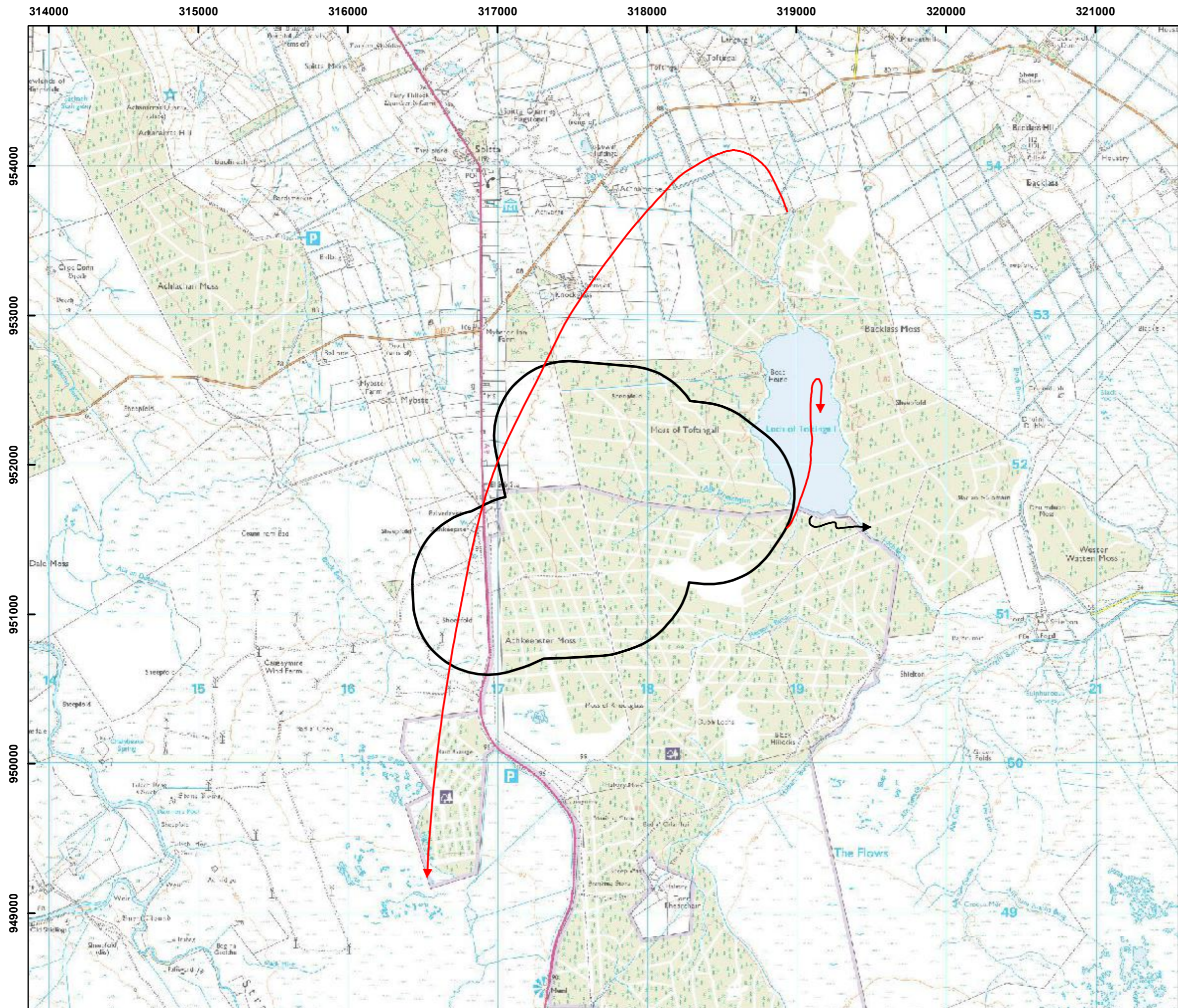


Figure 8.5.

Diver Flights Recorded from GVPs - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

