RNSA

Rannsóknarnefnd samgönguslysa

Report on Serious Air Traffic Incident

Case no.: **20-085F016**

Date: **22. August 2020**

Location: **Short final for Runway 01 at Keflavik Airport**

Description: **Near miss**

1. FACTUAL INFORMATION

| Location and time	
Location:	On final for Runway 01 at Keflavik Airport
Airspace:	Class D
Date:	22. August 2020
Time[1]:	16:15
METAR BIKF at 16:00	320/10KT CAVOK 13/05 QNH 1010
Short description:	When a passenger flight (Aircraft B) was on final for landing on Runway 01 at Keflavik Airport, a training flight (Aircraft A) entered the final for the same runway, in front of Aircraft B. The minimum vertical separation was 225 feet and the minimum horizontal separation was 0.59 NM.

Aircraft A	
Type:	Diamond DA-20
Register:	TF-KFG
Year of manufacture:	2011
Serial number:	C0590
CoA:	Valid
Type of flight:	Training
Instructor's flight hours	790 hrs, of which 597 hrs as an instructor
Student pilot's flight hours	50 hrs

Aircraft B	
Type:	AIRBUS - A320
Register:	HA-LXG
Year of manufacture:	2009
Serial number:	7182
CoA:	Valid
Type of flight:	Scheduled passenger flight
Captain´s flight hours	Unknown

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[1] All times in the report are Icelandic local times (UTC+0), unless otherwise stated.

Runway 01 at Keflavík Airport was in use when a flight instructor and a student pilot were on a training flight (TF-KFG) inbound for landing in Class-D airspace. At the same time, a scheduled passenger aircraft (HA-LXG) was on an initial approach for landing on the same runway.

When TF-KFG was at KUAGERDI, the student pilot contacted the tower controller (ATCO[2]) at Keflavík Airport (frequency 118.3) and reported his altitude and location and requested to come in for a landing (full-stop landing). The ATCO replied and provided the altimeter setting, information that Runway 01 was in use, and requested that the pilot report over PATTERSON (see Figure 1 below and Appendix 2).
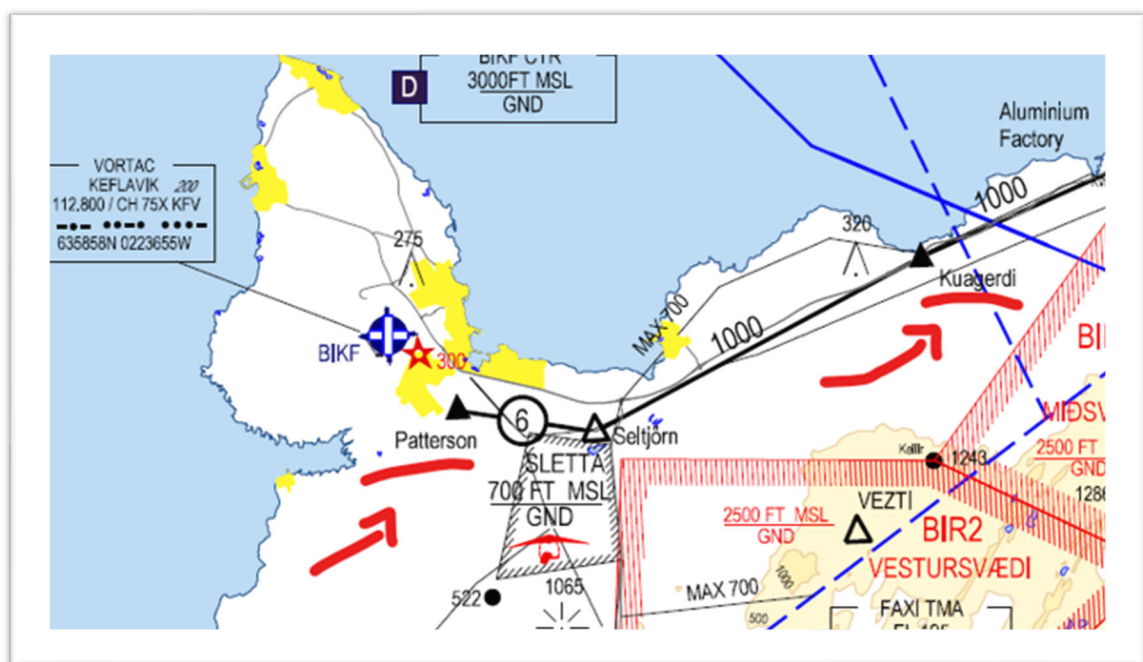
Figure 1: VFR chart showing both PATTERSON and KUAGERDI, Class D airspace

Next, the ATCO requested confirmation of whether they planned for a touch-and-go or a full-stop landing. The student pilot read back the altimeter setting and repeated that it would be a full-stop landing.

