PBN TRANSITION PLAN

Republic of MOLDOVA

ADM-PL-PBN

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Abstract

The purpose of this document is in order to ensure compliance with Government Decision No. 111/2022 from 23.02.2022 enabling smooth and safe transition to the provision of services using PBN in a timely and effective manner in FIR CHISINAU.

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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

Edition	Edition date	Reason for change	Pages affected
0.1	08.02.2023	First edition	
0.2	24.03.2023	Note changed in accordance with Ukrainian letter 1-18.1/866/23 from 17.03.2023	19
0.3	11.07.2023	The chapter 3" consultation process" has been added.	9
		Table 1 updated – added information related to surveillance	12
		Table 3 updated – added information related to surveillance	13
		Table 4 updated – added information related to primary and contingency procedures	13
		The chapter 5.4" Surveillance and communication infrastructure" has been added	13
		The table" National Air Operators PBN Capabilities" has been updated	15
		The chapter 9.3" Rationalisation of ground-based NAVAIDs" has been updated.	24
		The chapter 9.4" Contingency scenarios" has been added	26
0.4	24.08.2023	The chapter 2.1" Enroute airspace has been updated"	12
		List of conventional nav-aids used for SIDs and STARs updated;	25
		List of conventional nav-aids used for Instrument approach procedures updated.	26
0.5	05.09.2023	" Document change record" updated	3
		LUBM RWY direction changed	10
		" National Air Operators PBN Capabilities" updated	16
0.6	09.08.2024	" PBN Transition Roadmap" changed	22, 24
		"List of conventional nav-aids used for SIDs and STARs" changed	27

0.7	04.11.2025	Evaluation of the operational environment for International Airport Marculesti (LUBM) added	14, 15
		“National Air Operators PBN Capabilities” updated	19
		“Implementation of SIDs and STARs at LUBM” added	15,16
		“Implementation of IAPs at LUBM” added	16
		” PBN Transition Roadmap” updated	25-26
		” PBN Transition Roadmap” / Medium Term updated	26 – 27
		“Rationalisation of ground-based NAVAIDs” updated	31
		“Summary of navigation infrastructure planning” added	35
		” Reference Documents” updated	39-40
		Chapter 3” consultation process” has been updated	11
		Table 6 “Overview of the current LUKK approach operations” updated	16
		Table of Section 7 - added a reference to LNAV implementation in the "Medium-term plans" column - LUBM RWY07/25	25
		Section 8.2.1 regarding RNAV 5 support updated	30
		Updated Section 8.3.1 - AD LUKK included as a contingency for AD LUBM.	33
		Section 8.3.2 “SID/STAR routes” table associated with LUKK RWY 27 SID/STAR updated	34
		Section 8.3.3 updated regarding the availability of this infrastructure for contingency purposes after 2030	35

DISTRIBUTION LIST

Edition	Edition date	Distribution	Remarks
0.7	04.11.2025		

Contents

EXECUTIVE SUMMARY

The purpose of this document is to provide a general plan for implementation of performance-based navigation within the airspace of CHISINAU FIR (LUUU). This document is subject to consultation of all stakeholders involved in implementation of PBN concept in CHISINAU FIR.

Government Decision No. 111/2022 from February 23, 2022, mandates MOLDATSA ANSP to establish and implement a PBN transition plan in order to ensure a smooth and safe transition to the provision of their services using performance-based navigation, to address the needs of airspace users, and promote national environmental objectives without compromising the safety or capacity of the airspace.

Furthermore, we will undertake appropriate stakeholder consultation to ensure a smooth transition during implementation. We will present the strategic roadmap for PBN implementation to the CAA Moldova for acceptance and confirmation once the performance targets, safety assessment and stakeholder consultation have been successfully undertaken. Following acceptance, it will be our responsibility to manage the implementation to ensure that the agreed timelines are met.

However, it will be our responsibility to communicate with the stakeholders (airport operators, airlines, adjacent ANSPs and the Network Manager) to ensure that the airspace users know about the planned changes and have enough time to equip/retrofit the correct equipment on board the aircraft.

The deliverables of the process will be a strategic roadmap defining the PBN implementation. The State commitment to this plan will be clearly indicated by the CAA Moldova signing the finalised document.

1. Statement of Strategic Compliance - Intention Policy.

MOLDATSA S. E undertakes to develop a PBN transition plan to meet the national objectives as detailed by the CAA Moldova in PBN Implementation Plan. Transition plan is developed in collaboration with all the involved stakeholders, it will follow the high-level principles elaborated by the CAA Moldova (PBN Implementation Plan) and will comply with both national and European regulatory requirements, particularly as regards:

- **Government Decision Republic of Moldova No. 111/2022** from February 23, 2022 - transposes EU Regulatory requirements (PBN IR) into national requirements;
- **EU Regulation 2018/1048 (PBN IR)** – airspace usage requirements and operating procedures concerning performance-based navigation (PBN).
- **ICAO Resolution 37/11** urges all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept as laid down in the performance-based navigation (PBN) Manual (Doc 9613).
- **ICAO Doc. 9750,** the Global Air Navigation Plan (GANP) is described as ICAO's highest air navigation strategic document and the plan to drive the evolution of the global air navigation system. The GANP identifies PBN as the highest priority and outlines implementation issues involving PBN planning and implementation as part of the Aviation System Block Upgrades (ASBUs).
- **LSSIP Moldova** (NAV03 and NAV10).

The PBN transition plan is developed to ensure that the State meets its specified goals in PBN Implementation Plan. Throughout the development and deployment of the Transition Plan, MOLDATSA S.E will ensure that performance targets are clearly defined and met and that the future airspace changes are at least as safe as current operations if not safer. Furthermore, through the involvement of the stakeholders, MOLDATSA ensure that the plan is deliverable in coordinated timeframe. The PBN transition plan which will ensure that the evolution from today's operations to tomorrow's environment is communicated, coordinated and executed in the most efficient and cost beneficial way. As a commitment to its neighbors, Romania and Ukraine, MOLDATSA will conduct a transparent public consultation before moving forward with implementation.

