

# PBN Transition plan for ICELAND

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## 1. Introduction

Purpose of this document is to provide a general plan for implementation of performance-based navigation within the airspace of Reykjavik FIR. This document is subject to consultation of all stakeholders involved in implementation of PBN concept in Reykjavik FIR.

According to EU Reg. 2018/1048, tasks Isavia ANS to develop PBN implementation/transition plan to ensure regulatory compliance and to meet airspace users demands, without impacting on the safety or capacity of the airspace whilst in support of national environmental commitments.

This implementation plan has clearly defined transition plan with timescales. The plan will be updated at least yearly.

## 2. Abbreviations

|         |   |
|---------|---|
| ACC:    | Area Control Centre   |
| ADS-B:  | Automatic Dependent Surveillance Broadcast                              |
| AIP:    | Aeronautical information publication                                    |
| ANS:    | Air Navigation Service  |
| APCH:   | Approach  |
| ATC:    | Air Traffic Control   |
| ATM:    | Air traffic management  |
| ATS:    | Air Traffic Service   |
| BIRD:   | Reykjavik FIR, OAC, ACC, FIC  |
| CAT:    | Category  |
| CTA:    | Control Area  |
| DME:    | Distance Measuring Equipment  |
| FIC:    | Flight Information Centre   |
| EGNOS:  | European Geostationary Navigation Overlay Service                       |
| FIR:    | Flight Information Region   |
| GNSS:   | Global Navigation Satellite System                                      |
| ICAO:   | International Civil Aviation Organization                               |
| ICETRA: | Icelandic Transport Authority (The Civil aviation authority in Iceland) |
| IFR:    | Instrument Flight Rules   |
| ILS:    | Instrument Landing System   |
| LNAV:   | Lateral Navigation  |
| LPV:    | Localiser Performance with Vertical guidance.                           |
| MLAT:   | Multilateration   |
| MNPS:   | Minimum navigation performance specifications                           |
| NAT:    | North Atlantic  |
| NAVAID: | Navigation aid  |
| NDB:    | Non-directional Radio Beacon  |
| OAC:    | Oceanic Area Control  |
| PBN:    | Performance Based Navigation  |
| RF:     | Radius to Fix   |
| RNAV:   | Area navigation   |
| RNP:    | Required Navigation Performance   |
| SBAS:   | Satellite -based Augmentation System                                    |
| SID:    | Standard Instrument Departure   |
| STAR:   | Standard instrument Arrival   |
| VNAV:   | Vertical Navigation   |
| VOR:    | VHF Omnidirectional Radio range   |

### 3. Definitions

**Area navigation:** A method of navigation which permits aircraft operations on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

**Area navigation route:** An ATS route established for the use of aircraft capable of employing area navigation.

**Lateral Navigation:** A method of navigation which permits aircraft operation on a horizontal plane using radio navigation signals, other positioning sources, external flight path references, or a combination of these.

**Navigation aid:** Any visual or electronic device, ground or space based, that provides point-to-point guidance information or position data to aircraft in flight.

**Navigation specification:** A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1

**Performance-based navigation:** Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

**Standard instrument arrival:** A designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

**Standard instrument departure:** A designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the en-route phase of a flight commences.

## 4. Reference documents

- A. Icelandic Regulation 444/2020 of 13<sup>th</sup> May 2020 laying down airspace usage requirements and operating procedures concerning performance-based navigation and implementing COMMISSION IMPLEMENTING REGULATION (EU) No 2018/1048 of 18 July 2018 laying down airspace usage requirements and operating procedures concerning performance-based navigation.
- B. Icelandic Regulation 787/2010 of 4<sup>th</sup> of October 2010, Procedures for Air Navigation Services.
- C. COMMISSION IMPLEMENTING REGULATION (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan
- D. Regulation (EC) N° 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation).
- E. Icelandic Regulation 237/2014 implementing Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.
- F. Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council Text with EEA relevance
- G. Icelandic Regulation 773/2010 on charts.
- H. ICAO ANNEX 10, Aeronautical Telecommunications, Volume I, Radio Navigation Aids.
- I. ICAO ANNEX 11, Air Traffic Services.
- J. ICAO Doc 4444 PANS-ATM Procedures for Air Navigation Services, Air Traffic Management.
- K. ICAO Doc 8168 PANS-OPS vol. I and vol. II.
- L. ICAO Doc 9613 Performance Based Navigation (PBN) Manual
- M. ICAO Doc 9750, 2020-2030 Global Air Navigation Plan
- N. ICAO Doc 9854, Global ATM Operational Concept
- O. ICAO Doc 9958, Assembly Resolutions in Force
- P. ICAO NAT Region MNPS to PBN Transition Plan

## 5. Requirements for PBN implementation plan

According to IR 2018/1048, providers of ATM/ANS are required to take the necessary measures to ensure a smooth and safe transition to the provision of their services using performance-based navigation in accordance with Article 3, of COMMISSION IMPLEMENTING REGULATION (EU) 2018/1048.

