

**MAPPING AND GEOGRAPHIC INFORMATION CENTRE FIELD
REPORT**

*Darwin Plus 109 Initiating Monitoring Support for the SGSSI-MPA Research
and Monitoring Plan: 21/22 and 22/23 Fieldwork*

**NATHAN FENNEY, ADRIAN FOX
AND JAMIE COLEMAN**

BRITISH ANTARCTIC SURVEY

FIELD REPORT

2021-22 AND 2022-23 ANTARCTIC FIELD SEASONS

**Darwin Plus 109 Initiating Monitoring Support for the SGSSI-MPA Research
and Monitoring Plan: 21/22 and 22/23 Fieldwork**

By

**NATHAN FENNEY, ADRIAN FOX
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(MAGIC - MAPPING AND GEOGRAPHIC INFORMATION CENTRE)

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Authors

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Date

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1 Overview Map

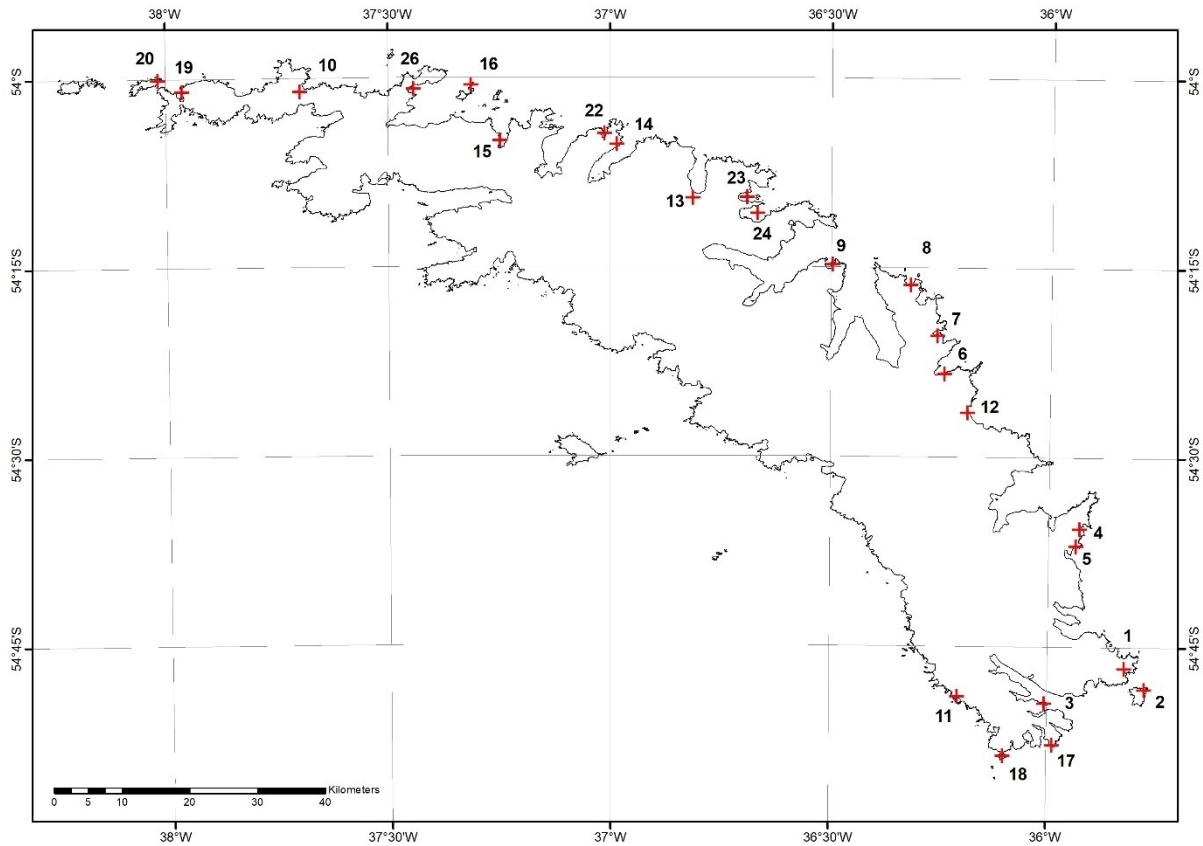


Figure 1: Location of target sites across South Georgia.