The ATCO replied with ROGER[3] and reiterated that they should report over PATTERSON. The student pilot replied with WILCO[4].

[2] Air Traffic Control Officer
[3] According to ICAO Annex 10, "ROGER" has the meaning "I have received all of your last transmission"
[4] Abbreviation for "will comply". According to ICAO Annex 10, "WILCO" has the meaning "I understand your message and will comply with it"

2

However, the flight instructor and student pilot flew over PATTERSON without reporting their location and continued their flight toward "short final" for Runway 01. Meanwhile, there was another aircraft (HA-LXG) on approach for RWY 01.

When the passenger aircraft (HA-LXG) was on the final approach (see Figure 2 to right), approximately 7 NM from the threshold, the crew was cleared to land on Runway 01.

According to the tower audio recordings, this was approximately 5 ½ minutes after the last communication between the tower and TF-KFG.
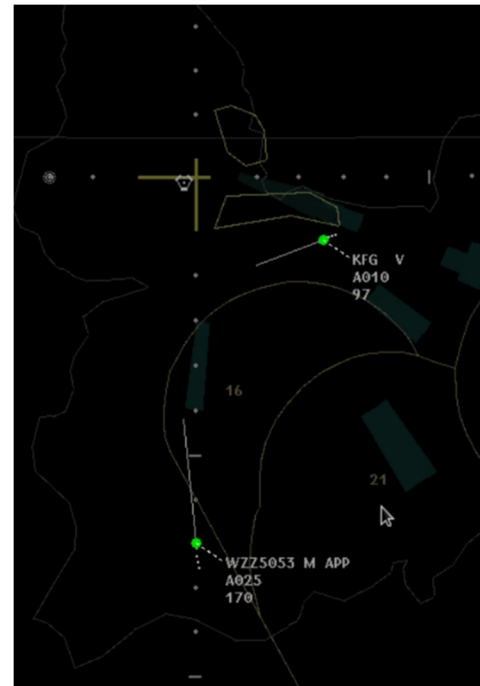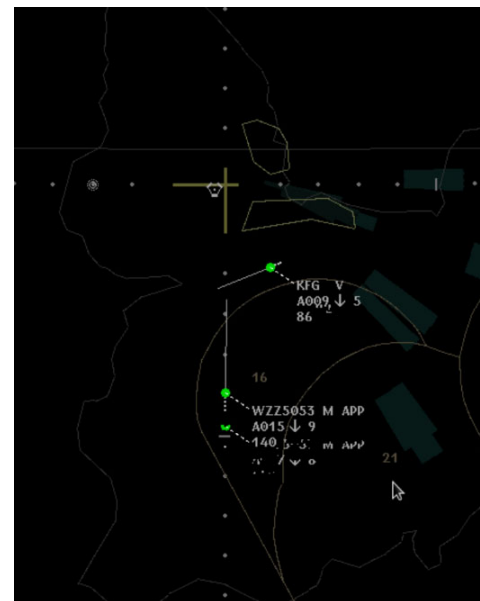

Figure 2: HA-LXG 7 NM from BIKF

When HA-LXG was approximately 4 NM from Runway 01 (see Figure 3 to right), its flight crew noticed traffic on the Navigation Display, coming from the east, and approaching final for Runway 01, in front of them.

After a visual confirmation of the traffic, the flight crew of aircraft HA-LXG heard a radio transmission from the other traffic, announcing that they were on final Runway 01.

The flight crew of aircraft HA-LXG then decided to perform a go-around and during the first phase of the go-around, they received a TCAS[5] TA[6].

Figure 3: HA-LXG 4 NM from BIKF

When the training aircraft (TF-KFG) was entering the final, the student pilot reported his location and the ATCO immediately responded and instructed them to fly towards Hafnir (i.e., through the final).

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[5] Traffic Collision and Avoidance System
[6] Traffic Advisory

When the flight instructor realized what was happening, he took over the control of the aircraft along with radio communications and directed the aircraft towards Hafnir.