2. Compliance Methodology

MOLDATSA S. E. followed the EUROCONTROL guidance on PBN implementation by applying the seventeen activities laid out in the European Airspace Concept Handbook for PBN Implementation. MOLDATSA S.E. reviewed the national objectives set out by the CAA Moldova and EU Regulatory requirements, and derived a set of operational requirements to fulfil the strategic goals. MOLDATSA S.E organized an implementation team consisting of all involved stakeholders and developed a set of implementation objectives to achieve the operational requirements. These objectives are prioritised to ensure that a timely and

coordinated set of successful implementations will deliver the future airspace concept. The prioritisation forms the basis of the transition plan. Each individual objective will require a team of involved stakeholders to manage the implementation and it will be at this granularity that specific performance targets will be set and safety demonstrated in accordance with the national safety policy. The careful coordination of the implementation objectives will ensure the connectivity through the airspace and at its boundaries is maintained and that the airspace users will have an efficient, cost-beneficial set of flows within the national airspace.

3. Consultation process.

In accordance with Chapter II, p.6 of National Regulations Nr. 111- 23.02.2022, which is equivalent to Article 4 of Commission Implementing Regulation (EU) 2018/1048, MOLDATSA initiated the consultation process in order to receive information or advice from all interested parties, and to take account of their views, where appropriate.

PBN Transition Plan Moldova, edition 0.1 has been consulted with:

- aerodrome operators: LUKK, LUBM, LUKH; LUKE, LUKV;
- UkSATSE;
- ROMATSA;
- national airlines;
- The Network Manager.

PBN Transition Plan has been updated to edition 0.2 containing the following recommendation from UkSATSE:

- Referring to the wording” Ukrainian crises” in the note para 7 of the Plan, the definition corrected –” the aggression by the Russian Federation against Ukraine” as per the wording of the UN GA resolution A/RES/ES-11/6 dated 23 February 2023” Principles of the Charter of the United Nations underlying a comprehensive, just and lasting peace in Ukraine”.

PBN Transition Plan has been updated to edition 0.3 containing the following NM recommendations:

- updating the content of the plan with information about LUBM RWY 07/25;
  Note: Following the consultation with the airport operator S.E "Aeroportul International Mărculești" (LUBM), it was found that the company currently does not have an approved development plan. We will adjust the PBN Moldova Transition Plan when the LUBM development plan will be approved by the government of the Republic of Moldova. This is why the plan lacks information regarding LUBM RWY07/25.
- providing further details, whenever available, in the plan on the outcome of the consultation with all actors, including consultation with NM;
- added information related to surveillance and communications infrastructure;

– revisited the contents of section 8.3 - Rationalization of ground-based NAVAIDs.

PBN Transition Plan has been updated to edition 0.4 containing the following recommendations:

- added information related to NAVAIDS cross-border use agreements between Moldova and neighboring countries for en-route;
- list of conventional nav-aids used for SIDs and STARs updated;
- list of conventional nav-aids used for Instrument approach procedures updated.

PBN Transition Plan has been updated to edition 0.5 containing the following CAA RM request:

- updating the content of the table" National Air Operators PBN Capabilities".

PBN Transition Plan has been updated to edition 0.6 in the context of changing the purchase period of DME/DME from 2027 to 2024.

The PBN Transition Plan has been updated to edition 0.7, incorporating the following modifications:

- Detailed specifications for arrival and departure procedures at *Aeroportul Internațional Mărculești* (LUBM);
- Current operational status of approach procedures at LUBM;
- Compliance assessment of LUBM's SID/STAR/IAP with PBN IR (Performance-Based Navigation Implementing Rule) requirements;
- Introduction of LNAV/VNAV and LPV approach procedures at LUBM;
- Updated PBN transition roadmap;
- Minimum operational network of conventional navigation aids defined within the future operational framework;
- Summary of navigation infrastructure planning included.
- Updated Reference Documents.
- Table 6 "Overview of the current LUKK approach operations" in section 5.3.1 updated;
- Table in Section 7 updated by adding a reference to LNAV implementation for LUBM RWY 07/25 in the "Medium-term plans" column;
- Section 7.1.4 regarding implementation of LPV at LUBM updated;
- Section 8.2.1 regarding RNAV 5 support updated;
- Section 8.3.1 updated, AD LUKK added as a contingency for AD LUBM;
- Table in Section 8.3.2, column "Contingency procedure as per PBN IR" "RNAV 1, for LUKK RWY 27 SID/STAR updated;
- Section 8.3.3 updated regarding the availability of this infrastructure for contingency purposes after 2030.

4. Analysis

4.1 Drivers for change

The defined PBN implementation is targeted to optimise the overall safety, capacity and efficiency of flight operations in Republic of Moldova thanks to:

- reduction fuel consumption and allows for more efficient use of national airspace (due to better route placement, fuel efficiency, reduced emission, noise abatement, etc.)
- reduction costs for operators through the use of optimal routes, reduction fuel consumption and flight duration, increases payload;
- increased airspace capacity by reducing horizontal and vertical separation of aircraft;
- reduction workload for pilots and air traffic controllers by simplifying ATM instructions,
- reducing the need for radio and telephone communications and radar vectoring.

In order to establish actions needed for PBN Implementation, the drivers for change were identified, taken from **Government Decision Republic of Moldova No. 111/2022**, February 23, 2022 which fully corresponds with **EU Regulation 2018/1048 (PBN IR)**.

REQUIREMENTS		Applies 03/12/2020	Applies 25/01/2024	Applies 06/06/2030
Art.4-PBN IR/ p.5, ch. 5- (Government Decision RM)	Transition Plan (*or significant updates)* approved *(living document)*	2022	X	X
AUR.PBN.2005 (1) or (2) or (3)	RNP APCH at IREs without Precision Approach (PA)	X		
	RNP APCH at all IREs (with PA)		X	
AUR.PBN.2005 (4) or (5)	RNAV 1 or RNP 1(+) SID and STAR - one per IRE		X	
	RNAV 1 or RNP 1(+) for all SID and STARs			X
AUR.PBN.2005 (6)	RNAV 5 ATS routes at and above FL150	X		
	RNAV 5 ATS routes below FL150		X	
AUR.PBN.2005 (7)	Helicopter RNP 0.3/RNAV 1/RNP 1 SID/STAR - one per IRE		X	
	Helicopter RNP 0.3/RNAV 1/RNP 1 for all SID/STAR			X
	Helicopter RNP 0.3/RNAV 1/RNP 1 ATS routes below FL150		X	

5. EVALUATION OF THE OPERATIONAL ENVIRONMENT

5.1 En-route airspace

In 2019, MOLDATSA S. E. successfully implemented free route airspace with the boundaries of FIR Chisinau from FL095 – FL660.