2 Personnel

Nathan Fenney (NF), MAGIC / BAS

Adrian Fox (AF), MAGIC / BAS

Jamie Coleman (JC), BAS

3 Introduction

The fieldwork for the Darwin Plus project *Initiating Monitoring Support for the SGSSI-MPA Research and Monitoring Plan* was undertaken by Nathan Fenney, Adrian Fox and Jamie Coleman over the 2021/22 and 2022/23 seasons and involved conducting a series of aerial surveys over major wildlife colonies around South Georgia using the fixed-wing eBee X remotely piloted aerial system (RPAS). The project was conducted in conjunction with the Government of South Georgia and the South Sandwich Islands (GSGSSI) for the purpose of undertaking a large-scale baseline reference survey of key indicator species across the territory. The following report presents an overview of the work undertaken, along with the aerial survey equipment and methods used, data collected, constraints, and any recommendations for similar

aerial photography work undertaken in the future on South Georgia.

4 Aims / Objectives

- 1) To test and develop field-based workflows to enable the successful use of the fixed-wing eBee X RPAS as a data collection platform within the environmental constraints experienced on South Georgia, including but not limited to beyond visual line of site operation (BVLOS).
- 2) To acquire photogrammetric standard vertical aerial photography of key indicator species at target sites across South Georgia. The timing of the aerial surveys was linked to the individual species breeding cycle.

5 Tasks

5.1 Darwin Plus 109 aerial photography

- To acquire photogrammetric standard vertical aerial photography of six target species across 26 target sites (Figure 1). *Please note, it was not intended for the field team to visit every site during the course of the project as this would have required significantly more time and resources, instead the field team prioritised the sites based on a number of factors including timing, weather, difficulty to access etc.*
- Roughly 50% of the time in the field was based at the research station at King Edward Point (KEP). While at KEP the GSGSSI small boats were used to access sites local to the station.
- Roughly 50% of the time in the field was based on the GSGSSI FPV Pharos SG. FPV Pharos SG was used to access the more remote sites.

5.2 Supplementary taskings

- Request from BAS estates to acquire photogrammetric standard vertical aerial photography of infrastructure at Bird Island and KEP stations.
- Testing of combined RGB (red, green, blue) and thermal sensor SenseFly Duet T for detecting fur seals in tussock. Such a sensor has significant potential for application in the South Georgia environment.

6 Specifications

The fixed-wing eBee X RPAS platform was used for all aerial surveys. Please note, flight operations within South Georgia airspace fall under Air Navigation (Overseas Territories) Order 2013 Article 73. Additional permissions were granted by Air Safety Support International (ASSI) for BVLOS operation of the eBee X out to a maximum of between 3 km and 8 km from the pilot (see Appendix X for details). During the 22/23 season permission was also granted to increase the operational ceiling from 400 feet to 600 feet above ground level (AGL).

The aerial surveys were carried out using either the SenseFly Aeria X sensor (Darwin Plus 109 taskings) or the SenseFly Duet T thermal sensor (supplementary taskings).

The altitude of the eBee X during acquisition was species specific (determined by the required resolution) and was between 80 m and 120 m AGL. The majority of the aerial surveys were conducted using a horizontal grid-based solution with a forward overlap of 80% and a side overlap of 60%. For long thin target areas such as beaches, a corridor mapping methodology was applied with a forward overlap of between 80% and 90%.

During the aerial surveys a geodetic Trimble GNSS (Global Navigation Satellite System) receiver collected data and was used to improve the exterior orientation of the camera during post-processing.

7 Equipment

7.1 RPAS Equipment

Pcs.	Item	Used
2	SenseFly eBee X platform (S/N IX-12-29034 and S/N IX-12-61425)	✓
2	SenseFly Aeria X sensor	✓
1	SenseFly Duet T sensor	✓
4	SenseFly eBee X wings (pair)	✓
7	SenseFly eBee X Endurance Battery	✓
4	SenseFly USB Radio Modem (2x IX-12-29034 and 2x IX-12-61425)	✓
2	SenseFly Radio Trackers	✓
2	Ping USB ADSB receiver	✓
1	Gitzo tripod	✓
1	SenseFly Backpack	✓
	MISC (tape, glue, tools, replacement parts...)	✓