According to the surveillance data, the minimum vertical distance between the two aircraft was 225 feet, and at the same time the distance was 0.59NM, but when the minimum lateral distance between them was 0.27NM while the vertical distance was 600ft. Both aircraft landed safely at the airport shortly after.

Figure 4 shows the surveillance data during the incident.
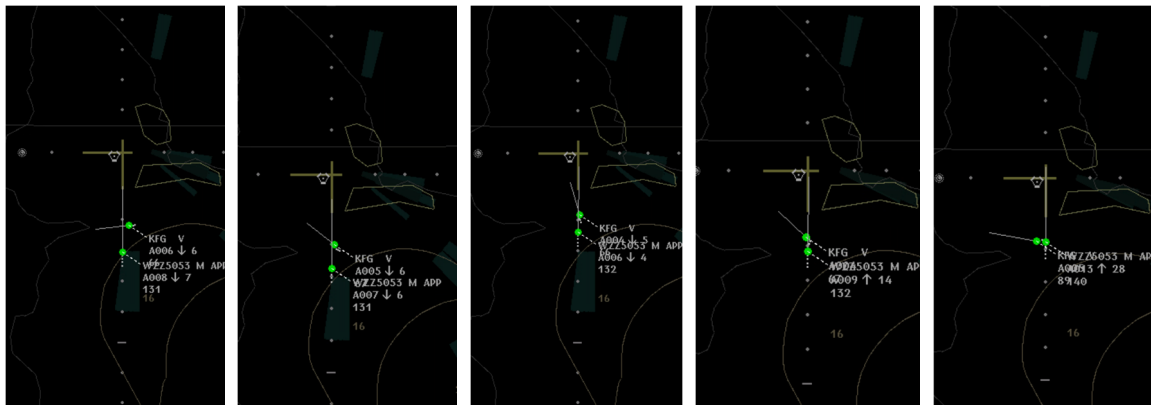
Figure 4: Surveillance data of HA-LXG and TF-KFG

2. ANALYSIS

According to the information from the flight instructor and the student pilot, on the training aircraft (TF-KFG), they did not hear the communications between the tower and the crew of HA-LXG and did not receive traffic information. They, therefore, did not expect any other air traffic and focused their attention on the approach and landing. Both aircraft were in Class D airspace, at the time of the incident, where two-way communication is required (118.3) and IFR flights are separated from other IFR flights and VFR flights receive traffic information in respect of all other flights (see Appendix 3). TF-KFG was on that frequency and noticed that there was a communication with an aircraft on the ground but missed the landing clearance for the conflicting aircraft (about 30 seconds later).

When TF-KFG was over KUAGERDI, the TWR ATCO was, at the same time, communicating with an aircraft on the ground, that was preparing for departure, on a different frequency. According to the tower frequency recordings, the ATCO was talking fast and the transmission stating where TF-KFG should report was not clear.

Figure 1 shows that PATTERSON is marked with a black filled-in triangle. AIP Iceland states that such points are compulsory reporting points.

| ▲ | Reporting point compulsory – REP |

Figure 5, AIP Iceland GEN2.3.6.1

According to the student pilot and the flight instructor, their understanding after the initial transmission was that they were supposed to report over PATTERSON. After the second transmission, their understanding was that they should report on FINAL. The second transmission was however unclear according to the student pilot statement. He and the instructor talked about whether the second transmission was for them to report on FINAL and the student pilot asked the instructor if this would override the first one. The reply from TF-KFG, after the second transmission, was WILCO, instead of reading the clearance back (readback). At the time when the student pilot replied with WILCO, the ATCO was already communicating with another aircraft on a ground frequency.

According to the ATCO work instructions (MANOPS *130.3.4, see Appendix 1*) for reading back, the ATCO must listen to the response and correct it in case of an incorrect or missing readback. In this case, WILCO was used. Since the instructions to report at PATTERSON were essentially a route clearance into the Control Zone, the pilot should have read back the clearance, and, failing to do so, the ATCO should have asked for a readback.

As the pilots and the ATCO failed to do so, the ATCO was unaware that the pilots misunderstood the clearance and the opportunity to correct the hear-back error was lost. SIA-Iceland[7] would like to emphasize the importance of a correct readback, both from pilots and ATCO.

As earlier stated, the instructor and the student pilot, on board the training aircraft TF-KFG, discussed among themselves whether the first or second request to report was valid and they concluded that the second one should be valid. They therefore decided to announce their position on the final.