Being part of the ICAO NAT Region, Isavia ANS has implemented MNPS to PBN Transition Plan for the oceanic area.

Isavia ANS followed the existing regulation requirements for the territory of Iceland, best practices during the preparation for transition to PBN operations, including:

- Icelandic Regulation 787/2010 of 4th of October 2010, Procedures for Air Navigation Services.
- COMMISSION IMPLEMENTING REGULATION (EU) 2018/1048. Airspace usage requirements and operating procedures concerning performance - based navigation.

As required by IR 2018/1048, Isavia ANS has consulted all the following parties on the transition plan and the draft of any significant updates thereof and take account of their views where appropriate:

- a. aerodrome operators, airspace users and representative organizations of such airspace users affected by the provision of their services,
- b. the Network Manager,
- c. providers of ATM/ANS that provide their services in adjacent airspace blocks.

Due to lack of governmental funding some planned implementation dates, in this version (3.0), in table 7.C and 7.D, are pushed back. See table below showing estimated cost of fulfilling the PBN Transition Plan.

| Cost                         | 2024              | 2025              | 2026              | 2027              | 2028              |
|------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Procedures design and charts | 19.711.160        | 20.203.939        | 20.709.037        | 21.226.763        | 21.757.432        |
| Flight testing               | 16.933.000        | 20.827.590        | 7.116.093         | 5.470.497         | 50.347.180        |
|                              | <b>36.644.160</b> | <b>41.031.529</b> | <b>27.825.131</b> | <b>26.697.260</b> | <b>72.104.612</b> |

## 6. PBN implementation plan in accordance with Part 3 of IR2018/1048.

| Regulation timeline | Regulation articles/sub-articles  | Isavia ANS Compliance |
|---------------------|---|-----------------------|
| 03-12-2020          | For ATS routes above FL 150 - RNAV 5  | 05.10.2023            |
|                     | RNP APCH at IREs without Precision Approach (PA)  | 28.11.2024            |
| 25-01-2024          | RNP APCH at IREs (with PA)  | 28.11.2024            |
|                     | For all instrument runway ends, point AUR.PBN.2005(4) of the Annex of IR2018/1048 shall apply with respect to one SID or STAR route established   | 25-01-2028            |
|                     | For ATS routes below FL 150 - RNAV 5  | 05.10.2023            |
| 06-06-2030          | For all instrument runway ends, point AUR.PBN.2005(4) of the Annex of IR2018/1048 shall apply with respect to all SID or STAR routes established  | 06-06-2030            |
|                     | Without prejudice to Article 6 and to the possibility of providers of ATM/ANS to provide their services using landing systems enabling CAT II, CAT IIIA or CAT IIIB operations within the meaning of points 14, 15 and 16, respectively, of Annex I to Regulation (EU) No 965/2012. | 06-06-2030            |
|                     | Providers of ATM/ANS shall not provide their services using conventional navigation procedures or using performance-based navigation which is not in accordance with the requirements of point AUR.PBN.2005 of the Annex.   | 06-06-2030            |

## 7. Operational requirements and PBN implementation objectives

### A. Transition plan

As part of the preparation for the transition to fully performance-based navigation (PBN), the operational environment that is expected to exist at the time when the PBN routes and procedures are to be implemented will be evaluated.

The purpose of the evaluation of the operational environment is to:

- ensure that measures are taken, and appropriate information is made available to the ATS units in order to facilitate mixed operations, i.e. operations of PBN capable and non-PBN capable aircraft;
- underpin the transition plan and help to describe the introduction of the new PBN routes and procedures in detail, i.e. the transition along the different stages until the end-state is eventually implemented;
- consider both normal operations as well as contingencies, and therefore, be used to define the contingency measures, which are expected to evolve and adapt to the different stages of the implementation.

When implementing the required routes and procedures, there is an opportunity to optimise the overall safety, capacity, and efficiency of flight operations.

The complexity of the airspace structures and traffic flows as well as the specificities of the traffic operating at the affected aerodromes will be considered. Aircraft operational capability expected in the affected airspace will be evaluated, with the purpose of estimating the number of aircraft unable to perform the envisaged PBN operations.

A general plan to gradually withdraw NDB stations is to be prepared, considering the progress of PBN operations and the necessity for radio navigation aids after consultation with stakeholders. Withdrawal of NDB stations will be fully completed 2030 except for SB and TN NDB that will remain for contingency. No changes are planned regarding VOR, DME, ILS systems, H-radar stations, MLAT, ADS-B and communications infrastructure.