Table 1

7.2 GNSS Equipment

Pcs.	Item	Used
1	Trimble R9s GNSS receiver incl. charger (S/N 5951R21002)	✓
1	Trimble 5700 GNSS receiver (S/N 0220273199)	
2	Trimble Zephyr Model 2 GPS antenna (S/N 4127561672 and S/N 1441137114)	✓
2	Trimble antenna cable	✓
2	Trimble external battery pack (Yuasa NP5-12 battery) incl. charger	✓
2	Tripod mount converter	✓
1	Tribrach	
2	Manfrotto tripod	✓
	MISC (cables, converters, measuring sticks...)	✓

Table 2

7.3 MISC Equipment

Pcs.	Item	Used
1	Dell Latitude Rugged Extreme 7212 (S/N 35783183954)	✓
7	Dell Type J7HTX 34Wh battery	✓
1	Nikon Monarch M7 8x30 binoculars	✓

Table 3

8 Project diary

Please note in addition to the field team (NF, AF and JC), the project was supported by staff from KEP. This included, Jerry Gillham (JG), Ross Taylor (RT) and Sarah Clark (SC).

8.1 21/22 Season

Nov-21

- 8 NF & AF depart UK to Stanley via MOD airbridge.
- 9-27 COVID quarantine / waiting in Stanley for arrival of FPV Pharos SG.
- 28 Board FPV Pharos SG bound for KEP.
- 29-30 In transit to SG.

Dec-21

- 1 FPV Pharos SG arrives at KEP.
- 2 **RPAS survey: Hestersletten (AM / PM) - TEST FLIGHTS.**

- JG joins field team, FPV Pharos SG departs KEP for Gold Harbour, **RPAS survey: Gold Harbour (AM) – issue experienced on take-off, flight was subsequently repeated successfully.**
- 4 **RPAS survey: Bjornstadt Bay (AM).**
 Landing at: Rosita Harbour (PM) – low cloud prevented operation of RPAS platform.
- 6 **RPAS survey: Blue Whale Harbour (AM) – during flight wind exceeded operational limits and flight called-off.**
 FPV Pharos SG returns to KEP. Both FPV Pharos SG and KEP locked down due to potential COVID outbreak.
- 8-9 Both FPV Pharos SG and KEP locked down due to potential COVID outbreak.
 10 FPV Pharos SG remains docked at KEP.
 11 FPV Pharos SG departs KEP for Bird Island.
 Landing at: Right Whale Bay (AM) – no RPAS survey undertaken, terrestrial images collected instead, Landing at: Elsehul (PM) – no RPAS survey undertaken.
- 13 **RPAS survey: Husvik (PM) - attempt unsuccessful due to high wind,**
 14 FPV Pharos SG arrives at KEP (AM).
 15 Field team disembarks FPV Pharos SG. JC joins field team to replace JG.
 16-17 Prep. at KEP.
 18 NF, AF, and JC dropped off at Sorling (AM) using KEP small boats, walk to Hound Bay, **RPAS survey: Hound Bay (PM)**, overnight at Hound Bay Hut.
RPAS survey: Hound Bay (AM), walk to Sorling (PM), small boat transfer back to KEP.
- 20-21 Prep. at KEP.
 NF, AF, and JC dropped off at Carlita (AM) using KEP small boats, walk to
 22 Husvik Harbour, **RPAS survey: Husvik (PM)**, **RPAS survey: Stronmess (PM)**, overnight at Husvik Managers Villa.
 23 Walk to Carlita (PM), small boat transfer back to KEP.
 24 Prep. at KEP. High winds prevented flight at Maiviken.
 25 Christmas day.
 26 Prep. at KEP. High winds prevented flight at Maiviken.
 27 **RPAS survey: Maiviken (PM).** Overnight in Maiviken hut.
- 28-29 Prep. at KEP.
 30 NF, AF, and JC dropped off at Corral (PM) using KEP small boats, overnight at Corral Hut.
 31 Walk from Corral to Rookery Bay, **RPAS survey: Rookery Bay (AM)**, walk back to Corral, small boat transfer back to KEP.

Jan-22

- 1 Rest day / prep. at KEP.
 2 **RPAS survey: Hestersletten (AM / PM) - TEST FLIGHTS.**
 3 Field team joins FPV Pharos SG and departs for Elsehul.
 4 **RPAS survey: Prion Island, Inner Lee Island, Outer Lee Island, Skua Island and Petrel Island (PM).**
 5 High winds prevented landing at Rosita Harbour.
 6 FPV Pharos returns to KEP. NF and AF disembark.
- 7-11 Rest / prep. at KEP.
 12 Field team help with fur seal pup weighing at Maiviken
 13 Prep. at KEP.