Since February 2022, FRA is available H24 within Chisinau CTA above FL095 up to FL660 as part of the SEE FRA (South East Europe FRA). SEE FRA encompasses the FRAs within Sofia CTA, București CTA, Budapest CTA, Bratislava CTA, Praha CTA and Chisinau CTA).

Flight Phase	NAV Application	Effective date	Nav. Specification	Nav. Infrastructure (primary)	NAV back-up infrastructure (contingency)	NAV application (contingency procedures)
En-route	ATS Routes *FL660 FL055*	2005	RNAV 5	GNSS	VOR/DME Surveillance	
	LUSFRA *FL660 FL095*	12 SEP 2019	RNAV 5	GNSS	VOR/DME Surveillance	
	SEEFRA *FL660 FL095*	24 FEB 2022	RNAV 5	GNSS	VOR/DME* Surveillance	Surveillance service (vectoring)

Table 1 RNAV5 Implementation Status

*As there is only single VOR/DME, a NAVAIDS cross-border use agreement is established between MOLDATSA – UkSATSE for en-route.

5.2 SID and STAR routes

5.2.1 International Airport Chisinau (LUKK)

General information about TMA CHISINAU operations is given in Table 2 and detailed description of arrival and departure procedures is presented in Table 3.

RWY	08/26; 09/27
Radar service provided	Yes
NAV provided	PBN and Conventional
NAV specification	RNAV 1
PBN NAV infrastructure	GNSS

Conventional NAV infrastructure	Based on a single VOR/DME (KIV)
Concept of operations	Primary procedures in use are those based on GNSS and conventional navaids. All aircraft may be subject to radar vectoring.

Table 2 LUKK TMA Operations

The table below summarizes the airspace in relation to current navigation specification and corresponding CNS / navigation-aids supporting the nav-spec.

Flight Phase	NAV Application	Effective date	Nav. Specification	Nav. Infrastructure (primary)	NAV back-up infrastructure (contingency)	NAV application (contingency procedures)
TMA	SID/STAR	22 APR 2021	RNAV 1	GNSS	VOR/DME Surveillance	Conventional SID/STAR Surveillance service (vectoring)

Table 3 PBN TMA procedures at LUKK

5.2.2 International Airport Marculesti (LUBM)

General information about MARCULESTI operations is given in Table 4 and detailed description of arrival and departure procedures is presented in Table 5.

RWY	07/25
Radar service provided	Yes
NAV provided	PBN
NAV specification	RNAV 1
PBN NAV infrastructure	GNSS
Conventional NAV infrastructure	-
Concept of operations	Primary procedures in use are those based on GNSS. All aircraft may be subject to radar vectoring.

Table 4 LUBM TMA Operations

The table below summarizes the airspace in relation to current navigation specification and corresponding CNS / navigation-aids supporting the nav-spec.

Flight Phase	NAV Application	Effective date	Nav. Specification	Nav. Infrastructure (primary)	NAV back-up infrastructure (contingency)	NAV application (contingency procedures)
LUBM	SID/STAR	22 APR 2021	RNAV 1	GNSS	Surveillance	Surveillance service (vectoring)

Table 5 PBN TMA procedures at LUBM

5.3 Instrument approach procedures

5.3.1 International Airport Chisinau (LUKK)

Status of the current approach operations is presented in the table below:

Flight Phase	NAV Application	Effective date	Nav. Specification	Nav. Infrastructure (primary)	NAV back-up infrastructure (contingency)	NAV application (contingency procedures)
APP	IAP/ RWY 08/26	21 AUG 2014	RNP APCH	Conventional (ILS)	GNSS, VOR/DME	LNAV, LNAV/VNAV VOR/DME
		26 MAR 2020	RNP APCH			
	IAP/ RWY 09/27	26 MAR 2020	RNP APCH	GNSS	Conventional (VOR/DME)	VOR/DME

Table 6 Overview of the current LUKK approach operations

5.3.2 International Airport Marculesti (LUBM)

In accordance with AD 1.3, AIP Moldova, the type of traffic permitted for Î.S. "Aeroportul Internațional Marculești" is VFR, which means that operations must be conducted in compliance with visual flight rules (VFR).

For these reasons, the following instrument approach procedures was deleted from AIP Moldova:

- AD 2 LUBM 4-3-1_Instrument_Approach_Chart-ICAO_RNP_RWY_07;
- AD 2 LUBM 4-3-3_Instrument_Approach_Chart-ICAO_RNP_RWY_25.

5.4 Surveillance and communications infrastructure.

Communication, Navigation and Surveillance facility services are provided for the entire CHISINAU FIR.

5.4.1 Communication services.

- Mobile/fixed service
- Broadcasting service

5.4.2 Navigation service

The following radio navigation facilities are available for international flights within the area of CHISINAU FIR:

- Instrument LandingSystem (ILS);
- VHF Doppler Omnidirectional Radio Range (DVOR);
- Distance-Measuring Equipment (DME).

5.4.3 Surveillance service

The following surveillance facilities are used for the entire CHISINAU FIR:

- Primary Surveillance Radar (PSR);
- Monopulse Secondary Surveillance Radar (MSSR Mode S);
- Multilateration surveillance system (WAM);
- Automatic dependent surveillance — broadcast (ADS-B);

Agreements for the shared use of radar data are established between MOLDATSA – ROMATSA and MOLDATSA - UkSATSE. The objective of these Agreements is to improve radar coverage and radar data availability in the Flight Information Region. In the Agreement between MOLDATSA and UkSATSE, the parties also coordinate maintenance schedules to prevent simultaneous outages of the DME.