## B. Implementation of exclusive use of PBN 1

|  |   |
|--|---|
| 1. Providers of ATM/ANS shall not provide their services using conventional navigation procedures or using performance-based navigation which is not in accordance with the requirements of point AUR.PBN.2005 of the Annex.   |   |
| <b>AUR.PBN.2005</b>  | Transition plan   |
| (1) Providers of ATM/ANS shall implement, at all instrument runway ends, approach procedures in accordance with the requirements of the RNP approach (RNP APCH) specification, including LNAV, LNAV/VNAV and LPV minima and, where required due to traffic density or traffic complexity, radius to fix (RF) legs.   | See table 7.C.  |
| (2) By way of derogation from point (1), at instrument runway ends where, due to terrain, obstacles or air traffic separation conditions, the implementation of 3D approach procedures is excessively difficult, providers of ATM/ANS shall implement 2D approach procedures in accordance with the requirements of the RNP approach (RNP APCH) specification. In that case, they may also, in addition to the implementation of those 2D approach procedures, implement 3D approach procedures in accordance with the requirements of the RNP authorisation required (RNP AR APCH) specification.   | See table 7.C.  |
| (3) By way of derogation from point (1) at instrument runway ends without an appropriate SBAS coverage, providers of ATM/ANS shall implement RNP APCH procedures, including LNAV and LNAV/VNAV minima. Providers of ATM/ANS shall also implement LPV minima at those instrument runway ends, no later than 18 months from the date at which such appropriate SBAS coverage is available.   | SBAS approach is not allowed west of 19W due limitation on EGNOS coverage. See table 7.C.<br><br>A new EGONS station is planned to be established in the north-west part of Iceland, it will extend EGNOS coverage over the whole of Iceland. Implementation date is still not clear. |
| (4) Where providers of ATM/ANS have established SID routes or STAR routes, they shall implement those routes in accordance with the requirements of RNAV 1 specification.  | SID and STAR with RNAV 1 have been implemented within CTA where surveillance is provided. See table 7. D.   |
| (5) By way of derogation from point (4), where providers of ATM/ANS have established SID routes or STAR routes and where higher performance requirements than those referred to in that point are required in order to maintain air traffic capacity and safety in environments with high traffic density, traffic complexity or terrain features, they shall implement those routes in accordance with the requirements of the RNP 1 specification, including one or more of the following additional navigation functionalities: (a) operations along a vertical path and between two fixes and with the use of: (i) an 'AT' altitude constraint; (ii) an 'AT OR ABOVE' altitude constraint; (iii) an 'AT OR BELOW' altitude constraint; (iv) a 'WINDOW' constraint; (b) the radius to fix (RF) leg. | SID and STAR with RNP 1 have been implemented where terrain and/or lack of surveillance required. See table 7.D.  |
| (6) Where providers of ATM/ANS have established ATS routes for en route operations, they shall implement   | RNAV 5 in BIRD FIR is based on GNSS only, see AIP ICELAND ENR 1.8.3.1.3.9   |

|  |   |
|--|---|
| <p>those routes in accordance with the requirements of the RNAV 5 specification.</p>   | <p>...RNAV SPECIFICATIONS...<br/>           B1 RNAV 5 all permitted sensors<br/>           B2 RNAV 5 GNSS<br/>           B3 RNAV 5 DME/DME (not available within Reykjavik CTA)<br/>           B4 RNAV 5 VOR/DME (not available within Reykjavik CTA)<br/>           B5 RNAV 5 INS or IRS (not available within Reykjavik CTA)<br/>           B6 RNAV 5 LORANC (not available within Reykjavik CTA)</p> |
| <p>(7) By way of derogation from points (4) and (6), where providers of ATM/ANS have established ATS routes, SID routes or STAR routes for rotorcraft operations, they shall implement those routes in accordance with the requirements of the RNP 0.3, RNAV 1 or RNP 1 specifications. In that case, they shall be entitled to decide which of those three sets of requirements they comply with.</p> | <p>No routes for rotorcraft operations have been established in BIRD FIR.</p>   |
| <p>2.Paragraph 1 shall be without prejudice to Article 6 and to the possibility of providers of ATM/ANS to provide their services using landing systems enabling CAT II, CAT IIIA or CAT IIIB operations within the meaning of points 14, 15 and 16, respectively, of Annex I to Regulation (EU) No 965/2012.</p>  | <p>CAT I approaches are only based on ILS as SBAS coverage currently does not allow CAT I RNP approaches.<br/>           No plans are for implementing GBAS. See chapter 10, Contingency measures.</p>  |

