REPORT TO CONGRESS

NOAA SPACE WEATHER NEXT PROGRAM
LAGRANGE 1 SERIES PROJECT
DETERMINATION OF READINESS

Developed pursuant to: 33 U.S.C. § 878a(b) – Major Program Annual Report for Satellite Development Program

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33 U.S.C. § 878A(B) – MAJOR PROGRAM ANNUAL REPORT FOR SATELLITE DEVELOPMENT PROGRAM INCLUDED THE FOLLOWING LANGUAGE

(b)(1) NOAA shall not enter into a contract for development of a major program, unless the Under Secretary determines that—

- *(A) The technical, cost, and schedule risks of the program are clearly identified and the program has developed a plan to manage those risks;*
- *(B) The technologies required for the program have been demonstrated in a relevant laboratory or test environment;*
- *(C) The program complies with all relevant policies, regulations, and directives of NOAA and the Department of Commerce (DOC);*
- *(D) The program has demonstrated a high likelihood of accomplishing its intended goals; and*
- *(E) The acquisition of satellites for use in the program represents a good value to accomplishing NOAA's mission.*

(2) The Under Secretary shall transmit a report describing the basis for the determination required under paragraph (1) to the appropriate congressional committees at least 30 days before entering into a contract for development under a major program.

(3) The Under Secretary may not delegate the determination requirement under this subsection, except in cases in which the Under Secretary has a conflict of interest.

THIS REPORT RESPONDS TO THIS REQUIREMENT.

DETERMINATION OF READINESS BY THE UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE

The Under Secretary of Commerce for Oceans and Atmosphere has determined that the Space Weather Next program Lagrange 1 Series project as designed meets the requirements as specified in 33 U.S.C. § 878a(b)(1):

A. The technical, cost, and schedule risks of the project are clearly identified and the project has developed a plan to manage those risks;

B. The technologies required for the project have been demonstrated in a relevant laboratory or test environment;

C. The project complies with all relevant policies, regulations, and directives of NOAA and the Department of Commerce (DOC);

D. The project has demonstrated a high likelihood of accomplishing its intended goals; and

E. The project represents a good value to accomplishing NOAA's mission.

Submitted by:

August 26, 2024

Richard W. Spinrad, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere
and NOAA Administrator

Date

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I. EXECUTIVE SUMMARY

The Space Weather Next program is responsive to the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act, which specified the National Oceanic and Atmospheric Administration (NOAA) as providing space weather observational data continuity and enhanced space weather capability. Space Weather Next will provide NOAA space weather observations through a comprehensive architecture and a coordinated multi-mission program to ensure space weather products are available to meet user requirements.

The Space Weather Next program will use a portfolio management approach which allows for individual projects to be developed over time to satisfy portfolio goals and requirements. The first project in Space Weather Next, Space Weather Next Lagrange 1 Series project (L1 Series), has a total life cycle cost (LCC) of greater than $250 million, which classifies it as a "major project" under 33 U.S.C. § 878a(a)(7). Therefore, the Under Secretary of Commerce for Oceans and Atmosphere must notify Congress of the readiness of the L1 Series project in order to enter into contracts for development. Once defined, NOAA will submit readiness reports for other major projects in Space Weather Next.

The Under Secretary of Commerce for Oceans and Atmosphere has determined the L1 Series is ready to begin development activities with the National Aeronautics and Space Administration (NASA) through an Interagency Agreement (IAA) and award prime development contracts for instruments, spacecraft to support NOAA instruments, a hosted partner payload, and related ground services for the L1 Series. This report documents the project's readiness based on the satisfaction of the following criteria:

A. Identification and management of technical, cost, and schedule risks;
B. Demonstration of all required technologies in a relevant laboratory or test environment;
C. Compliance with all relevant policies, regulations, and directives of NOAA and the Department of Commerce (DOC);
D. High likelihood of accomplishing its intended goals; and
E. Represents good value to accomplishing NOAA's mission.