→ Black-throated diver

→ Red-throated diver

□ Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

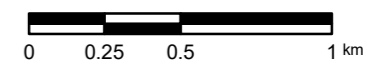
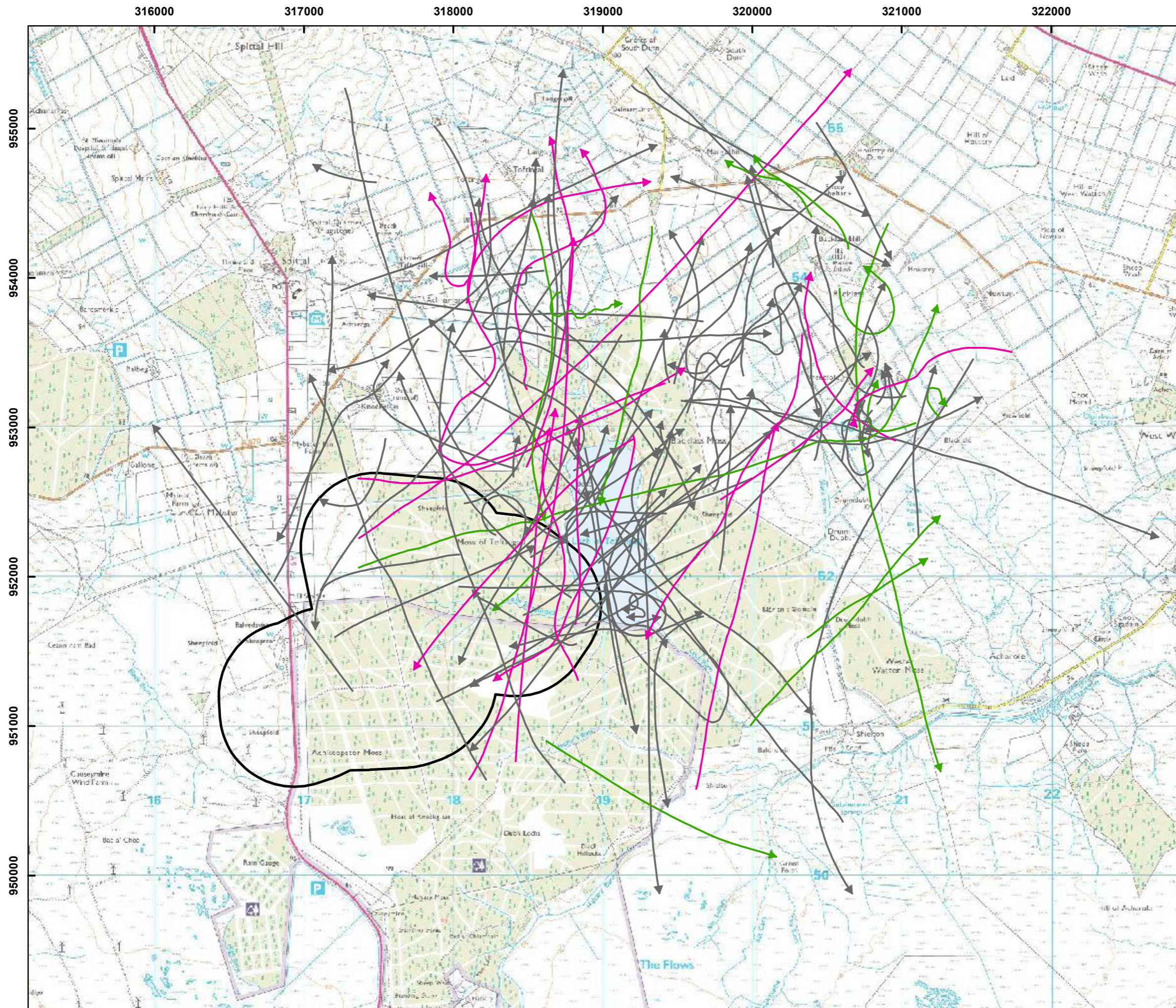


Figure 8.6.

Diver Flights Recorded During Other Surveys - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

- Greylag goose
- Pink-footed goose
- Goose sp.
- Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

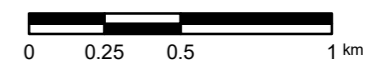
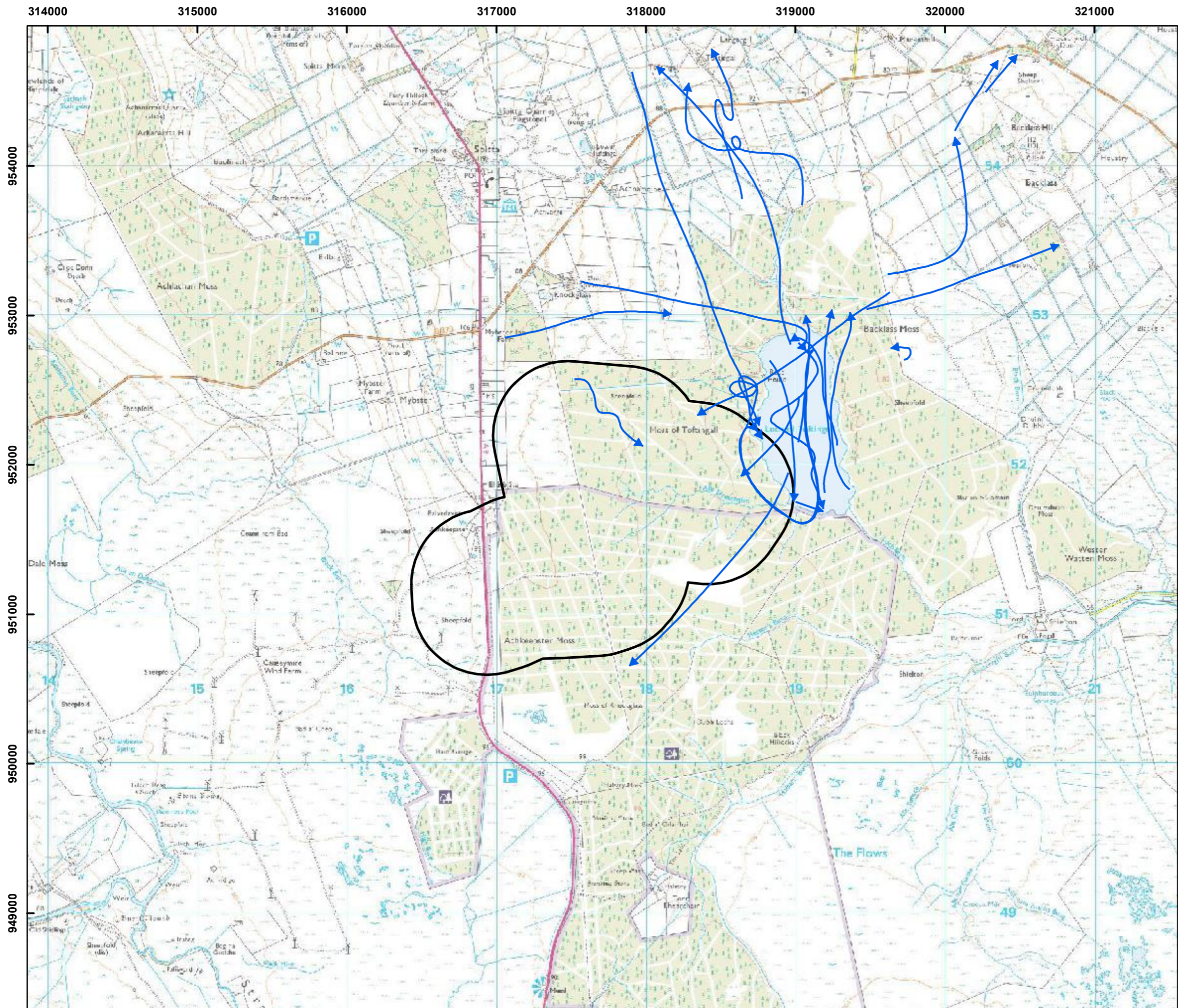