- NF, AF, and JC dropped off at Carlita (AM) using KEP small boats, walk to
 14 Husvik Harbour, **RPAS survey: Fortuna Bay (PM)**, overnight at Husvik
 Managers Villa.
 15 Walk to Carlita (PM), small boat transfer back to KEP.
 16 Prep. at KEP.
 17 NF, AF, and JC dropped off at Sorling (PM) using KEP small boats, walk to St
 Andrews Bay, overnight at St Andrews Bay Hut.
 18 **RPAS survey: St Andrews Bay (PM)**, overnight at St Andrews Bay Hut.
 19 Walk to Sorling (PM), small boat transfer back to KEP.
 20 Prep. at KEP.
 21 Field team joins FPV Pharos SG and departs for Gold Harbour, **RPAS survey:
 Gold Harbour (PM)**.
 22 **RPAS survey: Sea Leopard Fjord (AM), RPAS survey: Right Whale Bay
 (PM)**
 23 **RPAS survey: Salisbury Plain (AM)**, FPV Pharos returns to KEP, field team
 disembark.
 24-25 Prep. for departure from KEP
 26 Field team joins FPV Pharos SG and departs for Stanley.
 27-29 In transit to Stanley.
 30 FPV Pharos arrives at KEP, field team disembark.
 31 Waiting for north-bound transit in Stanley.

Feb-22

- 1 Waiting for north-bound transit in Stanley.
 2 NF, AF and JC depart Stanley for UK via MOD airbridge.
 3 NF, AF and JC arrive back in the UK.

8.2 22/23 Season

Oct-22

- 12 NF & JC depart UK to Stanley via MOD airbridge.
 18 Board FPV Pharos SG bound for KEP.
 20 Attempted landing at Bird Island.
 21 FPV Pharos SG arrives at KEP.
 22-24 Prep. at KEP.
 25 NF, JC joined by RT and dropped off at Hound Bay by FPV Pharos SG, **RPAS
 survey: Hound Bay (PM)**, overnight at Hound Bay Hut.
 26 **RPAS survey: Hound Bay (AM)**, travel overland to St Andrew's, overnight St
 Andrew's Bay Hut.
 27 **RPAS survey: St Andrews Bay (AM), RPAS survey: St Andrews Bay (PM)**,
 overnight St Andrew's Bay Hut.
 28 **RPAS survey: St Andrews Bay (AM)**, travel overland to Sorling for small boat
 transfer back to KEP.
 29-31 Prep. at KEP.

Nov-22

- NF, JC joined by SC and dropped off at Carlita by small boat transfer from KEP,
 1 travel overland to Husvik, **RPAS survey: Husvik (PM)**, overnight in Husvik Villa.
 2 Unable to fly due to weather, overnight at Husvik Villa.
 3 **RPAS survey: Husvik (PM) - attempt unsuccessful due to high wind**, overnight at Husvik Villa.
 4 **RPAS survey: Husvik (AM)**, travel overland to Carlita for small boat transfer back to KEP.
 5 Prep. at KEP.
 6 **RPAS survey: KEP (AM)**.
 7 NF & JC join FPV Pharos SG.
 8 **RPAS survey: Undine (AM)**.
 9 **RPAS survey: Gold Harbour (PM)**.
 10 NF & JC transferred from FPV Pharos SG to KEP via small boats.
 11-12 Prep. for departure / waiting for weather window to test thermal camera.
 13 **RPAS survey: KEP (AM) - test thermal camera**.
 14 Prep. for departure
 15 **RPAS survey: KEP (AM) - test thermal camera**, prep for departure.
 16 NF & JC join National Geographic Explorer bound for Ushuaia.
 29 Arrive Ushuaia, JC stays on board National Geographic Explorer (for unrelated work), NF overnights in Buenos Aires.
 30 NF departs Buenos Aires for UK.

Dec-22

- 1 NF arrives back in the UK.

9 Summary of results

Please find below a table summarising the sites visited during the 21/22 and 22/23 seasons.