### C. Implementation of RNP approach based on GNSS only.

| ICAO CODE | Airport name    | IFR RWY         | LNAV         | LNAV/VNAV    | LPV          | A-RNP        | REMARKS   |
|-----------|-----------------|-----------------|--------------|--------------|--------------|--------------|---|
| BIAR      | AKUREYRI        | 01              | -            | -            | -            | Planned 2024 | Challenging terrain environment. Possible candidate for A-RNP or RNP AR     |
|           |                 | 19 <sup>1</sup> | Implemented  | Implemented  | Implemented  | -            |   |
| BIBD      | BILDUDALUR      | 04<br>22        | Implemented  | -            | -            | -            | RNP APCH to circling (LNAV) due terrain                                     |
|           |                 | 22              | Planned 2024 | Planned 2024 | -            | -            | Outside EGNOS range.  |
| BIEG      | EGILSSTADIR     | 03              | Implemented  | Planned 2024 | Planned 2024 | -            |   |
|           |                 | 21              | Implemented  | Implemented  | Planned 2024 | -            |   |
| BIGJ      | GJOGUR          | 04<br>22        | Implemented  | Implemented  | -            | -            | RNP APCH to circling (LNAV) due terrain                                     |
|           |                 | 22              | Planned 2024 | Planned 2024 | -            | -            | Outside EGNOS range   |
| BIGR      | GRIMSEY         | 17              | Planned 2024 | Planned 2024 | Planned 2024 | -            |   |
|           |                 | 35              | Implemented  | Implemented  | Implemented  | -            |   |
| BIHU      | HUSAVIK         | 02              | Implemented  | Implemented  | Implemented  | -            |   |
|           |                 | 20              | Planned 2025 | Planned 2025 | Planned 2025 | -            |   |
| BIHN      | HOFN            | 18              | Implemented  | -            | -            | -            | Not suitable for LNAV/VNAV nor LPV due to offset.                           |
|           |                 | 36              | Implemented  | -            | Planned 2024 | -            | Not suitable for LNAV/VNAV due to terrain.                                  |
| BIIS      | ISAFJORDUR      | 08              | Implemented  | -            | -            | -            | Cloud break procedure. Straight in or circling not possible due terrain.    |
|           |                 | 26              |              |              |              |              |   |
| BIKF      | KEFLAVIK        | 01              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 10              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 19              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 28              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
| BIRK      | REYKJAVIK       | 01              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 19              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 13              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 31              | Implemented  | -            | -            | -            | Outside EGNOS range<br>LNAV/VNAV not possible due high VPA                  |
| BIKR      | SAUDAR-KROKUR   | 18              | Planned 2024 | Planned 2024 | -            | -            | Outside EGNOS range   |
|           |                 | 36              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
| BITN      | THORSHOFN       | 01              | Implemented  | Planned 2024 | Planned 2024 | -            |   |
|           |                 | 19              | Implemented  | Planned 2024 | Planned 2024 | -            |   |
| BIVM      | VESTMANNA-EYJAR | 03              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 12              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
|           |                 | 21              | -            | -            | -            | -            | Not suitable for LNAV nor LNAV/VNAV due to terrain.<br>Outside EGNOS range  |
|           |                 | 30              | Implemented  | Implemented  | -            | -            | Outside EGNOS range   |
| BIVO      | VOPNA-FJORDUR   | 04              | Implemented  | Implemented  | Implemented  | -            |   |
|           |                 | 22              | Planned 2025 | Planned 2025 | Planned 2025 | -            |   |
| BIBL      | BLONDUOS        | 03              | Implemented  | -            | -            | -            | Outside EGNOS range<br>No MET service for LNAV/VNAV                         |
|           |                 | 21              | Planned 2025 | -            | -            | -            | Outside EGNOS range<br>No MET service for LNAV/VNAV                         |
| BINF      | NORDFJORDUR     | 08              | Implemented  | -            | -            | -            | Cloud break procedure. Straight in or circling is not possible due terrain. |
|           |                 | 26              | -            | -            | -            | -            |   |
| BIRL      | REYKJAHLID      | 01              | Implemented  | -            | -            | -            | Not suitable for LNAV/VNAV nor LPV due to terrain. No MET services.         |
|           |                 | 19              | -            | -            | -            | -            | Not suitable for LNAV, LNAV/VNAV nor LPV due to terrain.                    |