The L1 Series project is aligned with Public Law 116-181, the PROSWIFT Act, the 2022-2026 DOC Strategic Plan, the 2022-2026 NOAA Strategic Plan, and the NOAA National Environmental Satellite, Data, and Information Service (NESDIS) strategic objectives. User needs for L1 observations are outlined in the NOAA Consolidated User Requirements List (COURL) and documented in the NESDIS Space Weather Next Program Objectives.

II. PROJECT DESCRIPTION

The L1 Series project will define and develop the first two satellite observatories in the series, designated as L1-A and L1-B, to be launched sequentially to support continuity of Space Weather Follow On (SWFO) observations at L1, and the necessary supporting ground/data management services and launch vehicles. The two satellite observatories will each provide accommodations for the same set of NOAA-provided instruments to make the required observations, as well as a hosting opportunity for a partner research to operations instrument. L1-A launch is planned for FY 2029 to allow for overlap calibration with the SWFO-L1 that is designed to operate for 5 years following a planned launch in FY 2025. L1-B will launch no sooner than FY 2031. The design life for each is 5 years.

Each satellite observatory is to be launched on a dedicated launch vehicle acquired via the NOAA-NASA IAA and funded through Space Weather Next. Ground and data management services will be implemented through mission unique capabilities derived from and shared with the SWFO program and NESDIS-developed enterprise ground system/data management capabilities. The project scope includes operations, maintenance, and sustainment over the operational lifetime through 2038.

Requirements for these measurements are documented in the *Space Weather Next Program Objectives (NESDIS-REQ-4500)* that is derived from the NOAA Space Weather Mission Service Area Observational User Requirements within the NOAA COURL in November 2017 and the Space Weather Operations, Research, and Mitigation Subcommittee Recommendations Version 2.1.

Table 1. L1 Series Instruments

Instrument	Description	Mission Needs Served
Coronagraph	• Detects coronal mass ejections (CME) from the surface of the Sun • Measures and images solar coronal white light, including CME imagery • This will be the first commercially procured coronagraph. Prior instruments have been government built by the United States Naval Research Laboratory (NRL).	• Used to provide 1- to 4-day warnings of geomagnetic storms
X-ray irradiance monitor	• L1-A: ESA-furnished X-ray Flux Monitor (XFM) instrument • L1-B: NOAA procured instrument • Monitors the occurrence and strength of X-ray flares emanating from the Sun in two wavelengths	• X-ray flux affects the propagation of radio through the ionosphere • Used to identify the periods and severity of radio interference

Solar wind plasma sensor	• Measures flux of major population of solar wind plasma as a function of energy	• Used to generate warnings (~15-60 minutes) ahead of impending geomagnetic activity
Supra-thermal ion spectrometer	• Measures ion/proton flux population	• Aids in estimating arrival time of CME for space weather forecasters
Magnetometer	• Measures magnetic field vector that has traveled out from the Sun with the solar wind	• Used to generate warnings about the severity of geomagnetic activity
Instrument of opportunity (contributed instrument)	• Observatories will be designed to host an instrument offered by partner or commercial entity	• Potential enhanced observational capability via external contributions

III. READINESS CRITERIA

A. Technical, Cost, and Schedule Risks of the Project Are Clearly Identified and the Program Has Developed a Plan to Manage Those Risks

NOAA will manage project risk through a comprehensive risk management program, overseen by the NESDIS Office of Space Weather Observations (SWO), and in accordance with the *Space Weather Observations Programs Division Risk Management Plan*. The Risk Management Plan complies with NOAA NESDIS and NASA Goddard Space Flight Center risk management policies. It details the functional structure and responsibilities for identifying and reporting project risks and mandates a proactive process to identify, communicate, assess, and mitigate risks effectively.

The NASA-NOAA Standing Review Board (SRB) assessed the mission concept for the L1 Series and found that the mission concept was sound and that attendant technical, schedule and cost risks associated with the procurement, design, and fabrication of the instruments, spacecraft, and ground services are manageable due to:

1. **Significant heritage and minimal customization:** The elements will leverage and extend the systems and services deployed for SWFO, which has already undergone procurement, design, and fabrication phases. This significant heritage and minimal customization of elements are expected to reduce technical risk.