Tasking	Site	Species	Achieved	Comments
Darwin Plus 109	Bay of Isles	Wandering albatross	Yes	
	Bjornstadt Bay	Gentoo penguins	Yes	
	Blue Whale Harbour	Fur seals	No	Incomplete capture. High wind during flight required operations to be ceased.
	Elschul	Macaroni penguins	No	No suitable take-off location could be found a safe distance from Antarctic fur seal territories and away from seabird congregations in flight
	Fortuna Bay	King penguins	Yes	
	Gold Harbour	Elephant seals, king penguins gentoo penguins	Yes	
	Hestersletten	NA	Yes	Test flights.
	Hound Bay	Elephant seals, fur seals	Yes	

	Husvik	Elephant seals, fur seals	Yes	
	Maiviken	Fur seals	Yes	
	Right Whale Bay	King penguins, gentoo penguins	Yes	Terrestrial imagery was used to capture gentoo colonies.
	Rookery Bay	Gentoo penguins	Yes	
	Rosita Harbour	Fur seals	Yes	
	Salisbury Plain	King penguins	Yes	
	Sea Leopard Fjord	King penguins	Yes	
	St Andrew Bay	Elephant seals, king penguins	Yes	
	Stromness	Fur seals	Yes	
	Undine	Elephant seals	Yes	
Supplementary	KEP	NA	Yes	Thermal sensor test / aerial survey of infrastructure.

Table 4

10 Discussion

10.1 eBee X operations

The eBee X RPAS proved to be both a highly reliable and capable platform for undertaking large scale RPAS-based aerial surveys in South Georgia's challenging and rapidly changing environment. The eBee X demonstrated it was adept at operating in winds in excess of 10 m/s despite having a maximum take-off weight of just 1.6 kg. Its BVLOS capability, however, proved to be of particular value to the project, allowing us to both survey larger target areas and areas that were otherwise inaccessible. Out of 45 flights just 6 were conducted within VLOS limits, while 39 were conducted BVLOS out to a maximum distance from the pilot of 3 km.

The following is a list of observations from the field team regarding the use of the eBee X in South Georgia.

- 1) Carrying the eBee X pelican case for any distance through tussock is challenging (due to the physical size). This had been required for the initial testing at Hestersletten as both platforms needed to be flown and there was only one eBee X backpack. However, it did highlight that reliance on the pelican case in the field would be ill advised and all future landings were conducted using the SenseFly backpack.
- 2) Caution needs to be taken when launching the platform when there is no wind. As a fixed-wing platform the eBee X uses the airflow over the wings to generate lift. During take-off, when the platform is still accelerating it is generating less lift (as it is passing through the air more slowly) which is why it is important to launch into the wind (resulting in a higher relative air speed and thus increased lift). However, on days with no

wind this is not possible and the eBee X must rely on the thrust generated by its engine alone. If the platform fails to generate enough lift the platform will land 10 – 20 m away. This is an extremely rare occurrence and does not usually present an issue with the eBee able to be relaunched immediately. However, when this occurred at Gold Harbour the platform landed in a small bog that hadn't previously been identified, damaging the electrics. While no permanent damage resulted, the platform did have to be shipped back to the UK for servicing. It is advisable therefore that in zero wind conditions care should be taken to consider the environment (landscape and presence of wildlife) 10 – 20 m in front of the platform in the case of a failed take-off.

- 3) During a flight at Bjornstadt Bay the ground proximity warning was issued by eMotion, despite the platform being significantly above the terrain. The ground proximity warning was triggered by water droplets in a small cloud present within the survey area. This is a known issue with LiDAR based ground proximity systems. For the remainder of the project the LiDAR system was disabled if clouds were present either at or below the planned operating altitude. Please note this system can be turned on and off as required during flights.
- 4) A discrepancy between the actual windspeed and that reported by the platform led to the pitot tube being replaced.
- 5) Following a series of short landings (5m), further investigation was undertaken. It was determined that the LiDAR landing sensor assumes a flat surface and therefore if the landing location is not flat there is the potential the platform will land slightly short of its intended target. In these situations, the LiDAR landing sensor should be disabled with the platform instead relying on GPS. This solution was highly successful.
- 6) The quality of the existing digital elevation models (DEM's) for much of South Georgia is poor and attention had to be paid to confirm planned flight lines would not intersect the terrain. In areas with particularly low-quality surface elevation information, it is advisable to increase the operating altitude of the platform. Once a flight has been completed, the eBee X can then use the data to create a higher accuracy DEM for future operations.
- 7) Wind was a major consideration during the fieldwork. Much of the flying undertaken was either early in the morning or late in the afternoon when the wind speeds were typically lower.
- 8) Because the wind and other environment factors on South Georgia such as precipitation are highly variable, the ability for the eBee X map a large area fast was highly advantageous.