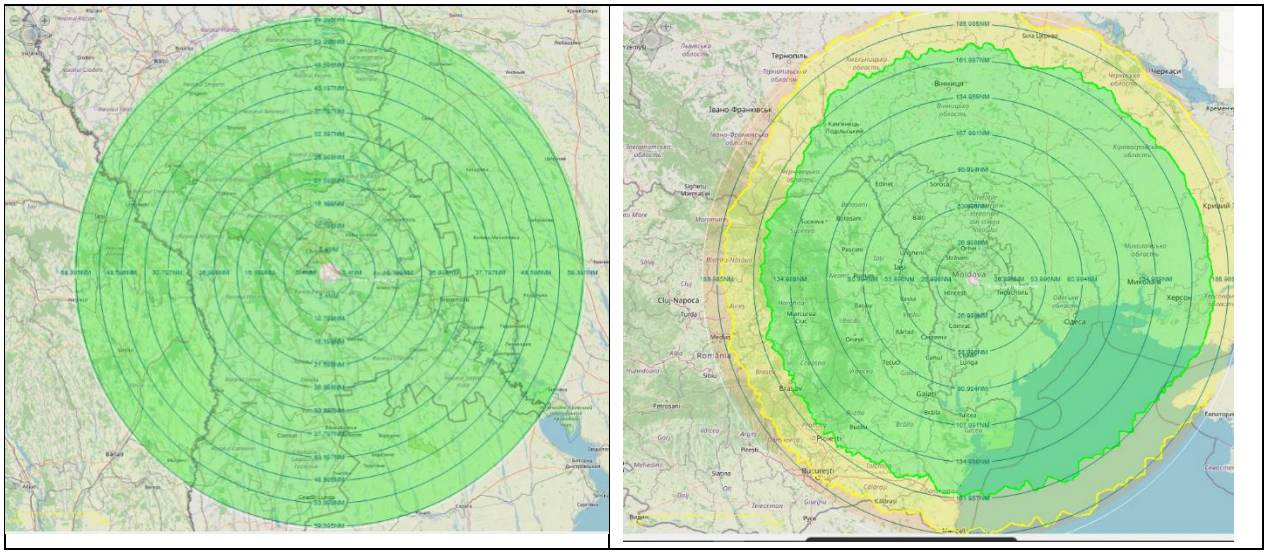

Table 7 – WAM, PSR and SSR radar coverage

5.4.4 NAVAIDS cross-border use agreements.

Service Level Agreements for the shared use of NAVAIDS are to be established between MOLDATSA –ROMATSA and MOLDATSA - UkSATSE.

5.5 Airborne equipment and capabilities

National Air Operators PBN Capabilities

	CA "Fly One" SRL	**CA "Hi Sky" SRL**	**CA "Terra Avia" SRL**		**CA "Aerotranscargo" SRL**	**CA "Fly Pro" SRL**	**CA "PECOTOX AIR" SRL**
Airframe	*A320*	*A319*	*B747*	*B737*	*B747*	*B747*	*B747*
Certified	RNAV5 RNAV1 RNP10 RNP APCH	RNAV1 RNAV5 RNP1 RNP APCH	RNAV10 RNP1 RNP2 RNP4 RNP APCH	RNAV10 RNP1 RNP2 RNP4	RNAV10 RNP1 RNP2 RNP4 RNP APCH	RNAV5 RNAV1 RNP1 RNP10 RNP APCH	RNAV10 RNP2 RNP4

Some aircrafts are not capable for some Navigations specifications required by the PBN IR (i.e., RNP APCH, RNAV 5).
The following measures will be used to ensure operations of non- PBN capable users:

a) vectoring of controlled aircraft based on the use of an ATS surveillance system;
b) maintain conventional navigation procedures;
c) use of any other existing PBN application.

6. COMPLIANCE WITH THE REQUIREMENTS

6.1 Implementation of ATS Routes

6.1.1 Requirements

AUR.PBN.2005 (6):

- RNAV 5 ATS routes at and above FL150 by 03 DEC 2020;
- RNAV 5 ATS routes below FL150 by 25 JAN 2024.

6.1.2 Fulfilment

All requirements have been fulfilled in accordance with details presented in the table below.

Flight Phase	NAV-Application	When	NAV Specification	Nav Infrastructure	NAV back-up infrastructure
En-route	FRA (above FL095)	Implemented on 22 APR 2021	-		
	ATS-routes ≥ FL055	Implemented - 2005 **in accordance with AUR.PBN.2005 (6)**	**RNAV5**	**GNSS**	**VOR/DME**

Conditions from **AUR.PBN.2005 (6)** and requirements for RNAV 5 implementation in ICAO Doc 9613 Vol. II, Part B, paragraph 2.2.1 are already met. Further improvements of DME/DME coverage are planned.

6.2 Implementation of SIDs and STARs

6.2.1 Requirements

AUR.PBN.2005 (4) or (5):

- RNAV 1 or RNP 1(+) SID and STAR - one per IRE by 25 JAN 2024;
- RNAV 1 or RNP 1(+) for all SID and STARs by 06 JUN 2030.

6.2.2 Fulfilment

The status of compliance with the requirements of the PBN IR is presented in Table below.

	RWY	SIDs		STARs	
		RNAV 1	RNP 1	RNAV 1	RNP 1
LUKK	08	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CCO operations are required to contribute to terminal airspace efficiency. The current SIDs need to be optimized.	**-**	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CDO operations are required to contribute to terminal airspace efficiency. The current STARs need to be optimized.	**-**
	26	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CCO operations are required to contribute to terminal airspace efficiency. The current SIDs need to be optimized	**-**	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CDO operations are required to contribute to terminal airspace efficiency. The current STARs need to be optimized.	**-**
	09	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CCO operations are required to contribute to terminal airspace efficiency. The current SIDs need to be optimized.	-	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CDO operations are required to contribute to terminal airspace efficiency. The current STARs need to be optimized.	-

	RWY	SIDs		STARs	
		RNAV 1	RNP 1	RNAV 1	RNP 1
	27	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CCO operations are required to contribute to terminal airspace efficiency. The current SIDs need to be optimized.	-	Implemented on 22 APR 2021 **- in accordance with AUR.PBN.2005 (4)** VOR/DME OVERLAY CDO operations are required to contribute to terminal airspace efficiency. The current STARs need to be optimized.	-
LUBM	07	Implemented since 21.08.2014 **- in accordance with AUR.PBN.2005 (4)** Optimizing the current SIDs is required.		Implemented since 21.08.2014 **- in accordance with AUR.PBN.2005 (4)** Optimizing the current STARs is required.	
	25	Implemented since 21.08.2014 **- in accordance with AUR.PBN.2005 (4)** Optimizing the current SIDs is required.		Implemented since 21.08.2014 **- in accordance with AUR.PBN.2005 (4)** Optimizing the current STARs is required.	