The investigation revealed that when the student pilot was calling in from KUAGERDI, the air traffic controller was alone at the workstation and at the same time communicating on ground frequency with traffic on the ground.

Two tower positions were open. The ATCO (and acting shift manager) was working a combined GND[8]/TWR[9] position and an ATCA[10] was working a DAT[11] position.

Two other ATCOs were on duty at the same time, both resting and neither of them was located in the ATC tower when the incident occurred. The ATCO in the tower considered workload as a medium.

Normally, there are two ATCO workstations open in the tower at Keflavik Airport, one for the TWR position and another for the GND position. At the time of the incident, one ATCO handled both positions from the workstation. This was a common practice in low-traffic situations.

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[7] Safety Investigation Authority of Iceland
[8] Ground Controller
[9] Tower Controller
[10] Air Traffic Control Assistant
[11] Data Terminal

When TF-KFG was passing PATTERSON, the ATCO had not been monitoring the location of TF-KFG. Traffic was visible on the surveillance display in the tower.

It is the assessment of SIA-Iceland, if there is any doubt about ATC instructions, or when the next contact should be made, further communication should take place for confirmation.

Following the incident, the use of surveillance displays was added to the recurrent training of Keflavík Airport Tower ATCOs to increase situational awareness of the traffic around the airport. However, this will be limited to aircraft that are equipped with a transponder which is not required in class D airspace, such as in this incident.

As mentioned in Chapter 1, when the student pilot reported his position, the ATCO immediately responded and instructed them to fly towards Hafnir (i.e. through the final). When looking at the Iceland AIP AD 2 BIKF 8 -1, for Keflavik VFR Routes, (see Appendix 4 and 5), HAFNIR is not marked as a location.

Keflavik Tower ATCOs frequently use HAFNIR and SANDGERDI as locations for VFR flights to orbit. Thus, SIA-Iceland believes that it would be beneficial for pilots to mark these locations on the VFR chart.

3. CONCLUSION

The following topics indicate the probable cause of the incident:

- The pilots of TF-KFG did not report at the compulsory reporting point
- The pilots of TF-KFG did not hear the communication between the tower and the crew of HA-LXG
- One ATCO person operating multiple frequencies
- Lack of situation awareness of possible conflict for both the pilot of the training flight as well as the ATCO
- Fast transmitting due to multiple frequency transmissions at the same time, probably caused a hear-back error by the pilots of the training flight
- Confirmation by the pilots of communication not requested in an uncertain situation
- Readback from the training aircraft was WILCO
- WILCO does not contain information from previous communication, rendering the ATCO unaware of the mishearing
- The traffic was unusually low
- The location of the training aircraft was not actively monitored by the ATCO
- Traffic visual on surveillance display not used or monitored

In June 2021, approximately one year after the incident, a Short-Term Conflict Alert (STCA) was implemented into the surveillance system within Keflavik approach area (FAXI TMA). The STCA system alerts the Approach controller of the potential collision hazard by color-coding the data label on the surveillance system. This system is currently not used for Keflavik CTR (Class D airspace). The SIA-Iceland believes that by the use of STCA within the BIKF control zone, serious incidents such as this could be avoided.

The investigation revealed that the crew of the passenger aircraft (HA-LXG) noticed the training aircraft soon enough to make a go-around only because the training aircraft was equipped with Transponder mode C. SIA-Iceland emphasizes the importance of this in the safety recommendation nr. 3.1.3 in the final report of case nr. M-05908/AIG-18, i.e. requirements for transponder with mode C in control zones (CTR).

4. SAFETY RECOMMENDATIONS

The following safety recommendations are addressed to Isavia:

20-085F016T01

> In case a single ATCO monitoring multiple frequencies in the Keflavík Airport Tower, evaluate the feasibility of temporary coupling the frequencies together to avoid multiple transmissions at the same time.

The following safety recommendation is addressed to Icetra:

20-085F016T02

> In Iceland AIP AD 2 BIKF 8 -1, for Keflavik VFR Routes, (see Appendix 2) add more location references, commonly used by BIKF TWR to put VFR traffic in holding around the airport, such as HAFNIR and SANDGERDI.

20-085F016T03

> To change the classification of the control zones for Keflavik from class D airspace to class C airspace.

The following Safety Action is issued:

> SIA-Iceland reminds pilots, that if there is any doubt about ATC instructions, further communication should take place for confirmation.