### D. Implementation of SID and STAR procedures based on GNSS only.

| ICAO CODE | Airport name    | IFR RWY | SID          |              | STAR         |              | REMARKS                  |
|-----------|-----------------|---------|--------------|--------------|--------------|--------------|--------------------------|
|           |                 |         | RNAV 1       | RNP 1        | RNAV 1       | RNP 1        |                          |
| BIAR      | AKUREYRI        | 01      | -            | Implemented  | -            | Planned 2025 |                          |
|           |                 | 19      | -            | Implemented  | -            | Implemented  |                          |
| BIBD      | BILDUDALUR      | 04      | -            | Planned 2025 | -            | -            | Not instrument RWY       |
|           |                 | 22      | -            | Planned 2025 | -            | -            | Not instrument RWY       |
| BIEG      | EGILSSTADIR     | 03      | -            | Implemented  | -            | Planned 2025 |                          |
|           |                 | 21      | -            | Planned 2024 | -            | Planned 2025 |                          |
| BIGJ      | GJOGUR          | 04      | -            | Planned 2025 | -            | -            | Not instrument RWY       |
|           |                 | 22      | -            | Planned 2025 | -            | -            | Not instrument RWY       |
| BIGR      | GRIMSEY         | 17      | -            | Planned 2026 | -            | -            |                          |
|           |                 | 35      | -            | Planned 2024 | -            | -            |                          |
| BIHU      | HUSAVIK         | 02      | -            | Implemented  | -            | Planned 2025 |                          |
|           |                 | 20      | -            | Planned 2025 | -            | -            |                          |
| BIHN      | HOFN            | 18      | -            | Planned 2025 | -            | -            |                          |
|           |                 | 36      | -            | Planned 2026 | -            | -            |                          |
| BIIS      | ISAFJORDUR      | 08      | -            | Implemented  | -            | -            | Not instrument RWY       |
|           |                 | 26      | -            | Planned 2024 | -            | -            | Not instrument RWY       |
| BIKF      | KEFLAVIK        | 01      | Implemented  | -            | Implemented  | -            |                          |
|           |                 | 10      | Implemented  | -            | Implemented  | -            |                          |
|           |                 | 19      | Implemented  | -            | Implemented  | -            |                          |
|           |                 | 28      | Implemented  | -            | Implemented  | -            |                          |
| BIRK      | REYKJAVIK       | 01      | Planned 2024 | -            | Planned 2026 | -            |                          |
|           |                 | 19      | Planned 2024 | -            | Implemented  | -            |                          |
|           |                 | 13      | Planned 2024 | -            | Planned 2026 | -            |                          |
|           |                 | 31      | Planned 2024 | -            | Planned 2026 | -            |                          |
| BIKR      | SAUDAR-KROKUR   | 18      | -            | Planned 2027 | -            | -            |                          |
|           |                 | 36      | -            | Planned 2025 | -            | -            |                          |
| BITN      | THORSHOFN       | 01      | -            | Planned 2025 | -            | -            |                          |
|           |                 | 19      | -            | Planned 2027 | -            | -            |                          |
| BIVM      | VESTMANNA-EYJAR | 03      | -            | -            | -            | -            | Not possible due terrain |
|           |                 | 12      | -            | Planned 2025 | -            | -            |                          |
|           |                 | 21      | -            | Planned 2025 | -            | -            |                          |
|           |                 | 30      | -            | Planned 2025 | -            | -            |                          |
| BIVO      | VOPNA-FJORDUR   | 04      | -            | Planned 2025 | -            | -            |                          |
|           |                 | 22      | -            | Planned 2027 | -            | -            |                          |
| BIBL      | BLONDUOS        | 03      | -            | Planned 2028 | -            | -            |                          |
|           |                 | 21      | -            | Planned 2028 | -            | -            |                          |
| BINF      | NORD-FJORDUR    | 08      | -            | Planned 2026 | -            | -            | Not instrument RWY       |
|           |                 | 26      | -            | -            | -            | -            | Not possible due terrain |
| BIRL      | REYKJAHLID      | 01      | -            | -            | -            | -            | Not instrument RWY       |
|           |                 | 19      | -            | -            | -            | -            | Not instrument RWY       |

### E. Implementation of Radius to fix.

Radius to fix (RF) turn have been implemented for one airport (BIAR) and is planned for another (BIEG) mainly for domestic traffic, see table B above. As aircraft fleet capabilities to fly RF turns increases, RF might be implemented at more airports.

## 8. Mixed mode operations and VFR until 06.06.2030

By implementing SID and STAR procedures with PBN specification, some NDB based SID and STAR procedures will be withdrawn.

There are no PBN rotorcraft routes in Iceland. If established, it will be done in accordance with EU Regulation 2018/1048.

Some conventional NAV AID structure procedures will be updated for non PBN equipped aircraft as necessary.

VFR operations will remain unchanged.

The following measures will be used to ensure operations of non-capable aircraft.

- a. vectoring of controlled aircraft based on the use of an ATS surveillance system,
- b. conventional navigation procedures,
- c. use of any other existing PBN application, and
- d. procedural control.

