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# Mikroglob

## ECSS Phases 0ABC and Development of Satellite Constellation - Summary Report of the Ministry of National Defence

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| 1.0 | 30.04.2025 | JBO, NCZ | All | First issue |
| 1.1 | 24.06.2025 | JBO | All | Minor changes |

## Table of contents

# 1 Applicable and reference documents

Applicable and reference documents are listed in tables below.

## 1.1 Applicable documents

| No | Doc title | Doc Identifier | Ver.Rev |
|---|---|---|---|
| AD1. | Contract MIKROGLOB02 | AU/135/V/2024 | 20.12.2024 |
| AD2. | Mission Definition Review Report | MGB02-RP-CTI-PM-0203 | V1.0 |
| AD3. | Preliminary Requirements Review Report | MGB02-RP-CTI-PM-0204 | V1.0 |
| AD4. | Critical Design Review Report | MGB02-RP-CTI-PM-0205 | V1.0 |

## 1.2 Reference documents

| No | Doc title | Doc Identifier | Rev |
|---|---|---|---|
| RD1. | Project Planning and Implementation | ECSS-M-ST-10C | Rev. 1 |
| RD2. | Krajowy Plan Odbudowy i Zwiększania Odporności | Plan Rozwojowy KPO | 06.2022 |

# 2 Introduction

This document has been prepared in accordance with §2(13) of Contract AU/135/V/2024 dated 20 December 2024 (AD1). It has been developed to support the reporting obligations of the Contracting Authority under the Recovery and Resilience Facility (RRF) and the National Recovery and Resilience Plan (KPO), in relation to Investment A2.6.1.

The report constitutes a public summary of activities carried out during ECSS Phases 0, A, B, and C of the MIKROGLOB project. These phases collectively represent the successive stages of mission analysis, requirements definition, and design development, culminating in readiness for satellite constellation implementation.

This document complements three milestone deliverables submitted under the MIKROGLOB programme:

- Mission Definition Review Report (AD2);
- Preliminary Requirements Review Report (AD3);
- Critical Design Review Report (AD4).

The current report does not replicate the detailed technical content of these milestone reports. It provides a non-confidential summary, demonstrating how each phase of the programme contributes to the long-term goal of establishing a national satellite Earth Observation (EO) system, in accordance with the investment objectives set forth in RD2.

### 2.1 Purpose

The purpose of this document is to summaries how the ECSS-standardized Phases 0 through C contributed to the definition, de-risking, and implementation planning of a satellite Earth Observation constellation in Poland. It outlines how each design phase addressed the strategic and technical goals defined under the MIKROGLOB program, in line with the objectives of KPO Investment A2.6.1 (RD2).

### 2.2 Scope

This report includes:

- An overview of the MIKROGLOB project and its alignment with national and EU priorities;
- Phase-by-phase summary of key technical and programmatic outcomes, as reviewed at consecutive milestones;
- An explanation of the role of ECSS methodology in structuring system development and managing complexity;
- A summary of the project's contribution to digital transformation, environmental sustainability, and strategic autonomy;
- A forward-looking assessment of implementation progress and readiness for transition into subsequent phases.

## 3 General Overview of the MIKROGLOB Project

### 3.1 Strategic objectives

The MIKROGLOB programme aims to establish a national satellite Earth Observation (EO) system that addresses civil and defense needs for high-resolution, timely, and secure imagery. It is developed under the framework of the Recovery and Resilience Facility (RRF) and specifically supports the goals of Investment A2.6.1 of the National Recovery and Resilience Plan (KPO) (RD2). The strategic goals of the programme include improved situational awareness, environmental monitoring, public safety, and resilience of state functions to external crises.

### 3.2 KPO Investment A2.6.1

As defined in RD2, the MIKROGLOB programme supports the expansion of Poland's national EO capabilities. It contributes to the broader initiative of building a National Satellite Information System (NSIS) and developing satellite-based monitoring and data services. MIKROGLOB directly addresses the investment milestone concerning the completion of Phases 0/A/B/C prior to the launch of the first operational satellite.

### 3.3 Contribution to national capability development

The project fosters domestic competence in the design, manufacturing, and operation of space infrastructure. The programme is executed in a way that encourages the participation of Polish industry and research organizations, in alignment with the strategic goal of building sustainable national capacity. The implementation approach is competitive and technically driven, while ensuring that the acquired competencies benefit national stakeholders and support sovereign capability in the long term.