The following board members approved the report:

- Guðmundur Freyr Úlfarsson

- Geirþrúður Alfreðsdóttir

- Bryndís Lára Torfadóttir

- Gestur Gunnarsson

- Tómas Davíð Þorsteinsson

- Hörður Arilíusson

Reykjavík, 27. December 2023

On behalf of the SIA-Iceland

Þorkell Ágústsson

Investigator-In-Charge

APPENDIX 1

MANOPS *130.3.4*

Read-back requirements have been introduced in the interests of flight safety. Safety-related parts of ATC clearances and instructions which are transmitted by voice shall be read back to the air traffic controller.

A. The following items shall always be read back:

1. ATC route clearances and any amendment thereto;

2. clearances and instructions to enter, land on, take off from, hold short of, cross, taxi and backtrack on any runway; and

3. runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in automatic terminal information service (ATIS) broadcasts, transition levels.

B. Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

C. The controller shall listen to the readback to ascertain that the clearance or instruction has been correctly acknowledged and shall take immediate action to correct any Incident discrepancies revealed by the readback.

D. Voice readback of controller-pilot data link communications (CPDLC) messages is not required.

APPENDIX 2 - Keflavik VFR Routes

Keflavik VFR Routes
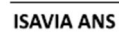
APPENDIX 3 – Airspaces of the ATC is categorized and decided accordingly

ENR 1.4.1 Classification of airspaces

ATS airspaces are classified and designated in accordance with the following:

Class A
IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Class B*
IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

Class C
IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.

Class D
IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

Class E
IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as practical.

Class F*
IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.

Class G
IFR and VFR flights are permitted and receive flight information service if requested.

The requirements for the flights within each class of airspace are as shown in the following table.

* Airspace classes B and F are not used inwithin BIRD FIR/CTA.

Flokkur / Class	Tegund flugs / Type of flight	Veittur aðskilnaður / Separation provided	Veitt þjónusta / Service provided	Takmarkanirá hraða / Speed limitation	Kröfur um fjarskiptabúnað / Radio communication requirement	Þurfa flugheimild / Subject to an ATC clearance
	VFR	VFR frá IFR / VFR from IFR	1. Flugstjórnarþjónusta til aðskilnaðar frá IFR 2. Upplýsingar um VFR- / VFR-loftför (ráðgjöf til að forðast árekstur að beiðni) 1. Air traffic control service for separation from IFR; 2. VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Já Yes
D	IFR	IFR frá IFR / IFR from IFR	Flugstjórnarþjónusta, upplýsingar um VFR-loftför (ráðgjöf til að forðast árekstur að beiðni) Air traffic control service including traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Já Yes
	VFR	Engin / Nil	Upplýsingar um umferð milli IFR/VFR- og VFR/VFR-loftfara (ráðgjöf til að forðast árekstur að beiðni) IFR/VFR and VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Já Yes
E	IFR	IFR frá IFR / IFR from IFR	Flugstjórnarþjónusta og upplýsingar um VFR-loftför eftir því sem við verður komið Air traffic control service and traffic information about VFR flights as far as practical	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Já Yes
	VFR	Engin / Nil	Upplýsingar um loftför eftir því sem við verður komið Traffic information as far as practical	250 kt IAS undir F100 250 kt IAS below F100	Engar No	Nei No
F*	IFR	IFR frá IFR eins og við verður komið IFR from IFR as far as practical	Flugráðgjafaþjónusta Flugupplýsingaþjónusta Air traffic advisory service; flight information service	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Nei No
	VFR	Engin / Nil	Flugupplýsingaþjónusta Flight information service	250 kt IAS undir F100 250 kt IAS below F100	Engar No	Nei No
G	IFR	Engin / Nil	Flugupplýsingaþjónusta Flight information service	250 kt IAS undir F100 250 kt IAS below F100	Talstöð Continuous two-way	Nei No
	VFR	Engin / Nil	Flugupplýsingaþjónusta Flight information service	250 kt IAS undir F100 250 kt IAS below F100	Engar No	Nei No

* Flokkar loftrýmis B og F eru ekki í notkun innan BIRD FIR/CTA.

