



OWP | OFFICE OF
WATER
PREDICTION

National Oceanic and Atmospheric Administration

National Weather Service
DRAFT
Office of Water Prediction

Community Hydrologic Prediction System (CHPS)
Infrastructure and Support

Performance Work Statement (PWS)

1. Background

1.1. General Organization Information

The Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS) is the primary source of weather data, forecasts, and warnings for the United States. Television weathercasters and private meteorology companies rely on this information to prepare their forecasts. The NWS is the sole official voice for issuing warnings during life-threatening weather and water situations.

In its official capacity, NOAA/NWS provides comprehensive water resources information including river and flood forecast, for use by individuals, water resources and emergency managers to protect life and property. In addition this critical water intelligence supports sound socio-economic decision-making for a sustained economy. NOAA:

- Provides integrated water prediction, forecasting the movement and presence of water throughout the nation in terms of quantity, availability, and quantity, from summit to sea with the appropriate timeliness, resolution, reliability, accuracy, and quantified uncertainty required to make decisions;
- Partners with other Federal, state, and local agencies to monitor, analyze, and provide real-time water information, and assess the socio-economic value and impact of water.
- Informs risk and resource management decisions and improves resilience through collaborations across the water enterprise with Federal, tribal, state, and local officials, private sector, NGOs, and academia.

The NWS Office of Water Prediction (OWP) collaboratively researches, develops and delivers state-of-the-science national hydrologic analyses, forecast information, data and decision-support services. Furthermore, OWP provides guidance to support and inform essential emergency services and water management decisions. In partnership with NWS at every level, OWP coordinates, integrates and supports consistent water prediction activities.

NOAA / NWS water forecasting requires coordination and cooperation with multiple offices throughout the organization. A few key examples are listed below. Additional organizational information is available at <http://www.noaa.gov/about/organization> and <http://www.weather.gov/organization/>.

- National Weather Service
 - National Centers for Environmental Prediction (NCEP),
 - River Forecast Centers (RFCs)
 - Weather Forecast Offices (WFO)
 - Regional Headquarters
 - Office of Central Processing (OCP)
 - Office of Science and Technology Integration (OSTI)
 - Analyze, Forecast and Support Office (AFSO)
- National Ocean Service / Office of Coast Survey, Coast Survey Development Laboratory

1.2. CHPS and FEWS

Community Hydrologic Prediction System (CHPS) refers to the full suite of software infrastructure used operationally to perform NWS hydrologic forecasting operations at all 13 NWS RFCs. Key components include:

- Flood Early Warning System (FEWS) infrastructure software. FEWS is developed, owned and maintained by Deltares, an institute in The Netherlands.
- “OHD Core”: FEWS compatible software for modeling and input data
- 3rd party models adapted from the U.S. Army Corps of Engineers, Hydrologic Engineering Center (specifically, HEC-RAS and HEC-RESSIM).

The initial CHPS operational deployment in 2011 provided the highest priority (“baseline”) hydrologic forecasting functionality to the RFCs, with lower priority requirements deferred until a later time. OWP continues to work on the deferred requirements for CHPS. These requirements include such functions as incorporation of hydrologic model calibration tools and possible access to user interface tools built into the FEWS infrastructure.

The NWS Office of Central Processing (OCP) provides primary support for the NWS RFC hydrologic forecasting and related operations. Accordingly, OCP provides first tier support for CHPS operations at the RFCs. While most issues are handled within OCP, it is sometimes necessary for OCP to seek technical input from FEWS Subject Matter Experts (SMEs) for complex problems within the FEWS components. This consultation can help identify the root cause of the problem and formulate a solution or response. In some cases, the response may require guidance to OCP and/or RFCs on FEWS operations and internal methods. Alternatively, analysis and consultation may result in the identification of FEWS software bugs which must be fixed or otherwise addressed, with varying degrees of urgency. The most urgent fixes are deployed into operations as soon as possible, while less urgent corrective fixes are deferred to a later time.

The NWS expects that some changes and enhancements to existing FEWS features will be requested by the forecasters. Generally, such requests are intended to improve usability in small but important ways. The NWS catalogs, categorizes, and prioritizes them for future consideration as resources permit.