2. **Lessons learned from SWFO:** NOAA will directly apply experience and knowledge gained from the procurement, design, and fabrication of SWFO flight and ground systems to further mitigate technical risk.
3. **Mature technology:** The instruments, spacecraft, and ground services are assessed to have a high technology readiness level (TRL), indicating that they have been demonstrated in relevant environments and are considered mature technologies with low technical risk.
4. **Successful developments in coronagraphs:** The successful build of compact coronagraphs (CCOR) by the NRL has matured the technology, manufacturing techniques, and on-board processing methods. This has reduced technical risk for industry-built coronagraphs.

This assessment was validated through subsequent integrated NASA, NOAA, and DOC review processes, culminating in DOC Milestone 2/3 on July 18, 2024 (see Appendix C).

Technical Risk

NOAA and NASA have determined that there is minimal technical risk that would impede the procurement of the spacecraft, instruments, and ground services. The majority of L1 Series components will be very similar to those for the SWFO program. This results in significant heritage and high TRL for major elements. There is moderate risk associated with the procurement of an industry-built coronagraph. In the past, NASA missions and SWFO have acquired coronagraphs from the NRL. This is primarily a build process risk, as design elements will leverage existing technologies with high TRL. Market research identified multiple vendors willing and able to build a coronagraph. The Phase A period is underway to ensure a high TRL level for the new version. This technical risk has been assessed as manageable by both the program and independent review processes.

NOAA and NASA are taking the following steps to further reduce the technology risk associated with a new, commercially sourced, coronagraph:

1. NOAA is developing a comprehensive and detailed set of requirements building on the NRL CCOR baseline requirements and considering lessons learned from the NRL CCOR. NOAA has defined the technical specifications for the coronagraph as precisely as possible to capture the function of the NRL CCOR without constraining industry solutions.
2. NOAA worked with the NRL to provide the vendors with an opportunity to enter into technology transfer and assistance agreements with the U.S. Navy as part of their proposal as they so choose. Vendors may leverage NRL's expertise to facilitate the development and manufacturing of their coronagraph.
3. On NOAA's behalf, NASA awarded five technology development Phase A contracts to provide and to mature design concepts and receive government feedback. The strategy of developing several independent design solutions before proceeding to a competitive acquisition is a common and proven approach to government acquisition of challenging technology. The method has been

demonstrated to reduce technical risk and improve acquisition outcomes. NOAA will encourage designs that mitigate manufacturability challenges and performance risks identified through CCOR experience.

4. After the completion of coronagraph designs, on NOAA's behalf, NASA intends to acquire the coronagraph through a full and open competition. In development, integration, and acceptance testing, NOAA-NASA will leverage the CCOR test and evaluation plans developed for SWFO to verify the performance of the coronagraph system.

Cost Risk

There is a low risk associated with the cost estimate for the L1 Series observatories. Cost estimates for the L1 Series were developed using aerospace industry standard models and methods which factor in spacecraft and instrument size, complexity, and maturity. The estimates include the NASA guideline recommended level of cost reserves and consider elements derived from ongoing projects and contracts associated with the SWFO program. The SWFO contracts are cost-plus contracts for the instruments and fixed price contract for the spacecraft. The high level of heritage for both the flight and ground elements, particularly the design similarities to SWFO, increases the confidence that the project can be implemented within the estimated budget.

Independent cost assessments were performed by the NASA-NOAA SRB at Mission Concept Review in March 2023; by the NESDIS Chief Financial Officer cost estimation team at Key Decision Point (KDP)-A in September 2023; and by the DOC Office of Acquisition Management (OAM) Integrated Product Team (IPT) for Milestone 2/3 in June 2024. These assessments have validated the estimated resource requirements detailed in Table 2.

NESDIS, NOAA, and DOC will continue to evaluate project performance, value, and risk against available resources throughout its lifecycle.