Figure 8.7.

Goose Flights Recorded from GVPs and MWP sites - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

→ Whooper swan

▭ Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

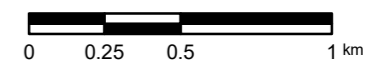
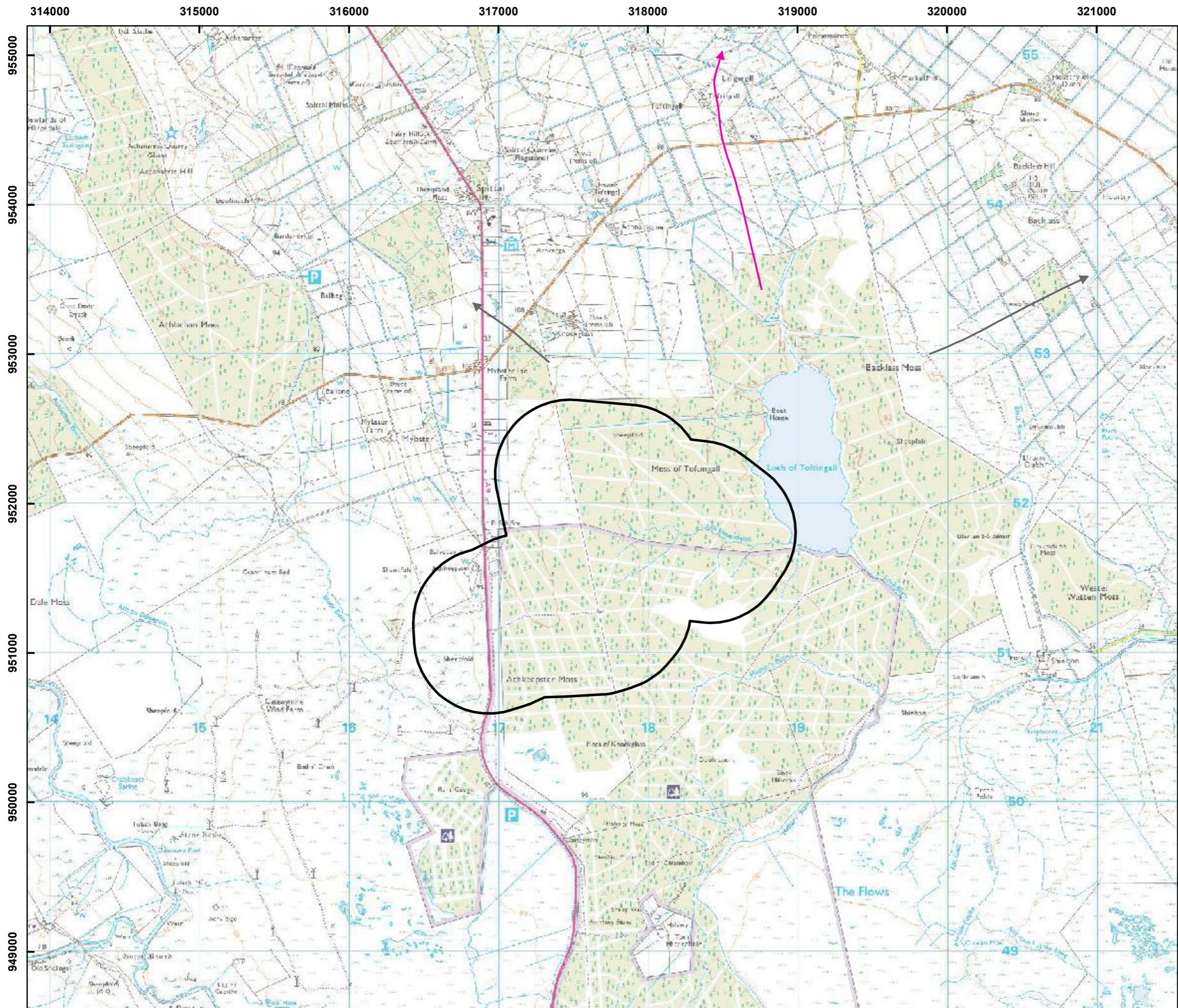