Future Recommendations:

- The gimble mounted SODA 3D payload would work better than the Aeria X for future surveys to remove much of the impact turbulence had on image quality in higher winds.

- There is the potential to operate the eBee X from a ship and avoid having to land at more remote sites if ship is equipped with dynamic positioning (DP).

10.2 Field logistics

Just a quick note regarding logistics. Due to the sheer number and often inaccessible nature of the target sites, along with the temporal requirements dictated by the species in question, the logistics for the field deployment were complex. Planning the fieldwork required input from multiple groups including BAS, GSGSSI, ASSI and the RAF, while in the field the team worked closely with KEP (including both the BAS personnel and Government Officers) and FPV Pharos SG. In addition, the field team had to factor in the weather along with other external considerations.

Small boating in particular was impacted by the weather and despite multiple attempts to undertake extended boating none were successful. As a result, the field team had to walk overland to access several sites including Husvik (x2), Stromness, St Andrews Bay (x2), Rookery Bay and Hound Bay (x2). Please note that there was no impact to the wider project as a result, however, it is worth highlighting for future field projects the challenge combining a temporally sensitive activity with weather dependant logistics.

Finally, access to the most remote sites was undertaken using FPV Pharos SG. The support from FPV Pharos SG was significant and much appreciated by the field team. It is worth highlighting that the FPV Pharos SG is under significant pressure to deliver a number of taskings and so to minimise our impact in the future it may be advisable to consider alternatives such as a small yacht or cruise ship.

11 Conclusions

Despite having to overcome a number of challenges over the course of the two seasons, the field campaign was highly successful with data collected across South Georgia at key sites. In particular, the eBee X platform proved to be very capable in the field, operating successfully in the, at times, difficult South Georgia environment and appears well suited to meet the significant ongoing demand for ultra high-resolution imagery around South Georgia.

12 Acknowledgements

We would like to thank the team at KEP, GSGSSI, FPV Pharos SG and National Geographic Explorer for their support over the course of the fieldwork. Particular thanks are due to Sarah Clark KEP Station Leader and Jerry McLeod Master of the FPV Pharos SG, who worked closely with us to deliver what was a logistically complex, but highly successful field campaign over the two seasons.

Appendix A: BVLOS Permissions

Appendix B: Sortie Details

Sortie no.	Date	Aircraft	Site	Flight duration (min)	Distance (km)	Target GSD (cm)	Survey altitude (m)	Payload	Range (VLOS/BVLOS)	Survey target	Comments
1	02/12/21	IX-12-61425	Hestersletten	8 min	5.8 km	-	-	Aeria X	VLOS	-	Test flight.
2	02/12/21	IX-12-61425	Hestersletten	11 min	8.1 km	-	-	Aeria X	BVLOS	-	BLVOS test flight.
3	02/12/21	IX-12-29034	Hestersletten	8 min	5.5 km	-	-	Aeria X	VLOS	-	Test flight.
4	02/12/21	IX-12-29034	Hestersletten	12 min	8.3 km	-	-	Aeria X	BVLOS	-	BLVOS test flight.
5	02/12/21	IX-12-29034	Hestersletten	15 min	10.8 km	-	-	Aeria X	VLOS	-	Test flight.
6	03/12/21	IX-12-61425	Gold Harbour	-	-	-	-	Aeria X	BVLOS	-	Flight aborted following issue experienced during take-off.
7	03/12/21	IX-12-29034	Gold Harbour	18 min	13.7 km	2.5 cm	118.3 m	Aeria X	BVLOS	Gentoo penguins	
8	04/12/21	IX-12-29034	Bjornstadt Bay	12 min	8.6 km	1.9 cm	89.9 m	Aeria X	BVLOS	Gentoo penguins	Flight aborted due to low cloud.