Table 2: SW Next L1 Series Project Funding Requirements ($ in millions)*, **

Prior FY	FY 2024 enacted	FY 2025 requested	FY 2026 estimated	FY 2027 estimated	FY 2028 estimated	Cost to Complete	Total
185.6	131.8	184.8	196.6	218.7	222.6	1,192.6	2,332.7

* Profile is inclusive of L1-A and L1-B missions and Space Weather Next program office project management. This profile does not include costs for L5 or Level of Effort activities that are also within the SW Next appropriation.
** Note: The Congressional Baseline Report, for purposes of implementing 33 U.S.C. § 878a(c) and (d), will be delivered following decision authority acceptance at the Key Decision Point-C (KDP-C) milestone.

Schedule Risk

The launch readiness date (LRD) for L1-A (FY 2029) will ensure continuity of observations beyond the SWFO-L1 5-year design life and provide one year of overlap with SWFO-L1 for on-orbit checkout and calibration. L1-B should be launched at the earliest possible date within budget constraints in order to maintain high availability of required observations and observational resilience. Dedicated launches for the L1 Series significantly reduce schedule risk.

Schedule estimates for the L1 Series were developed using aerospace industry-standard models and methods which factor in satellite and instrument size, complexity, and maturity. An independent schedule risk assessment was performed using NASA Joint Analysis of Cost and Schedule tool. The schedule estimates were benchmarked against the development schedules for comparable instruments, spacecraft, and satellite observatory integration and test campaigns, particularly the schedule experience from SWFO, and includes NASA-recommended reserves. The coronagraph is the most critical element affecting the overall schedule. This analysis assessed that the flight segment schedule is aggressive, but considered feasible given the schedule performance to date for SWFO-L1.

NOAA/NASA and DOC have determined the schedule risk to be acceptable within the planned resource levels identified in the Milestone 2/3 review. Stability and timeliness of the funding profile is necessary to maintain this schedule.

The major milestones listed in the table below are nominal for planning purposes for schedule and cost analysis. The L1 Series project will baseline an Integrated Master Schedule after the Preliminary Design Review and KDP-C.

Table 3: Notional Major Milestones

Planning Major Milestone Schedule
FY 2022 • Space Weather Next Program System Requirements Review/NESDIS Mission Concept Review (August 16, 2022) • Space Weather Next Program NASA KDP-0 (September 21, 2022)
FY 2023 • DOC Milestone 1 for Space Weather Next Program (October 25, 2022) • Program System Definition Review / L1 Series Mission Concept Review (March 1, 2023) • Coronagraph Design Studies Contract Awards (May 2, 2023) • Space Weather Next Program NASA KDP 1 (June 21, 2023) • L1 Series KDP A (September 20, 2023)
FY 2024 • DOC Milestone 2/3 for L1 Series (signed by Deputy Secretary on July 26, 2024)

• Instrument Contract Awards • L1 Series Systems Requirements and Systems Definition Reviews
FY 2025 • L1 Series KDP-B • Spacecraft development Contract Award • Ground Services Contract Awards • L1 Series Preliminary Design Review • Congressional Baseline Report
FY 2026 • L1 Series KDP-C • L1-A Critical Design Reviews
FY 2027 L1-B Critical Design Reviews
FY 2028 • All instruments delivered to NOAA L1-A spacecraft • NOAA L1-A Integration and Test • L1 Series KDP-D • L1 Series Mission Operations Review
FY 2029 • L1 Series KDP-E • NOAA L1-A Satellite Observatory shipped to launch site • NOAA L1-A Launch • L1 Initial Operational Capability: All observations are available from a single NOAA source and are delivered to the NOAA National Weather Service (NWS)/Space Weather Prediction Center (SWPC) within required latency • All instruments delivered to NOAA L1-B spacecraft • NOAA L1-B Integration and Test
FY 2030 • NOAA L1-A Transition to Operation • NOAA L1-B Satellite Observatory complete and placed in storage
FY 2032 • NOAA L1-B Launch • L1 Series Full Operational Capability: Resilient observational architecture achieved. All high availability observations have redundant NOAA sources and are delivered to the NWS/SWPC within required latency

B. Technologies Required for the Project Have Been Demonstrated in a Relevant Laboratory or Test Environment

The instrument, spacecraft, and ground design concepts have been designed to rely upon technologies that have been demonstrated in a relevant laboratory or test environment (i.e., TRL-6 or higher). There is no new technology development foreseen for the flight segment, and the ground segment will build on mature systems and services. The most challenging component is the transition of the coronagraph supplier from a government laboratory to a competitive commercial procurement.