Figure 8.8.
Whooper Swan Flights Recorded from GVPs and MWP's - April 2017 to April 2019

Toftingall Battery Energy Storage System



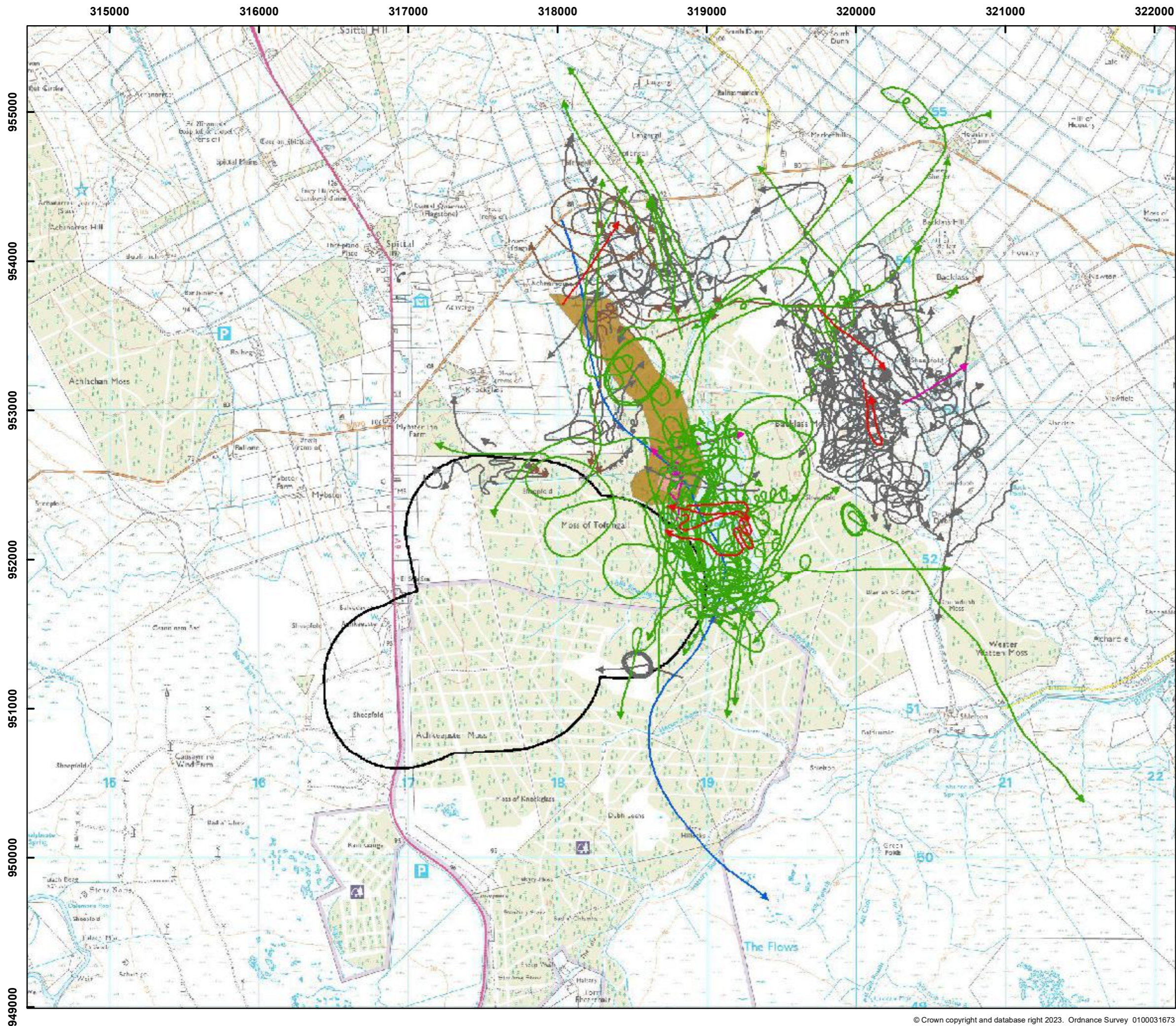
Key

Flight line

- Greylag goose
- Pink-footed goose
- Flight activity survey area

Date produced: 29/06/2023
 Source: NRP LTD

Figure 8.9.
Goose and Swan Flights Recorded During Other Surveys - April 2017 to April 2019
 Toftingall Battery Energy Storage System



Key

Flight line

- Hen harrier
- Merlin
- Osprey
- Peregrine
- Rough-legged buzzard
- White-tailed eagle

Flight area

- Merlin
- Rough-legged buzzard
- Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