9	04/12/21	IX-12-29034	Bjornstadt Bay	13 min	9.4 km	1.9 cm	89.9 m	Aeria X	BVLOS	Gentoo penguins	
10	06/12/21	IX-12-29034	Blue Whale Harbour	13 min	8.8 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	Incomplete capture. Flight aborted due to high wind.
11	13/12/21	IX-12-29034	Husvik Harbour	4 min	2.3 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	Flight aborted due to high wind.
12	18/12/21	IX-12-29034	Hound Bay	22 min	15.7 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	
13	18/12/21	IX-12-29034	Hound Bay	21 min	15.4 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	
14	19/12/21	IX-12-29034	Hound Bay	33 min	24.5 km	2.0 cm	94.6 m	Aeria X	BVLOS	Gentoo penguins	
15	22/12/21	IX-12-29034	Husvik Harbour	42 min	32.4 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	
16	22/12/21	IX-12-29034	Stromness Harbour	29 min	21.4 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	
17	27/12/21	IX-12-29034	Maiviken	50 min	38.6 km	2.0 cm	94.6 m	Aeria X	BVLOS	Fur seals	
18	31/12/21	IX-12-29034	Rookery Bay	8 min	5.8 km	1.8 cm	85.2 m	Aeria X	BVLOS	Gentoo penguins	

19	31/12/21	IX-12-29034	Rookery Bay	10 min	7.2 km	1.8 cm	85.2 m	Aeria X	BVLOS	Gentoo penguins	
20	02/01/22	IX-12-29034	Hestersletten	7 min	5.3 km	-	-	Aeria X	BVLOS	-	Test flight.
21	02/01/22	IX-12-29034	Hestersletten	13 min	9.3 km	-	-	Aeria X	BVLOS	-	Test flight.
22	02/01/22	IX-12-29034	Hestersletten	13 min	9.7 km	-	-	Aeria X	BVLOS	-	Test flight.
23	04/01/22	IX-12-29034	Prion Island	3 min	2.0 km	2.0 cm	94.6 m	Aeria X	BVLOS	Wandering albatross	Flight aborted after error issued regarding Aeria X payload.
24	04/01/22	IX-12-29034	Prion Island	36 min	26.7 km	2.0 cm	94.6 m	Aeria X	BVLOS	Wandering albatross	
25	04/01/22	IX-12-29034	Prion Island	27 min	19.9 km	2.5 cm	118.3 m	Aeria X	BVLOS	Wandering albatross	Survey altitude increased due to low quality terrain model.
26	14/01/22	IX-12-29034	Fortuna Bay	19 min	14.5 km	2.0 cm	94.6 m	Aeria X	BVLOS	King penguins	
27	18/01/22	IX-12-29034	St Andrews Bay	35 min	25.7 km	1.9 cm	89.9 m	Aeria X	BVLOS	King penguins	
28	21/01/22	IX-12-29034	Gold Harbour	17 min	12.7 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	

29	22/01/22	IX-12-29034	Sea Leopard Fjord	8 min	5.3 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	
30	22/01/22	IX-12-29034	Right Whale Bay	10 min	7.0 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	
31	23/01/22	IX-12-29034	Salisbury Plain	3 min	1.7 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	Flight aborted due to low cloud.
32	23/01/22	IX-12-29034	Salisbury Plain	23 min	16.5 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	
33	23/01/22	IX-12-29034	Salisbury Plain	22 min	16.4 km	1.8 cm	85.2 m	Aeria X	BVLOS	King penguins	
34	25/10/22	IX-12-61425	Hound Bay	32 min	23.8 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
35	26/10/22	IX-12-61425	Hound Bay	17 min	12.5 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
36	27/10/22	IX-12-61425	St Andrews Bay	30 min	22.4 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
37	27/10/22	IX-12-61425	St Andrews Bay	56 min	42.8 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals, king penguins	
38	28/10/22	IX-12-61425	St Andrews Bay	28 min	20.8 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	

39	01/11/22	IX-12-61425	Husvik Harbour	12 min	8.7 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
40	04/11/22	IX-12-61425	Husvik Harbour	21 min	16.3 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
41	06/11/22	IX-12-61425	KEP	37 min	28.5 km	1.9 cm	89.9 m	Aeria X	BVLOS	Aerial survey of infrastructure.	
42	08/11/22	IX-12-61425	Undine	8 min	5.9 km	1.5	71.0 m	Aeria X	BVLOS	Elephant seals	Low cloud required survey altitude to be lowered.
43	09/11/22	IX-12-61425	Gold Harbour	20 min	14.9 km	1.9 cm	89.9 m	Aeria X	BVLOS	Elephant seals	
44	13/11/22	IX-12-61425	KEP	14 min	10.3 km	Various	Various	Duet T	BVLOS	Fur seals	Thermal test.
45	15/11/22	IX-12-61425	KEP	47 min	36.2 km	Various	Various	Duet T	BVLOS	Fur seals	Thermal test.