For the L1 Series, NOAA will competitively source a coronagraph from industry instead of continuing with the NRL CCOR. This decision recognizes industry's capacity to build this instrument and move to routine production outside of a research laboratory environment. Industry may partner with NRL through NRL's technology transfer program, to aid in coronagraph design and manufacture. The anticipated procurements are described in Table 4.

Table 4: Technical Readiness Level (TRL)

Element	Program Assessment Summary
Coronagraph	**TRL-6 or greater.** First competitively sourced coronagraph supported by study contracts prior to development commitment. See risk section above.
X-ray irradiance monitor (ESA- furnished instrument for L1A)	**TRL-6 or greater.** ESA will provide an XFM to NOAA for L1-A. This instrument had originally been anticipated to be delivered for SWFO-L1. NOAA instrument for L1-B will build upon the design heritage from GOES-R Series X-ray irradiance instruments.
Solar wind plasma sensor	**TRL-6 or greater.** Instruments will build upon the design heritage of SWFO-L1 solar wind plasma sensor requirements.
Supra-thermal ion spectrometer	**TRL-6 or greater.** Instruments will build upon the design heritage of SWFO-L1 supra-thermal ion spectrometer requirements.
Magnetometer	**TRL-6 or greater.** Instruments will build upon the design experience of SWFO-L1 magnetometers.
Instrument of opportunity (contributed)	**Not applicable.** "Do No Harm" rules will be imposed on the instrument of opportunity supplier.
Spacecraft	**TRL-6 or greater.** Operating requirements are a near-copy of SWFO-L1 requirements. Due to the dedicated launch vehicles for the L1 Series, constraints that added complexity to the SWFO design have been significantly relaxed.

Launch vehicle	**Category 3 – significant flight history.** NASA Launch Services Program will provide two flight-proven launch vehicles for the L1-A and L1B launches.
Ground service	**TRL-6 or greater.** All of the ground services needed for the program are readily available and well known with significant leveraging of existing NESDIS and commercial or international partner services.

C. Complies with All Relevant Policies, Regulations, and Directives of NOAA and the DOC

NOAA has determined that the program complies with applicable policies, regulations, and directives of NOAA, NASA, and DOC based on a record of successful reviews and approvals.

NESDIS has satisfied the requirements set forth in 33 U.S.C. § 878a(b). In addition, NESDIS has satisfied the provisions of the *NOAA Administrative Order 216-108, Requirements Management* by rigorous documentation of program requirements through a tiered requirements documentation process. Similarly, under the terms of their IAA, NOAA and NASA will meet the requirements of *NASA Procedural Requirement 7120.5, NASA Space Flight Program and Project Management Requirements*.

Documentation

There are two primary documents that govern the project. The *Space Weather Next Program Objectives* (*NESDIS-REQ-4500*) outlines the overarching objectives for the program. From there, the *Space Weather Next Program Lagrange 1 (L1) Series Project Requirements (NESDIS-REQ-4505)* includes specific requirements allocated from the program to the L1 Series project. The above documents were derived from the NESDIS Level Requirements, reviewed by the Space Weather Next User Requirements Working Group and NESDIS Executive Council, and approved by the Assistant Administrator for Satellites and Information Service. Element level requirements are further detailed by the L1 Series project into performance, functional, and interface specifications as needed. All those requirements are subjected to a rigorous verification process to ensure they are satisfied.

Management

The project is managed by the NESDIS SWO and implemented under a NOAA-NASA IAA through the joint NOAA-NASA SWO Programs Division established within the Goddard Space Flight Center Flight Projects Directorate as Code 490. Oversight of the project is provided by this division.