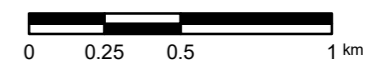
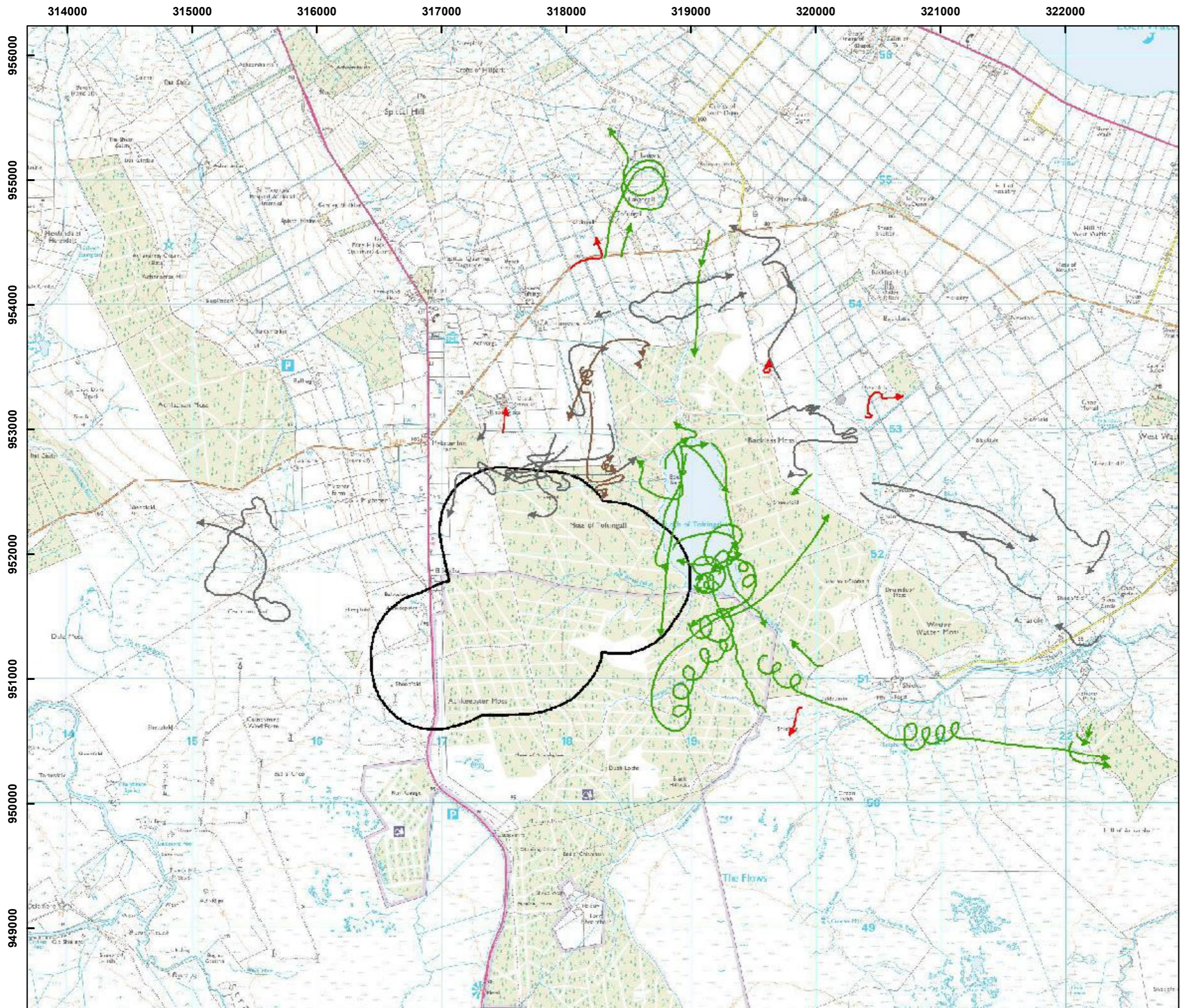


Figure 8.10.

Raptor Flights Recorded from GVPs - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