## 9. Transition plan

### A. Rationalisation of ground-based NAVAIDs

Isavia ANS will accommodate plans by Regulation (EU) 2018/1048 to accomplish required navigational service to aircraft before PBN IR targeted full implementation date 06.06.2030.

Ground based NDB's used for en-route and approaches, will be phased out gradually in coordination with stakeholders. The decommission will start with the enroute NDBs and the ones that do not support approach procedure.

From Regulation (EU) 2018/1048 Articles 5 & 6 the following is derived:

Except for operations depending on ILS CAT-II/III, conventional navigational aids will as of 06.06.2030 not have any purpose, except for the event of failure in PBN-components; either in the space segment, with signal propagation, or in the aircraft.

This implies unless a contingency situation is present, the use of conventional procedures is prohibited. In the case of a contingency situation, the aircraft is expected to:

- a. if the destination is an airport with conventional nav-aids: continue to destination,
- b. if the airport is a "GNSS-only"-airport: divert to an aerodrome with conventional nav-aids.

Rationalisation of ground-based NAVAIDs and the associated procedures.

| ICAO CODE | Airport Name | SYSTEM  | ID  | USAGE       | Contingency use ref. EU 1048/2018, Art 6. | DECOMMISSIONED (Planned) | DECOMMISSIONING YEAR (Planned) | Decommissioned/affected procedures   |
|-----------|--------------|---------|-----|-------------|---|--------------------------|--------------------------------|--|
| BIAR      | Akureyri     | VOR/DME | AKI | Enroute     | X   |                          |                                |  |
| BIAR      | Akureyri     | NDB     | AR  |             |   | X                        | 2030                           | ILS RWY 01, SID RWY 01 AR-1A,  |
| BIAR      | Akureyri     | L       | HJ  |             |   | X                        | 2030                           | ILS RWY 01, LOC RWY 01 CAT A and B, LOC RWY 01 CAT C AND D, NDB RWY 19, SID RWY 01 AKI-2A/AKI-2B, SID RWY 01 AR-1A |
| BIAR      | Akureyri     | LOC     | IAL |             | X   |                          |                                |  |
| BIAR      | Akureyri     | GP      | IAL |             | X   |                          |                                |  |
| BIAR      | Akureyri     | DME     | IAL |             | X   |                          |                                |  |
| BIAR      | Akureyri     | LOC     | IAL |             | X   |                          |                                |  |
| BIAR      | Akureyri     | GP      | IAR |             | X   |                          |                                |  |
| BIAR      | Akureyri     | DME     | IAR |             | X   |                          |                                |  |
| BIAR      | Akureyri     | Marker  | IEY |             |   | X                        | 2030                           | LOC RWY 01 CAT A and B, LOC RWY 01 CAT C AND D,  |
| BIAR      | Akureyri     | LOC     | IEY |             | X   |                          |                                |  |
| BIAR      | Akureyri     | DME     | IEY |             | X   |                          |                                |  |
| BIAR      | Akureyri     | L       | KN  |             |   | X                        | 2030                           | LOC RWY 01 CAT A and B, LOC RWY 01 CAT C AND D   |
| BIAR      | Akureyri     | TACAN   | MOB | Military    | X   |                          |                                |  |
| BIAR      | Akureyri     | NDB     | NB  |             |   | X                        | 2030                           | LOC RWY 01 CAT AND B, LOC RWY 01 CAT C AND D, ILS RWY 19, NDB RWY 19   |
| BIAR      | Akureyri     | L       | OE  |             | X   |                          |                                |  |
| BIAR      | Akureyri     | L       | TO  |             |   | X                        | 2030                           | ILS RWY 19, NDB RWY 19   |
| BIBD      | Bildudalur   | NDB/MKR | SB  | Contingency | X   |                          |                                |  |