All NOAA/NESDIS satellite programs operate in accordance with the joint agency processes established in the NOAA-NASA Satellite Program and Projects Management

Control Plan (MCP) and *NASA Space Flight Program and Project Management Requirements (NPR 7120.5)*.

The MCP documents the high-level governance, business processes, management controls, and organizational structure of the NOAA satellite programs that leverage NASA as the acquisition agent. The document codifies methods and procedures agreed upon by NOAA and NASA management to ensure clarity of communications and the consistent implementation of a formal and disciplined program management process across different programs and projects. It defines the NOAA-NASA intra-agency and interagency organizational relationships, authorities, roles, and responsibilities, and governance structure. Specific project level details shall be documented in project plans.

NOAA and NASA program management processes include very detailed, time-phased requirements for technical and programmatic documents, products, and reviews throughout the life cycle of the project. Ensuring the completion of these requirements is one of the main purposes of the Life Cycle Reviews and Key Decision Points.

Adherence to the MCP, NASA Space Flight Program and Project Management Requirements, and direction of the NOAA Observing Systems Council are consistent with the requirements in the DOC *Memorandum on Policy on Commerce Acquisition Project Management (11/06/2012)*, and the *Department Administrative Order (DAO) 208-16, Acquisition Project Management*. The DOC Policy and DAO requires major systems to institute a formal requirements process, institute formal program management discipline and ensure proper DOC oversight and insight on major systems.

D. Demonstrates a High Likelihood of Accomplishing its Intended Goals

The Space Weather Next L1 Series project is required to maintain continuity of observations presently planned for SWFO. NOAA has assessed the technical maturity, evaluated the cost and schedule, and has identified mitigations for all identified risk elements. Together, these measures give NOAA a high degree of confidence in its ability to meet project goals. In developing the project and defining these particular activities, NOAA has emphasized the most mature technologies and the reuse and leveraging of existing systems to maintain observational continuity. Costs are well understood, as all components are either near-copies of previous projects or are leveraged reuse of previously developed capabilities. NOAA has defined and documented a rigorous set of program objectives and continuity requirements – and will exercise proven NOAA-NASA program management systems to execute the project.

E. Represents a Good Value to Accomplishing NOAA's mission

The NOAA Space Weather Prediction Center (SWPC) will be the primary recipient of the observations and derived data products. SWPC will use the data to meet the needs of a broad array of external stakeholders such as the electric power industry, airline industry, utility and telecommunications companies, commercial and government satellite operators, U.S. and foreign governments, and the space weather research and academic community. The March 2020 Congressional Budget Office report *Enhancing the Security of the North American Electric Grid*[1] concluded that observations from space-based satellites such as Space Weather Next L1 would support warnings of impending space weather events and could avoid up to $560 billion in losses in the U.S. Gross Domestic Product from a Carrington-level storm. This is just one of many services that the Space Weather Next L1 series will be providing critical data to protect.

NOAA plays a crucial role as the civilian lead for operational space weather, and provides critical information that is used by the Nation's national and homeland security agencies. As our economy grows, so does its demand for accurate and timely space weather data. Our economy – both in space and on the ground – increasingly relies on advanced electronics, electrical distribution, and radio communication, and space-based assets, including satellites and personnel, that are directly vulnerable to the space environment. Maintaining the integrity of Global Positioning System services which underpins a number of activities that sustain the U.S. economy and U.S. interests abroad. Continuity of coronal mass ejection observation and *in situ* solar wind measurement at L1 enabled by the L1 Series project are essential to providing reliable and actionable space weather forecasts, warnings, and preparedness information to decision-makers.

NOAA used analyses of alternatives, trade studies, and consideration of multiple acquisition strategies to optimize the structure of the project. Existing investments in SWFO and common ground services are leveraged to limit cost. NOAA concluded that the activities described represent a good value to accomplishing the objectives of the L1 Series through continued leveraging of the multi-decadal NOAA-NASA partnership.