### 3.4 Alignment with policy goals

In accordance with RD2, the MIKROGLOB project contributes to several horizontal policy priorities:

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- Digital transformation: through the deployment of advanced EO technologies and secure data services;
- Green transition: by enabling satellite-supported monitoring of land use, emissions, and environmental threats;
- Strategic autonomy: by reducing reliance on non-European providers and supporting EU and national space infrastructure initiatives.

# 4 Phase-by-phase summary

## 4.1 Phase 0/A – Mission Definition

Phase 0/A focused on defining the mission objectives, assessing feasibility, and preparing a set of possible implementation scenarios. The trade-off analysis compared different combinations of payloads, platforms, and supply chain compositions. These options were evaluated using common criteria, without designating a preferred configuration at this stage.

Key outcomes included:

- System-level needs identification;
- Preliminary budgets, risk assessments, and schedule assumptions;
- Approval of the Mission Definition Review (MDR), documented in AD2.
- Approval of the Preliminary Requirements Review (PRR), documented in AD2.

More detail is provided in the Mission Definition Review Report (AD2).

## 4.2 Phase B – Preliminary Design

Phase B translated the mission concept into a preliminary technical baseline. It established the system and segment-level architecture, requirements specifications, and initial verification plans. Risk items identified in Phase 0/A were analyzed in more detail and mapped to mitigation strategies.

Key outcomes included:

- System architecture and interface concept definition;
- Consolidation of user and system requirements;
- Preliminary Verification and Validation (V&V) planning;
- Approval of the Preliminary Design Review (PDR), documented in AD3.
- Approval of the Ground Segment Preliminary Design Review (GSPDR), documented in AD3.

More detail is provided in the Preliminary Requirements Review Report (AD3).

## 4.3 Phase C – Detailed Design

Phase C focused on maturing the design and preparing for system-level integration and qualification. Detailed subsystem designs, interface control documents, and testing plans were produced and reviewed. The project was assessed as technically ready to proceed to the implementation phase (Phase D).

Key outcomes included:

- Consolidation of segment and subsystem design definitions;
- Detailed Verification, AIT, and Operations plans;
- Finalisation of critical ICDs and engineering documentation;
- Approval of the Critical Design Review (CDR), documented in AD4.
- Approval of the Ground Segment Critical Design Review (GSCDR), documented in AD4.

More detail is provided in the Critical Design Review Report (AD4).

# 5 Application of ECSS methodology

## 5.1 Structured phase progression

The adoption of the ECSS (European Cooperation for Space Standardization) methodology has enabled the systematic planning, development, and assessment of the MIKROGLOB project. Each successive ECSS phase (0, A, B, and C) introduced additional maturity to the mission concept and architecture, providing clear go/no-go decision points. This structured approach ensured that all technical and programmatic risks were identified early, managed appropriately, and regularly reviewed by the Contracting Authority.

This methodology allowed the Contracting Authority to base strategic decisions on traceable, auditable deliverables, in line with both RD1 and the investment requirements described in RD2.

## 5.2 Constellation architecture

Through Phases 0 to C, the ECSS process ensured that the design choices remained consistent with the long-term vision of a scalable, operational satellite constellation. This included:

- Standardisation of key interfaces to enable future satellite additions;
- Compatibility across payload and platform options;
- Ground segment architecture supporting distributed control and multi-satellite operations.

By avoiding premature design lock-in and enabling comparative evaluation of alternative implementation scenarios, the methodology ensured that the resulting system is expandable and resilient.

## 5.3 National competence development

The ECSS-driven approach also supported the development of competencies within the domestic space sector. Through clearly defined roles, deliverables, and documentation expectations, participating entities were able to build experience in internationally recognised engineering processes. This contributes directly to national capacity building goals highlighted in RD2, without introducing artificial restrictions on competitiveness.

## 5.4 Compliance with quality standards

ECSS principles ensure transparency, traceability, and conformance to quality standards, which aligns with the governance and accountability requirements embedded in the KPO framework (RD2). By adhering to these standards, the project has positioned itself to satisfy milestone A9L and to maintain eligibility for continued RRF financing.

# 6 Relevance to KPO

## 6.1 Contribution to KPO targets

The MIKROGLOB project contributes directly to the achievement of strategic targets defined under Investment A2.6.1 of the National Recovery and Resilience Plan (KPO) (RD2). The investment aims to expand national capabilities for monitoring, analysis, and decision support through Earth Observation (EO) data and services. The MIKROGLOB system constitutes a key building block of the planned national satellite infrastructure, complementing the National Satellite Information System (NSIS) and supporting civil and defence users alike.