- Hen harrier
- Merlin
- Osprey
- Rough-legged buzzard

Flight area

- Hen harrier
- Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

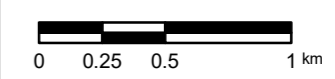
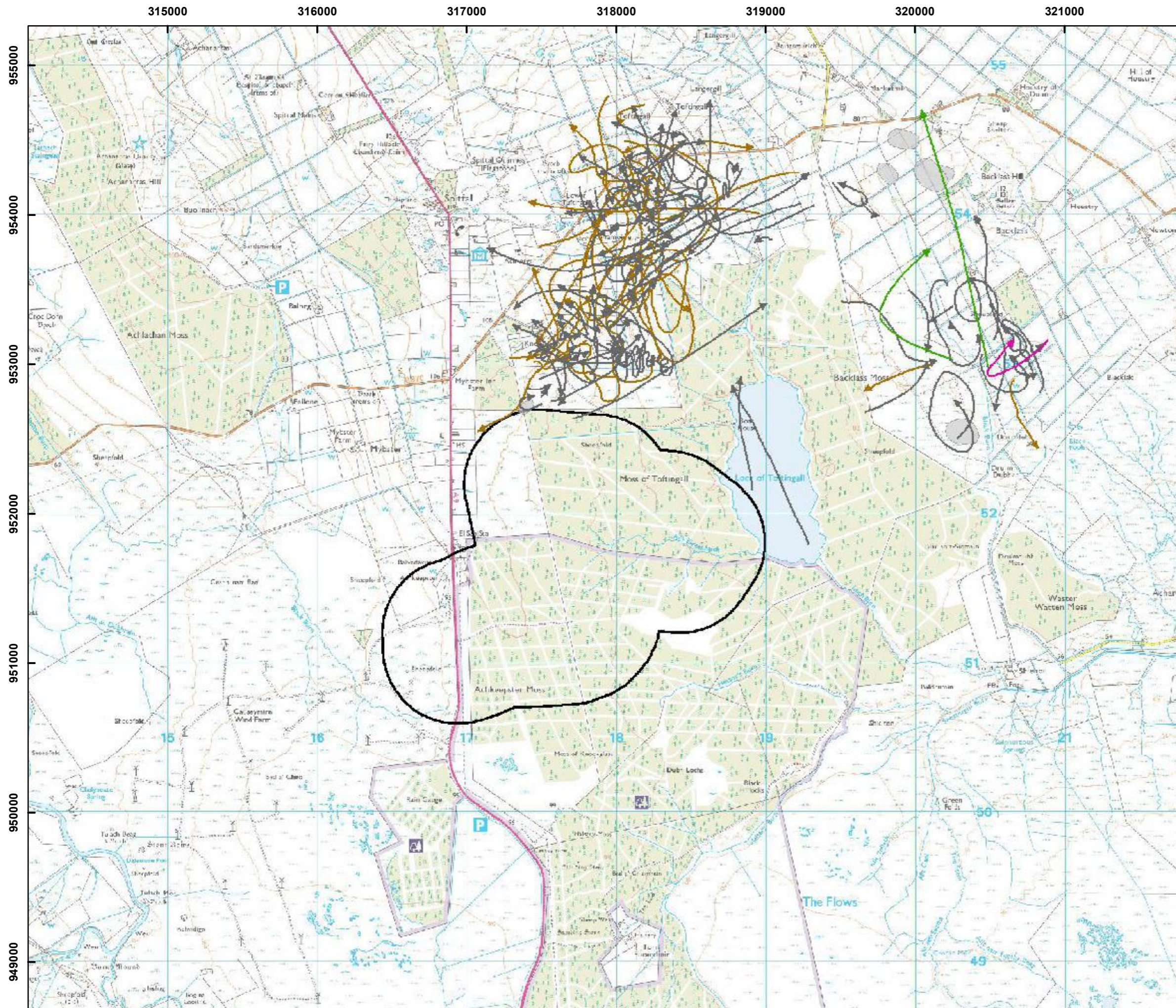


Figure 8.11.
Raptor Flights Recorded During Other Surveys - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