|      |                |           |     |                  |   |   |      |  |
|------|----------------|-----------|-----|------------------|---|---|------|--|
| BIEG | Egilsstaðir    | NDB       | ES  |                  |   | X | 2030 | ILS RWY 03, NDB RWY 03, NDB RWY 21, arrival procedures, SID RWY 03, SID RWY 21               |
| BIEG | Egilsstaðir    | LOC       | IES |                  | X |   |      |  |
| BIEG | Egilsstaðir    | GP        | IES |                  | X |   |      |  |
| BIEG | Egilsstaðir    | DME       | IES |                  | X |   |      |  |
| BIEG | Egilsstaðir    | L         | MN  |                  |   | X | 2030 | ILS RWY 03, NDB RWY 03, NDB RWY 21, SID RWY 03   |
| BIEG | Egilsstaðir    | NDB       | VA  |                  |   | X | 2024 | ILS RWY 03, NDB RWY 03, arrival procedures, SID RWY 03, SID RWY 21                           |
| BIBL | Blonduos       | NDB/MKR   | BL  |                  |   | X | 2023 | Decommissioned 26.01.2023  |
| BIGJ | Gjogur         | NDB/MKR   | GJ  |                  |   | X | 2030 | NDB A  |
| BIHU | Husavik        | NDB       | GA  |                  |   | X | 2025 | NDB RWY 02, SID RWY 20   |
| BIHU | Husavik        | L         | HS  |                  |   | X | 2025 | NDB RWY 02   |
| BIHN | Hofn           | NDB       | HN  | Contingency      |   |   |      | NDB RWY 36   |
| BIHN | Hofn           | MKR       | HN  |                  |   | X | 2027 | NDB RWY 36   |
| BIIS | Isafjordur     | NDB       | IS  |                  |   | X | 2028 | NDB C  |
| BIIS | Isafjordur     | L         | OG  |                  |   | X | 2030 | NDB C  |
| BIIS | Isafjordur     | DME       | OG  |                  | X |   |      |  |
| BIIS | Isafjordur     | NDB       | RE  |                  |   | X | 2030 | NDB C  |
| BIKF | Keflavik       | LOC       | IKF |                  | X |   |      |  |
| BIKF | Keflavik       | GP        | IKF |                  | X |   |      |  |
| BIKF | Keflavik       | DME       | IKF |                  | X |   |      |  |
| BIKF | Keflavik       | LOC       | IKN |                  | X |   |      |  |
| BIKF | Keflavik       | GP        | IKN |                  | X |   |      |  |
| BIKF | Keflavik       | DME       | IKN |                  | X |   |      |  |
| BIKF | Keflavik       | LOC       | IKO |                  | X |   |      |  |
| BIKF | Keflavik       | GP        | IKO |                  | X |   |      |  |
| BIKF | Keflavik       | DME       | IKO |                  | X |   |      |  |
| BIKF | Keflavik       | LOC       | IKW |                  | X |   |      |  |
| BIKF | Keflavik       | GP        | IKW |                  | X |   |      |  |
| BIKF | Keflavik       | DME       | IKW |                  | X |   |      |  |
| BIKF | Keflavik       | NDB       | KF  |                  |   | X | 2027 | NDB RWY 10   |
| BIKF | Keflavik       | VOR/TACAN | KFV | Enroute/Military | X |   |      |  |
| BIRK | Reykjavik      | NDB       | EL  |                  |   | X | 2028 | Currently on all SID's from BIRK. Conventional SID's will be replaced with RNP SID's in 2023 |
| BIRK | Reykjavik      | LOC       | IRE |                  | X |   |      |  |
| BIRK | Reykjavik      | DME       | IRE |                  | X |   |      |  |
| BIRK | Reykjavik      | LOC       | IRK |                  | X |   |      |  |
| BIRK | Reykjavik      | GP        | IRK |                  | X |   |      |  |
| BIRK | Reykjavik      | DME       | IRK |                  | X |   |      |  |
| BIRK | Reykjavik      | NDB       | RK  |                  |   | X | 2030 | LOC Y RWY 13, NDB RWY 13, ILS Y RWY 19   |
| BIVM | Vestmannaeyjar | L         | HL  |                  |   | X | 2027 | NDB RWY 12, NDB RWY 30   |
| BIVM | Vestmannaeyjar | DME       | HL  |                  | X |   |      |  |
| BIVM | Vestmannaeyjar | NDB       | VM  | Contingency      |   |   |      | NDB C  |
| BIVO | Vopnafjordur   | NDB       | HA  |                  |   | X | 2025 | NDB RWY 04   |
| BIVO | Vopnafjordur   | L         | VP  |                  |   | X | 2025 | NDB RWY 04   |
| BITN | Thorshofn      | NDB       | TN  | Contingency      | X |   |      |  |
|      |                | VOR/DME   | ING | Enroute          | X |   |      |  |
|      |                | NDB       | RH  | Enroute          |   | X | 2023 | Decommissioned 05.10.2023  |
|      |                | NDB       | HE  | Enroute          |   | X | 2023 | Decommissioned 05.10.2023  |
|      |                | NDB       | LA  | Enroute          |   | X | 2023 | Decommissioned 05.10.2023  |
| BIRF | Rif            | NDB       | RF  | Contingency      |   |   |      |  |
| BISF | Selfoss        | NDB       | SE  |                  |   | X | 2023 | Decommissioned 05.10.2023  |

## B. Rationalisation of ATS routes

Aircraft that are equipped only with short-range navigation equipment (VOR, DME, ADF) may operate through the NAT HLA along G3. Therefore, the ATS route G3 will remain after 2030 as part of Contingency defined by the NAT Air Navigation Plan, see chapter 10.