NOAA determined that the overall cost of the Space Weather Next L1 series represents a good value to the taxpayer by building a program utilizing existing technologies and incorporating lessons learned from the development of SWFO-L1. There are no other operational L1 missions that provide the types of space weather data that is required to support the Space Weather Prediction Center.

An evaluation of the commercial community indicated that there were no vendors with a planned mission or current mission at L1. This assessment is based on the results of NOAA's Broad Area Announcements that solicit information from the commercial industry, and NOAA's own analysis of announced plans of the U.S. commercial aerospace industry. Finally, continuing to leverage the NASA partnership has resulted in an assurance of mission success.

IV. CONCLUSION

The Under Secretary of Commerce for Oceans and Atmosphere has determined that the NESDIS SWO project for the first observatories of the Space Weather Next L1 Series meets the readiness criteria as specified in 33 U.S.C. § 878a(b)(1).

[1] www.cbo.gov/publication/56083

APPENDIX A

Acronym List

CCOR	Compact Coronagraph
CME	Coronal Mass Ejection
COURL	Consolidated Observational User Requirements List
DAO	Department Administrative Order
DOC	Department of Commerce
ESA	European Space Agency
GOES	Geostationary Operational Environmental Satellite
IAA	Interagency Agreement
IMAP	Interstellar Mapping and Acceleration Probe
IPT	Integrated Product Team
KDP	Key Decision Point
L1	Lagrange Point 1
L5	Lagrange Point 5
LCC	Life Cycle Cost
LRD	Launch Readiness Date
MCP	Management Control Plan
MDM	Milestone Decision Memorandum
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NRL	Naval Research Laboratory
NWS	National Weather Service
OAM	Office of Acquisition Management
PROSWIFT	Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow
SRB	Standing Review Board
SWFO	Space Weather Follow-On [Program]
SWO	Office of Space Weather Observations
SWPC	Space Weather Prediction Center
TRL	Technology Readiness Level
U.S.	United States
XFM	X-ray Flux Monitor

APPENDIX B

List of References Cited

Document	Location
NASA Procedural Requirement 7120.5 *NASA Engineering and Program/Project Management Policy*	https://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPR&c=7120&s=5E
National Space Weather Strategy and Action Plan (2019)	https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/03/National-Space-Weather-Strategy-and-Action-Plan-2019.pdf
NOAA Administrative Order 216-108: Requirements Management	www.noaa.gov/organization/administration/nao-216-108-requirements-management
NOAA Congressional Report – *Space Weather Follow-On: Space Weather Observation Needs and Plans, Including and Beyond a Solar Coronagraph. March 2019*	www.nesdis.noaa.gov/s3/2023-11/2018_SWFO_SWO_Needs_and_Plans_Including_and_Beyond_a_Solar_Coronagraph.pdf
Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act or the PROSWIFT Act (Public Law 116-181)	www.congress.gov/bill/116th-congress/senate-bill/881

APPENDIX C
Signed Milestone Decision Memorandum

UNITED STATES DEPARTMENT OF COMMERCE
Deputy Secretary of Commerce
Washington, D.C. 20230

July 26, 2024

MEMORANDUM FOR DR. RICHARD W. SPINRAD, UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE AND NOAA ADMINISTRATOR

FROM: Don Graves
Deputy Secretary, Department of Commerce

SUBJECT: Milestone Decision Memorandum Approval of Milestone 2/3 for the Space Weather Next, Lagrange Point 1 Series Project

The National Oceanic and Atmospheric Administration (NOAA)/National Environmental Satellite, Data, and Information Service (NESDIS) presented the Space Weather Next (SW Next) program's Lagrange Point 1 (L1) Series Project to the Milestone Review Board (MRB) for Milestone 2/3 (MS2/3) approval. The MRB Executive Secretary held an Integrated Product Team (IPT) review of the project. This Milestone Decision Memorandum (MDM) approves the L1 Series Project to proceed with necessary contracting actions, establishes the program baseline, and outlines my expectations for NOAA officials who are responsible for the L1 Series Project.