- Curlew
- Golden plover
- Greenshank
- Whimbrel

Flight area

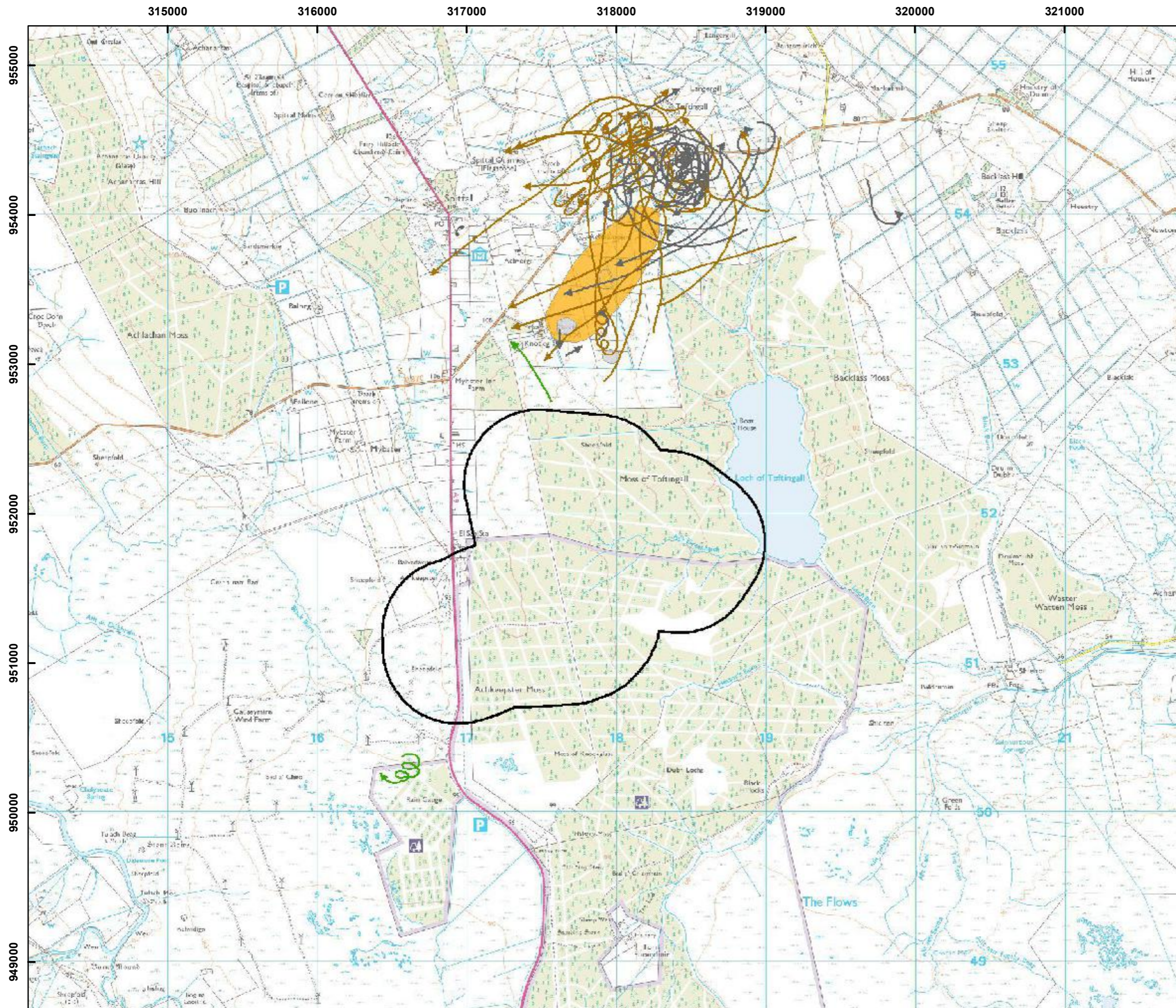
- Curlew
- Flight activity survey area

Date produced: 29/06/2023
 Source: NRP LTD

0 0.25 0.5 1 km

N

Figure 8.12.
Wader Flights Recorded from GVPs - April 2017 to April 2019
 Toftingall Battery Energy Storage System



Key

Flight line

- Curlew
- Greenshank
- Golden plover

Flight area

- Curlew
- Golden plover
- Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

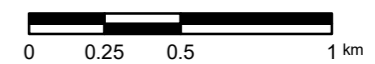
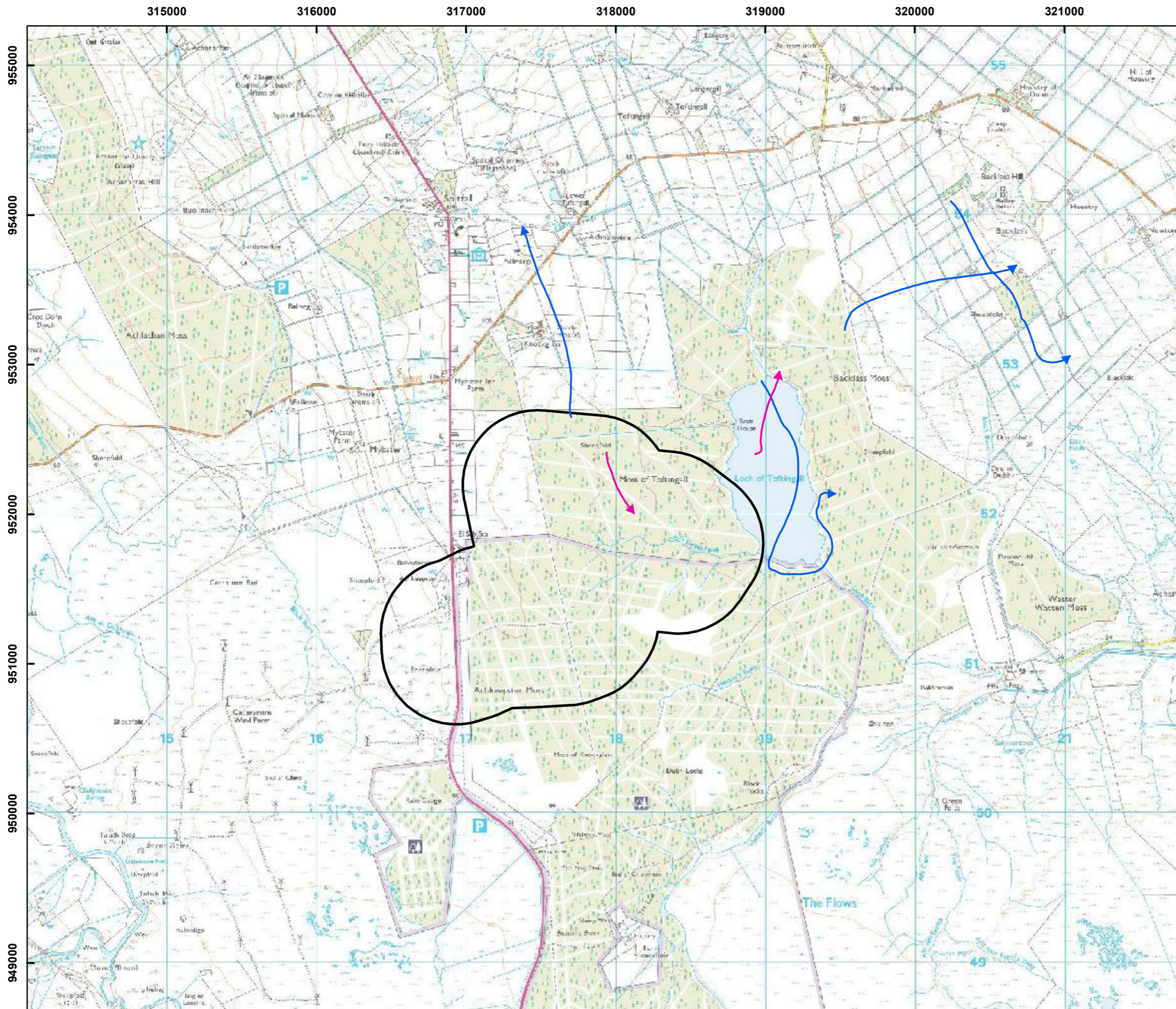