6.3 Implementation of IAPs

6.3.1 Requirements

AUR.PBN.2005 (1) or (2) or (3):

- RNP APCH at IREs without Precision Approach (PA) by 03 DEC 2020;
- RNP APCH at all IREs (with PA) by 25 JAN 2024.

  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 (EGNOS) is available.

6.3.2 Fulfilment

The status of compliance with the requirements of the PBN IR is presented in table 8

ICAO Code	IFR RWY	RWY Type	RNP APCHs		
			3D approach		2D approach
			LPV	LNAV/VNAV	LNAV
LUKK	08	Instrument Precision Approach	**Not applicable** - Outside EGNOS range	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**	Implemented on 21 AUG 2014 **- in accordance with AUR.PBN.2005 (1)**
	26	Instrument Precision Approach	**Not applicable** - Outside EGNOS range	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**	Implemented on 21 AUG 2014 **- in accordance with AUR.PBN.2005 (1)**
	09	Non-Precision Instrument Approach	**Not applicable** - Outside EGNOS range	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**
	27	Non-Precision Instrument Approach	**Not applicable** - Outside EGNOS range	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**	Implemented on 26 MAR 2020 **- in accordance with AUR.PBN.2005 (1)**
LUBM	07	Non-Instrument	**Not applicable** - Outside EGNOS range	**Not implemented** type of traffic permitted for Î.S. "Aeroportul Internațional Marculești" is VFR	**Not implemented** type of traffic permitted for Î.S. "Aeroportul Internațional Marculești" is VFR
	25	Non - Instrument	**Not applicable** - Outside EGNOS range	**Not implemented** type of traffic permitted for Î.S. "Aeroportul Internațional Marculești" is VFR	**Not implemented** type of traffic permitted for Î.S. "Aeroportul Internațional Marculești" is VFR

Table 8 Current level of compliance with IAPs requirements

6.4 Implementation of SID/STAR/ATS routes for rotorcraft operations

6.4.1 Requirements

AUR.PBN.2005 (7):

- Helicopter RNP 0.3/RNAV 1/RNP 1 SID/STAR - one per IRE by 25 JAN 2024;
- Helicopter RNP 0.3/RNAV 1/RNP 1 for all SID/STAR by 06 JUN 2030;

- Helicopter RNP 0.3/RNAV 1/RNP 1 ATS routes below FL150 by 25 JAN 2024.

6.4.2 Fulfilment

All requirements may be considered as fulfilled (or not applicable) in terms of the PBN IR because routes and procedures for rotorcraft operations have not been established at the moment and currently there is no demand for their implementation (see the table below).

NAV Specification	SID / STAR / ATS routes
RNP 0.3 or RNAV 1 or RNP 1	Not implemented **- in accordance with AUR.PBN.2005 (7)**: SID / STAR or ATS routes for rotorcraft operations have not been established yet

Table 9 Current level of compliance with rotorcraft operations requirements

7. PBN TRANSITION ROADMAP

MOLDATSA S. E. has identified the following dates for implementation and they can be broadly split into short and medium-term dates for introduction:

- Short-term (next 2 years);
- Medium-Term (3 to 5 years)
- Long term (> 5 years)

The following shows a calendar for the introduction of the operational requirements and phasing out of obsolete operations by phase of flight:

	Medium-term/ 2027	**Medium-term/ 2028**
SID/STAR LUKK	Revision and optimization of the existing RNAV 1 SIDs and STARs	
IAP LUKK	Revision and optimization of the RNP APCHs (LNAV, LNAV/VNAV)	
	Revision and optimization of the existing conventional instrument approach procedures	
	Implement LPV minima *"The implementation of the LPV line of minima will be scheduled according to AUR.PBN.2005 (3) once adequate SBAS coverage in the airspace is available, as confirmed by the ESSP. In that regard, MOLDATSA is in contact with the ESSP."*	
SID/STAR LUBM		Revision and optimization of the existing RNAV 1 SIDs and STARs

	Medium-term/ 2027	Medium-term/ 2028
IAP LUBM		Implementation of the LNAV procedures Implementation of the LNAV/VNAV procedures Implement LPV minima *"The implementation of the LPV line of minima will be scheduled according to AUR.PBN.2005 (3) once adequate SBAS coverage in the airspace is available, as confirmed by the ESSP. In that regard, MOLDATSA is in contact with the ESSP."*
Infrastructure	Acquisition of 3 DME	Acquisition of 2 DME
Rationalisation (ATS Route and procedures)	Only FRA	
Rationalisation (Infrastructure)	-	-

Note:
All of the activities are supposed to be finished by 2028; in case the ENR and terminal traffic is resumed. It's probable that the deadlines may need to be extended and rescheduled owing to a shortage of funding.

7.1 Medium term

7.1.1 Acquisition of DME – 2027 - 2028

In the case of revision and optimization of GNSS-only SIDs and STARs with the RNAV1 specification, in accordance with p.13 - Government Decision Republic of Moldova No. 111/2022 from February 23, 2022," MOLDATSA" S.E shall take the necessary measures to

ensure that they remain capable of providing their services through other means where, for unexpected reasons beyond their control, GNSS is no longer available.

The necessary measure to ensure the RNAV1 specification is the development of DME/DME-based ground infrastructure. The development of DME/DME-based ground infrastructure is needed to comply with the performance requirements of RNAV 1 navigation specifications whenever GNSS is no longer available.

At the same time, DME/DME will enssure the RNAV5 specification for en-route operations.