Specific contributions include:

- Operational readiness to provide EO data aligned with Polish and EU user needs;
- Introduction of a scalable architecture that enables continuous service delivery and system upgrades;
- Strengthened foundations for national situational awareness, public safety, and environmental protection.

## 6.2 Strategic value for public administration and defence

By establishing sovereign EO capabilities, MIKROGLOB enhances national resilience in areas such as:

- Crisis response and natural disaster monitoring;
- Border surveillance and security operations;
- Land use monitoring and infrastructure development planning.

The system is designed to provide timely, secure, and mission-adaptable imagery products to various branches of government, as identified in RD2. The ability to operate independently of external data providers ensures continuity of service during crises and improves long-term strategic autonomy.

## 6.3 Support to digital and green transformation

The project supports cross-cutting digital and environmental objectives included in the KPO framework. MIKROGLOB enables:

- Increased uptake of digital services within public administration through EO-based analytics;
- More accurate, data-driven policy decisions across spatial planning, agriculture, and climate monitoring;
- Avoidance of redundant infrastructure by leveraging shared IT resources within the NSIS ecosystem.

The deployment of space infrastructure contributes indirectly to reduced resource intensity in terrestrial data collection, supporting broader goals of green transition and sustainable governance.

## 6.4 Growth of domestic high-skilled employment

The development of the MIKROGLOB system has already generated demand for high-value technical roles in satellite engineering, ground operations, and systems integration. By executing design and development activities in large part within Poland, the programme contributes to:

- Expansion of the national space industrial base;
- Retention of intellectual property and know-how;
- Creation of long-term employment opportunities in high-technology sectors.

These outcomes align with the employment and innovation policy objectives described in RD2, and support Poland's strategic aim to grow its footprint in the European space sector.

# 7 Implementation Status

## 7.1 Progress Against KPO Milestone A9L

The MIKROGLOB project has completed all activities foreseen under ECSS Phases 0, A, B, and C in accordance with the contractual obligations (AD1) and the investment plan defined in RD2. The associated milestone deliverables — Mission Definition Review Report (AD2), Preliminary Requirements Review Report (AD3), and Critical Design Review Report (AD4) — have been formally submitted and accepted. The project is therefore considered to have fully satisfied the requirements of milestone A9L of Investment A2.6.1.

## 7.2 Readiness for Phase D

All necessary preparations have been concluded to allow for the timely initiation of Phase D. This includes:

- Consolidated engineering documentation and design definitions for space and ground segments;
- Finalised verification and AIT plans;
- Risk and configuration management systems implemented and in use.

No critical open issues remain outstanding that would prevent transition to Phase D.

The work plans for subsystem procurement, satellite integration, and pre-launch testing have been baselined and are being executed.

## 7.3 Launch timeline and constellation deployment

The current schedule foresees:

- Initiation of Phase D activities in Q2 2025;
- Launch of satellites in 2026.

## 7.4 Risk and funding outlook

Project-level risk remains within acceptable thresholds. Residual technical and programmatic risks have been documented, mitigated, and monitored as detailed in the milestone reports (AD2-AD4).

Funding disbursements continue to be aligned with deliverables and schedule achievements. Continued eligibility under the Recovery and Resilience Facility (RRF) is expected, subject to standard verification procedures.

# 8 Conclusions

This report demonstrates that the project remains in full compliance with the objectives and qualitative indicators defined under the KPO framework (Milestone A9L). The maturity of the design and supporting processes confirms the project's readiness to advance to the Critical Design Phase, thus supporting its continued eligibility for Recovery and Resilience Facility (RRF) financing.

All critical subsystems required for Phase D — including platform avionics, optical payloads, S-band and X-band communication modules, AOCS sensors and actuators, propulsion systems, EGSEs and MGSEs, and ground segment components — are already under contract or in advanced procurement. Activities to initiate production, integration, and testing are underway in line with the KPO milestone timeline.

By completing Phases 0/A/B/C in accordance with ECSS standards and national objectives, the project is now technically and programmatically aligned with future milestones A10L (launch of the first Polish satellite) and A11L (launch of the remaining three). The implemented system architecture and verified plans will allow the MIKROGLOB constellation to complete deployment in 2026 and deliver the strategic benefits defined under Investment A2.6.1.