Figure 8.13.
Wader Flights Recorded During Other Surveys - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Flight line

→ Arctic skua

→ Great skua

□ Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

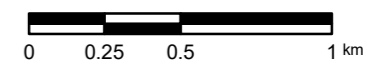
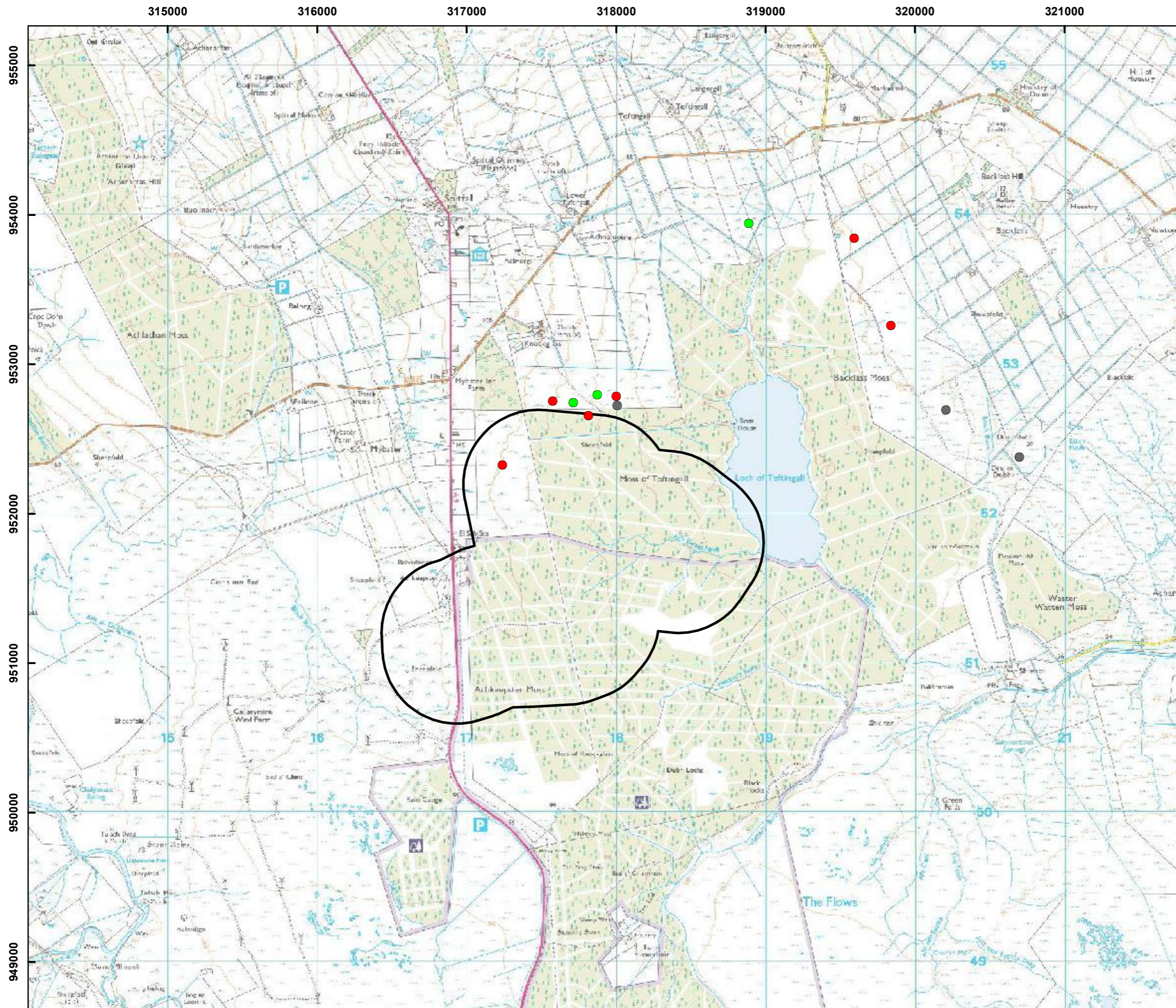


Figure 8.14.

Skua Flights Recorded from GVPs - April 2017 to April 2019

Toftingall Battery Energy Storage System



Key

Territories

- Curlew
- Lapwing
- Snipe
- Flight activity survey area

Date produced: 29/06/2023
Source: NRP LTD

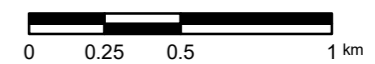


Figure 8.15.
Breeding Wader Territories, 2017

Toftingall Battery Energy Storage System