This measure is also necessary because, since February 2022, there has been an increase in jamming and/or spoofing of global navigation satellite systems (GNSS), according to *Safety Information Bulletin Operations – ATM/ANS – Airworthiness SIB No.: 2022-02R3, issued: 05 July 2024 – Global Navigation Satellite System Outage and Alterations Leading to Communication / Navigation / Surveillance Degradation.*

The DME network optimization project includes the purchase of five systems between 2027-2028, which will act as backup navigation infrastructure for LUKK airport (2027), LUBM airport (2028), and en-route operations in Chisinau FIR.

7.1.2 Revision and optimization of the existing RNAV 1 and conventional SIDs and STARs for LUKK aerodrome - 2027.

The existing RNAV 1 SIDs and STARs routes published currently in the CHISINAU TMA were designed with optimized vertical profiles taking in account the potential conflicting trajectories and the speed and altitude restrictions above populated areas. In the revision process (due by NOV 2027) of the existing conventional and RNAV 1 SID and STARs, the routes will be optimized to facilitate shorter and more direct tracks and to be enable to use the tactical CDO/CCO by segregating inbound and outbound flows laterally wherever possible.

7.1.3 Revision and optimization of the existing RNP APCH/ conventional IAP - 2027.

The following improvements will be introduced according revision of instrument flight procedures:

- Establish common IAF/IF waypoints for all instrument approach procedures with appropriate RWY for LUKK aerodrome;
- Design instrument procedures for ILS LUKK, LOC LUKK in such a way as to obtain the same segments up to the FAP/FAF for runway 08/26;
- Review Missed Approach Segment without using the vectorization procedures.

The main objectives of the review and optimization include:

- *Enhancing safety* – Updating procedures to reduce the risk of collisions, navigation errors, or route conflicts.

- *Optimizing traffic flow* – Reducing flight times, delays, and fuel consumption through more efficient routes.
- *Implementing new technologies* – Integrating advanced navigation systems (such as RNP - Required Navigation Performance (RF)).
- *Reducing environmental impact* – Minimizing noise and emissions by optimizing flight trajectories.
- *Adapting to infrastructure changes* – If the airport has undergone modifications (new obstacles), procedures must be updated accordingly.

The review process includes:

- *Reassessing existing routes* to identify and bypass critical points and conflicts;
- *Establishing common reference points (IAF/IF)* for all instrument approach procedures, aligned with the available runways at LUKK Airport;
- *Harmonizing ILS and LOC procedures* to ensure a smooth transition to the final approach points (FAP/FAF) for runway 08/26;
- *Optimizing the missed approach segment,* reducing reliance on vectoring and improving traffic management under high-density or emergency conditions;
- *Optimized vertical profiles,* considering potential conflict points and speed/altitude restrictions over populated areas;
- *Route optimization* to facilitate shorter and more direct paths, enabling the use of CDO/CCO (Continuous Descent Operations/Continuous Climb Operations) tactics by segregating inbound and outbound flows whenever possible.

7.1.4 Implement LPV minima (LUKK and LUBM) – 2027-2028

RNP APCH down to LPV minima is based on augmented GNSS (EGNOS) and may give access to a different range of minima, depending on the performance of the navigation systems and the assessment. This approach is considered as an APV.

RNP APCH procedures with APV allow precision-like guidance to runways without the need for ground infrastructure and provide a simplified solution for precise vertical guidance to runways.

The implementation of the LPV line of minima will be scheduled according to AUR.PBN.2005 (3) once adequate SBAS coverage in the airspace is available, as confirmed by the ESSP. In that regard, MOLDATSA is in contact with the ESSP.

However, since the Republic of Moldova is a non-EU State, the ESSP needs the authorization from the European Commission before establishing an EWA (EGNOS Working Agreement) with an organization based in a non-EU State. In this regard, the CAA Moldova has already started negotiation with EU Comision.

Implementation of LPV minima is expected at LUKK in 2027, followed by LUBM in 2028, if by that time will be ensured all necessary means for an instrument RWY.

7.1.5 Revision and optimization of the existing RNAV 1 SIDs and STARs LUBM - 2028.

Objective of this stage is to review, refine, and optimize the existing RNAV 1 Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs) for aerodrome LUBM by 2028, to ensure compliance with current PBN (Performance-Based Navigation) requirements, operational efficiency, and safety standards.

Key Considerations:

1. **Current Status (Published but Not Yet Fully Operational):**
   - RNAV 1 SIDs/STARs for LUBM are already published in the AIP (Aeronautical Information Publication) but may require further refinement before full operational use.
   - The published procedures may be provisional or based on preliminary designs and need validation, optimization, and potential adjustments.
2. **Initial Design Phase:**
   - Despite being published, the procedures will undergo an initial design process, which includes:
   - Route Structure Review: Ensuring waypoints, transitions, and path terminators are optimally placed for efficiency and obstacle clearance.
   - Flight Procedure Validation: Assessing flyability via simulations or flight trials.
   - Airspace Integration: Confirming compatibility with adjacent sectors, ATC procedures, and traffic flows.
   - Performance Requirements: Verifying that RNAV 1 accuracy (1 NM lateral tolerance) is achievable for all expected aircraft types.
3. **Optimization Goals:**
   - Reduce Air Traffic Congestion: Adjust routes to minimize conflicts with neighboring procedures.
   - Enhance Fuel Efficiency: Optimize vertical/lateral profiles for continuous climbs (SIDs) and descents (STARs).
   - Safety Improvements: Ensure obstacle clearance and mitigate terrain/airspace risks.
   - Compliance Updates: Align with ICAO Doc 8168 (PANS-OPS) and local regulatory requirements.
4. **Stakeholder Coordination:**
   - Air Traffic Control (ATC): Validate that the procedures are manageable in live operations.
   - Airlines/Pilots: Gather feedback on flyability and operational practicality.

- Regulatory Authorities (e.g., Civil Aviation Authority): Secure approval for any modifications post-design.

5. Outcome:

- Finalized, optimized and published RNAV 1 SIDs/STARs ready for full operational implementation after the design phase, replacing or updating the initially published versions.

7.1.6 Implementation of the LNAV/VNAV procedures LUBM - 2028.

The objective of this step is to successfully design, validate, and implement LNAV/VNAV approach procedures at Aerodrome LUBM by 2028, enhancing approach capabilities for aircraft equipped with Baro-VNAV while ensuring compliance with ICAO and local regulatory standards.