During the user consultation only one stakeholder, the Icelandic Aviation Academy, recommended that conventional ATS routes over Iceland would be reverted to RNAV 5.

Based on that Isavia ANS carried out an analysis of the usage of conventional ATS routes:

| Year | B1  | B2 | G1  | G2 | G4  | R2 | R5 |
|------|-----|----|-----|----|-----|----|----|
| 2011 | 44  | 0  | 18  | 29 | 12  | 4  | 2  |
| 2012 | 30  | 1  | 19  | 12 | 18  | 5  | 4  |
| 2013 | 22  | 2  | 19  | 7  | 13  | 5  | 1  |
| 2014 | 27  | 2  | 9   | 19 | 13  | 5  | 0  |
| 2015 | 29  | 4  | 11  | 17 | 5   | 5  | 0  |
| 2016 | 27  | 12 | 8   | 17 | 11  | 4  | 0  |
| 2017 | 27  | 3  | 9   | 18 | 8   | 5  | 1  |
| 2018 | 39  | 13 | 29  | 16 | 23  | 3  | 0  |
| 2019 | 83  | 11 | 38  | 41 | 35  | 11 | 0  |
| 2020 | 125 | 28 | 65  | 54 | 64  | 7  | 0  |
| 2021 | 88  | 27 | 111 | 18 | 135 | 12 | 1  |

Based on those results AIP ENR 4.4 + ENR 6.1-3 was updated, on the 5<sup>th</sup> of October 2023, as shown in the table below:

| B1                              | B2      | G1                     | G2      | G3                            | G4                     | R2      | R5      | Y148    | Y149    |
|---------------------------------|---------|------------------------|---------|-------------------------------|------------------------|---------|---------|---------|---------|
| Changed to RNAV 5 Y190 and Y191 | Deleted | Changed to RNAV 5 Y192 | Deleted | No change used as contingency | Changed to RNAV 5 Y193 | Deleted | Deleted | Deleted | Deleted |

## 10. Contingency measures- retained ground-based NAVAIDs for conventional navigation.

The demand for service in case of total GNSS failure has been assessed with the airspace users. The conclusion is that ATC will vector aircraft into ILS or LOC approaches with DME at all 4 international airports (BIKF, BIRK, BIAR, BIEG). Since PBN standard arrival routes (STAR) in Iceland will be based on GNSS only the contingency for STAR will be that ATC vectors aircraft into approach at these four airports. Due to the limitations of the radar coverage the finals for the approach into RWYs at BIAR and BIEG will be extended before 06.06.2030 to ensure that ATC can vector aircraft into the final.

Two potential constraints for contingency measures have been identified, that is ATCO qualification and apron limitations at international airports in case of GNSS failure where unknown number of aircraft would divert to airports in Iceland.

To make sure ATCOs are qualified to work with the contingency measures the continuation plan for ATCOs working the domestic area, FAXI TMA and BIAR TMA will be updated.

Apron limitations was identified for BIAR and BIEG. At BIAR the extension of the apron has been completed. A development project for BIEG has begun where the aim is to extend the apron in 2 or 3 years, today there is room for four aircraft to park at BIEG. In 2025 the plan is to be able to park 6 -10 passenger jets at BIEG.

Isavia ANS has performed a study on the percentage and number of non-capable aircraft within the BIRD FIR in the period 01.06.2022 - 30.09.2022:

| Period 01.06.2022 - 30.09.2022      | No     | Percentage |
|-------------------------------------|--------|------------|
| Total number of Aircraft            | 70.691 | 100%       |
| Aircraft with GNSS                  | 70.184 | 99,28%     |
| Aircraft without GNSS (non-capable) | 507    | 0,72 %     |

The Icelandic Coast Guard has requested that a beacon is maintained on every corner of Iceland. This is for contingency, to make it easier for the helicopters to navigate after a rescue mission over the sea. KFV and ING VOR will remain after 2030 and will serve as beacon on the southwest and southeast corners. RF NDB, HN NDB, VM NDB, TN NDB and SB NDB will remain in use after 2030 for this purpose.

3 VOR's with DME (ING, KFV, AKI) will be available within terminal and en-route airspace.

Aircraft that are equipped only with short-range navigation equipment (VOR, DME, ADF) may operate through the NAT HLA along G3. Therefore, the ATS route G3 will remain after 2030 as part of Contingency.

Additionally, tactical vectors using the available ATS Surveillance and the notification of traffic restrictions.

Communication equipment, conventional ground-based navigation facilities and radar stations will not be affected by GNSS failure. ADS-B and MLAT is affected by GNSS failure.