To address the need for improved understanding and responses to space weather events, the Department of Commerce, through NOAA, NESDIS created a consolidated and comprehensive space weather program. The National Weather Service (NWS) Space Weather Prediction Center (SWPC) requires continuous ingestion of a variety of space weather observations to sustain its operational forecast, warning, and alert capabilities. To fulfill NOAA's responsibilities and ensure user needs, including those of the NWS SWPC, and agency objectives are met, NESDIS identified one of its strategic objectives to "Advance space weather observational leadership in all applicable orbits to meet mission needs." The L1 Series Project is a fundamental building block to meeting this strategic objective. The L1 Series Project is the cornerstone of the SW Next program and is the recapitalization of the current Space Weather Follow-on (SWFO) program that will provide continuity of service at L1. It will include a new commercially developed coronagraph and a solar wind suite of instruments.

As part of the MRB process, the Office of Acquisition Management, in conjunction with NESDIS, developed an innovative portfolio management approach for the SW Next program. This approach defined portfolio goals and requirements, while allowing individual projects to be implemented over time, based on affordability and competing NESDIS priority considerations. The singular Milestone 1 (MS1) for the SW Next program incorporated synergies across various Department acquisition review processes, including the Acquisition Review Board and the Commerce Information Technology Review Board, while providing flexibility and programmatic insight for individual projects within the portfolio. MS2/3 decision authority is held at the Department/MRB level for the L1 project. In accordance with the MS1 authorization, SW Next program was required to return to the MRB (i.e., MS2/3) for a review of the SW Next L1 Series Project based on lifecycle cost and mission priority.

The Program's presentation to the IPT highlighted the criticality of the SW Next L1 Series Project schedule to maintain the continuity of space weather data. The IPT identified many competing priorities for the program to consider when implementing this critical mission, including: the balancing of constrained funding resources; prioritizing acquisition and contracting resources; and crafting affordable and efficient (multi-unit block buy) contract approaches that lower the life-cycle investment of the Department.

Taking into consideration these priorities, I approve the L1 Series Project and direct the SW Next program to do the following:

- Proceed prudently and as quickly as possible with the block-buy award of the commercial coronagraph contract given that these instruments are the technical and operational foundation of the project.
- Proceed with the Rapid Spacecraft Development Office spacecraft (S/C) procurement. Prior to awarding the S/C contract, analyze specific technical, schedule and resource requirements from the successful coronagraph awardee's Integrated Baseline Review. Adjust the S/C procurement, as necessary, to preserve adequate resources (including risk reserves) required for the critical path development of the coronagraph and align schedules for program planning and execution documentation.
- Award the ancillary instrument contracts utilizing an efficient acquisition approach, balancing available resources, project schedule, and acquisition staffing, with the commercial coronagraph contract execution as the overriding priority.
- Pursue the possibility of hosting a second contributed x-ray irradiance instrument on L1-B. The X-Ray Flux Monitor instrument originally scheduled to be accommodated on SWFO L1, will now be provided to the first observatory, L1-A, as a hosted payload contributed by the European Space Agency. If the contributed instrument does not address x-ray irradiance requirements, then the project may proceed with procurement of a NOAA instrument.
- Finalize the Congressional Readiness Report (CRR), which is required prior to coronagraph contract award, to ensure the CRR can be processed by the Department and forwarded to the Office of Management and Budget.

This MS2/3 approval establishes the Department's project baseline, summarized below in Table-1. The project shall report execution against the project baseline, in the prescribed Office of Acquisition Management format, on an annual basis every January, beginning in 2026, incorporating the cost, schedule and cost performance data from the previous fiscal year.

Table 1: SW Next L1 Project Resource Baseline ($M)

L1 Series + Program	FY22*	FY23*	FY24*	FY25	FY26	FY27	FY28	FY29	TC**	Total
Baseline	48.2	137.4	131.8	184.8	196.6	218.7	222.6	223.2	969.4	2,332.7

* Actuals
** To Complete (FY30 -38)

In my capacity as Milestone Decision Authority for the Department – I approve Milestone 2/3 for the SW Next L1 Series Project, subject to the above direction.

cc: MRB Members