8. NAVIGATION INFRASTRUCTURE

8.1 General

MOLDATSA S.E. will take the necessary measures to ensure that they remain capable of providing their services through other means where, for unexpected reasons beyond their control, GNSS or other methods used for performance-based navigation are no longer available, making it impossible for them to provide their services in accordance with p.4 HG RM 111 from 23.02.2022 and Article 3 from Regulation (EU) 2018/1048. Those measures will include, in particular, retaining a network of conventional navigation aids and related surveillance and communications infrastructure.

On the other hand, the purpose of PBN IR shows that in general, the role of the ground-based NAVAIDS will gradually evolve towards providing a backup for GNSS and supporting contingency operations in case of GNSS becoming unusable. This evolution offers the opportunity for the rationalization of some of the ground-based infrastructure and retaining the maintenance of only a Minimum Operational Network (MON) which is designed to efficiently provide this backup reversion service.

8.2 Navigation Infrastructure to support PBN

8.2.1 VOR

VOR has a limited role in PBN supporting one navigation application only, viz. RNAV 5, which is primarily used in en-route.

VOR/DME (KIV) installation assures RNAV5 capability in the event of GNSS outage.

NAVAIDS cross-border use agreement has been established with UKSATSE for en-route operations, as detailed in the side note (*) of Table 1 in Section 5.1, “En-route Airspace.”

8.2.2 DME

DME/DME supports RNAV 5, RNAV 2, and RNAV 1 navigation specifications. DME/DME is the most suitable terrestrial Navaid for PBN for appropriately equipped aircraft.

Due to a lack of DME infrastructure on the ground, it is currently not possible to use DME/DME to support RNAV for LUKK and LUBM.

MOLDATSA is planning to upgrade its DME infrastructure for LUKK (2027) and LUBM (2028), taking into account the following factors:

- Republic of Moldova must have its own ground-based navigation aids and be independent in event of GNSS failure;
- DME/DME provides a fully redundant capability to GNSS for RNAV applications, and a suitable reversionary capability to RNAV 1 for RNP applications requiring a lateral accuracy performance of ±1 NM (95%), providing there is an adequate DME infrastructure;
- to support reversion for PBN operations in case of GNSS failure. Therefore, the main objective should be the definition of the DME/DME performance in the airspace volumes where PBN operations are to continue;

In FIR CHISINAU, 1 DME is co-located with DVOR and two DME are associated with ILS.

MOLDATSA makes an effort to fill gaps and provide DME/DME coverage as low as possible without requiring more investment unless it is needed for safety reasons.

8.3 Rationalisation of ground-based NAVAIDs

Necessary minimum operational network of conventional navigation aids within future operational environment framework is planned according to the table below.

8.3.1 Approach procedures

Approach procedures							
Airport	**RWY**	**LNAV**	**LNAV/VNAV**	**LPV**	**Contingency procedures as per PBN IR**	**Contingency Navaids as per PBN IR**	**Remarks**
LUKK	08	Implemented	Implemented	Planned 2027	ILS CAT III	ILS	LPV Impossible (outside EGNOS WA) VOR/DME KIV required for RCF ILS Missed Approach until 2028
	26	Implemented	Implemented	Planned 2027	ILS CAT I	ILS	LPV Impossible (outside EGNOS WA) VOR/DME KIV required for RCF ILS Missed Approach until 2028
	09	Implemented	Implemented	Planned 2027	VOR/DME (KIV)	VOR/DME (KIV)	LPV Impossible (outside EGNOS WA) VOR/DME KIV will be part of the MON post 2030
	27	Implemented	Implemented	Planned 2027	VOR/DME (KIV)	VOR/DME (KIV)	LPV Impossible (outside EGNOS WA) VOR/DME KIV will be

Approach procedures							
Airport	**RWY**	**LNAV**	**LNAV/VNAV**	**LPV**	**Contingency procedures as per PBN IR**	**Contingency Navaids as per PBN IR**	**Remarks**
							part of the MON post 2030
LUBM	07	Planned 2028	Planned 2028	Planned 2028	Surveillance Alternative AD LUKK	Surveillance service (vectoring)	LPV Impossible (outside EGNOS WA)
	25	Planned 2028	Planned 2028	Planned 2028	Surveillance Alternative AD LUKK	Surveillance service (vectoring)	LPV Impossible (outside EGNOS WA)

8.3.2 SID/STAR Routes

SID/STAR routes						
Airport	**RWY**	**Navigation Specification**	**Sensors**	**Contingency procedures as per PBN IR**	**Contingency Navaids as per PBN IR**	**Remarks**
LUKK	08	RNAV 1 Implemented	GNSS	Conventional SID/STAR until 2028 RNAV 1 SID/STAR (DME/DME) from 2027 Radar	VOR/DME KIV DME KIV plus 3 new stations	RNAV 1 DME/DME planned for 2027. Conventional SID/STAR to be removed one year after DME/DME available.
	26	RNAV 1 Implemented	GNSS	Conventional SID/STAR until 2028 RNAV 1 SID/STAR (DME/DME) from 2027 Radar	VOR/DME KIV DME KIV plus 3 new stations	RNAV 1 DME/DME planned for 2027. Conventional SID/STAR to be removed one year after DME/DME available.
	09	RNAV 1 Implemented	GNSS	Conventional SID/STAR until 2028 RNAV 1 SID/STAR (DME/DME) from 2027 Radar	VOR/DME KIV DME KIV plus 3 new stations	RNAV 1 DME/DME planned for 2027. Conventional SID/STAR to be removed one year after DME/DME available.
	27	RNAV 1 Implemented	GNSS	Conventional SID/STAR until 2028 RNAV 1 SID/STAR (DME/DME) from 2027 Radar	VOR/DME KIV DME KIV plus 3 new stations	RNAV 1 DME/DME planned for 2027. Conventional SID/STAR to be removed one year after DME/DME available.
LUBM	07	RNAV 1 Implemented	GNSS	Surveillance service (vectoring)	Radar 2 new stations	RNAV 1 DME/DME planned for 2028

SID/STAR routes						
Airport	**RWY**	**Navigation Specification**	**Sensors**	**Contingency procedures as per PBN IR**	**Contingency Navaids as per PBN IR**	**Remarks**
				RNAV 1 SID/STAR (DME/DME) from 2028		
	25	RNAV 1 Implemented	GNSS	Surveillance service (vectoring) RNAV 1 SID/STAR (DME/DME) from 2028	Radar 2 new stations	RNAV 1 DME/DME planned for 2028

8.3.3 En-route

En-route			
Navigation Specification	**Sensors**	**Contingency procedures as per PBN IR**	**Remarks**
RNAV 5	GNSS DME/DME VOR/DME	DME/DME from 2028 VOR/DME	The list of navaids needed in support of en-route Reversion/Contingency operations is available in the Table below with the title “Summary of the navigation infrastructure planning”.