APPENDIX 4 – Example of VFR Inbound Routs for single engine aircraft
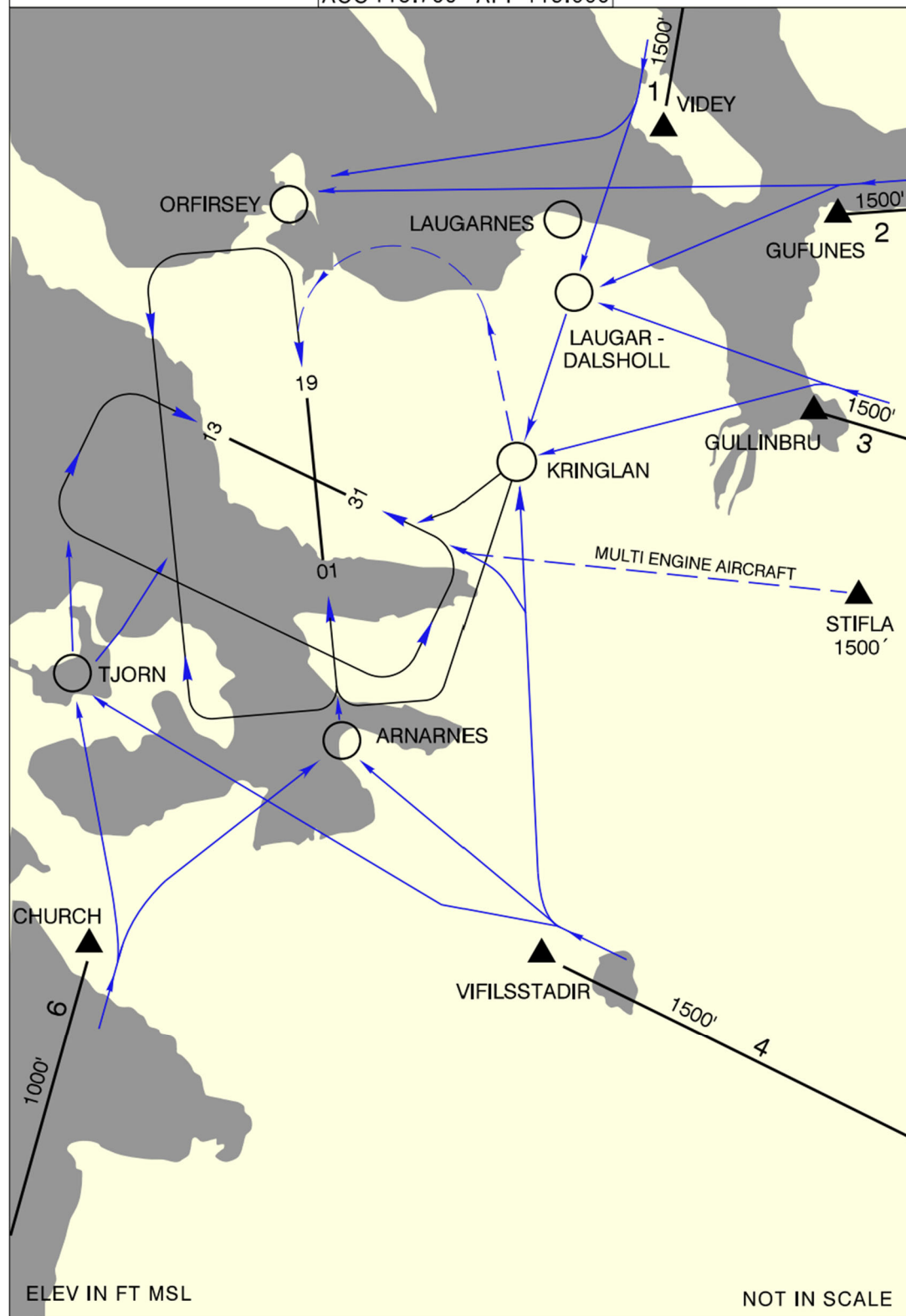

AIP Iceland
FLUGMÁLAHANDBÓK

AD ELEV 45

BIRK

INBOUND VFR-ROUTES
FOR SINGLE ENGINE
AIRCRAFT

RK TWR/AFIS 118.000
RK GND 121.700
ACC 119.700   APP 119.000

REYKJAVIK

VIDEY

ORFIRSEY

LAUGARNES

GUFUNES

LAUGAR -
DALSHOLL

GULLINBRU

KRINGLAN

MULTI ENGINE AIRCRAFT

STIFLA
1500´

TJORN

ARNARNES

CHURCH

VIFILSSTADIR

ELEV IN FT MSL

NOT IN SCALE

APPENDIX 5 – Example of VFR Outbound Routs for single engine aircraft