8.4 Summary of navigation infrastructure planning

Summary of navigation infrastructure planning									
Name of Station	**NAV ID**	**Type**	**Service Area / Flight Phase**	**Airport**	**MON 2030 +**	**EoL**	**Replace / Install**	**Remove**	**Remarks**
DVOR/ DME	KIV	DME	Airport/ En-Route	LUKK	Yes	-	NA	NA	Supports NPA
ILS RWY 08	IRG	ILS	Airport	LUKK	Yes	-	NA	NA	Facility Performance CAT III
ILS RWY 26	ILD	ILS	Airport	LUKK	Yes	-	NA	NA	Facility Performance CAT I
DME/ILS 08	IRG	DME	Airport	LUKK	Yes	-	NA	NA	Directional antenna
DME/ILS 26	ILD	DME	Airport	LUKK	Yes	-	NA	NA	Directional antenna

9. Glossary of Terms

AIP: Aeronautical information publication

Airspace concept: An airspace concept describes the intended operations within airspace. Airspace concepts are developed to satisfy explicit strategic objectives such as improved safety, increased air traffic capacity and mitigation of environmental impact. Airspace concepts can include details of the practical organization of the airspace and its users based on particular CNS/ATM assumptions, e.g. ATS route structure, separation minima, route spacing and obstacle clearance.

ANSP: Air navigation service provider

APCH: Approach

APV: Approach procedure with vertical guidance

Area navigation: A method of navigation which permits aircraft operation 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 includes Performance-based Navigation as well as other RNAV operations that do not meet the definition of Performance-based Navigation.

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

ATC: Air Traffic Control

ATM: Air traffic management

ATS: Air Traffic Service

ATS surveillance service: A term used to indicate a service provided directly by means of an ATS surveillance system.

BARO VNAV: BARO metric VNAV means an Area Navigation System where vertical navigation and guidance is relying on pressure altimeter as the source of vertical position information.

CAA: Civil aviation authority

CNS: Communications, navigation and surveillance

EASA: European Union Aviation Safety Agency

ECAC: European Civil Aviation Conference

EGNOS: European Geostationary Navigation Overlay Service

EoL: End of Life

GNSS: Global Navigation Satellite System

ICAO: International Civil Aviation Organisation

IFR: Instrument Flight Rules

ILS: Instrument Landing System

IRE: Instrument Runway End

LNAV: Lateral Navigation means the subset of functions and performance of the Area Navigation System related to horizontal navigation and guidance

LPV: Localiser Performance with Vertical guidance.

LSSIP: Local Single Sky implementation monitoring

MLS: Microwave landing system

Navigation aid (NAVAID) infrastructure: NAVAID infrastructure refers to space-based and or ground-based NAVAIDs available to meet the requirements in the navigation specification.

Navigation specification: A set of aircraft and aircrew requirements needed to support Performance-based Navigation operations within a defined airspace.

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

RNAV: Required Navigation accuracy means a subset of navigation specifications defined in the ICAO PBN Manual (Document 9613 Edition 4) relying on lateral position error being contained within X nautical miles (e.g. X = 5 corresponds to RNAV 5 specification) during 95 % of the flight time.

RNAV operations: Aircraft operations using area navigation for RNAV applications. RNAV operations include the use of area navigation for operations which are not developed in accordance with this manual.

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

RNAV system: A navigation system which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these. An RNAV system may be included as part of a flight management system (FMS).

RNP: Required Navigation Performance means a subset of navigation specifications defined in the ICAO PBN Manual (Document 9613 Edition 4) relying on lateral position error being contained within X nautical miles (e.g. X = 1 corresponds to RNP 1 specification) during 95 % of the flight time and providing integrity indicators and alerting.

RNP operations: Aircraft operations using an RNP system for RNP navigation applications.

RNP route: An ATS route established for the use of aircraft adhering to a prescribed RNP navigation specification.

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

RNP system: An area navigation system which supports on-board performance monitoring and alerting.

SBAS (Satellite-based augmentation system): A wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter.

SID (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.

STAR (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.

VHF: Very high frequency

VNAV: Vertical Navigation

VOR: VHF omnidirectional radio range

VOR/DME: An airborne sensor providing aircraft position data derived from DME range(s) and VOR angle(s).

10. Reference Documents.

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2. ICAO ANNEX 11, Air Traffic Services.
3. ICAO Doc 4444 - Rules of the Air and Air Traffic Services.
4. ICAO Doc 8168 - PANS-OPS vol. I and vol. II.
5. ICAO Doc 9613 - Performance Based Navigation (PBN) Manual 4th edition, 2013.
6. ICAO Doc 9750 – 2020-2030 Global Air Navigation Plan Fifth Edition.
7. ICAO Doc 9854 - Global ATM Operational Concept.
8. ICO Doc 9958 – Assembly Resolutions in Force (as of 8 October 2010).
9. ICAO EUR DOC 025 - EUR RNP APCH Guidance Material.
10. Regulation (EC) N° 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky (the framework Regulation).
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19. EUROCONTROL Airspace Planning Manual Volume 2, Section 5 – Terminal Airspace Design Guidelines, Ed 2.0 -Amendment 1, 17.01.2005.
20. European Airspace Handbook for PBN Implementation (Edition 4 published April 2021).
21. Safety Information Bulletin Operations – ATM/ANS – Airworthiness SIB No.: 2022-02R3, issued: 05 July 2024 - Global Navigation Satellite System Outage and Alterations Leading to Communication / Navigation / Surveillance Degradation.