2. Objectives

The contractor shall provide to the Government the analysis, definition, design, development, planning administration, training, and any other support or item required for the development, implementation, operation and maintenance of FEWS-based water resources, river, and flood forecast services.

The Contractor shall provide the necessary labor and resources to accomplish tasks in the following general areas of work:

- Time and Material and/or Labor Hours
 - o Daily Operational Support and Maintenance
 - o Other Subject Matter Expert support services

- Fixed Price delivery
 - FEWS Stable Builds and Enhancements
 - FEWS Patches
 - FEWS Evaluation Builds

3. Technical Requirements

3.1. Daily Operational Support

3.1.1. Overview

This activity provides support for the 13 NWS RFCs using CHPS in their operational forecasting and conducting activities related to forecasting.

As the NWS primary CHPS support group, OCP handles and solves most operational problems experienced by RFCs. Sometimes OCP requires assistance from Subject Matter Experts (SMEs) who have specialized understanding, knowledge, or experience with the FEWS operations, science, or software that represent the root cause of a problem. This assistance is requested only for issues believed to be caused by the FEWS software executing within the CHPS environment. There may be cases where the root cause is a hardware issue or a problem with NWS-provided software within CHPS. The FEWS SME is not expected to address problems which are unrelated to the FEWS system.

The OCP support group contacts the FEWS SME when specialized FEWS assistance is needed. Most of these requests are resolved by in-depth technical advice or guidance in the use, configuration, and maintenance of the FEWS system as a whole. The FEWS SME shall be expected to determine the cause of the problem and identify potential solutions. When an issue is actually the result of a software deficiency, a fix to the software is required to address the issue (See section 3.1.2 of the SOW).

During the course of providing expert FEWS support, there may be times when:

- A FEWS-based fix is implemented by the contractor as a temporary “patch” until a preferred longer term software solution can be designed and implemented by the contractor. There are two categories of response:
 - Functionality used to work correctly but no longer does. (Also known as regression errors or regression bugs.)
 - Software is operating per design specification but a change is needed to meet current operational requirements.
- A FEWS-based fix necessitates collaboration between the contractor and other software development organizations (such as OWP) to fully resolve the issue.
 - A “patch” or future software update may be required but often the collaboration will identify changes to the FEWS configuration to address or work around the issue
- The root cause turns out to be something unrelated to the FEWS software, design, or architecture; in such cases the FEWS SME is only expected to provide enough FEWS expertise to adequately demonstrate that the FEWS system is not the root cause.

- Complex issues may require additional, focused consultation in the form of customized training for NWS users such as forecasters, scientists, support staff, and software engineers. *These requirements are addressed in Section 3.2 Other Subject Matter Expert Services.*

OCP uses a tool (currently Redmine) to track all CHPS operational issues that are reported by the RFCs, with a priority categorization scheme based on level of impact to operational forecasting. The official list is on the OCP/FSIT Wiki Page (https://vlab.ncep.noaa.gov/redmine/projects/chps-issues-and-enhancements/wiki/Issue_Priorities). These categories are currently defined as follows:

Priority	Response Time	As applied to BUGS	As applied to SUPPORT
1 - Immediate	Immediate response needed	Severely impacts operations and no workaround available.	Task is time sensitive and critically impacts progress of other tasks.
2 - Urgent	Response needed by next day	Regularly impacts operations and workaround is complicated or difficult to maintain.	Time sensitive task.
3 - High	Response needed within 2-10 Days	Regularly impacts operations but is easy to spot or expect.	May be time sensitive or have minor impacts.
4 - Normal	Response can wait for 10 days but needed by next release	Nuisance bug with an easily implemented workaround	Default task priority.
5 - Low	Response can wait for some future date	Minor problem with little to no impact on usability. Mostly an FYI.	Performed or reevaluated in off-time.

3.1.2. Requirements

The contractor shall act as the “FEWS Subject Matter Expert” and provide support to the NWS primary CHPS site support team, OCP.

The contractor shall Organize and lead bi-weekly CHPS support coordination meetings.

The contractor will use Redmine. If NWS changes the ticket tracking system used for CHPS operational support, the contractor shall use the new system instead.

The ticket tracking categorization scheme described in Section 3.1.1 applies to the contractor once the NWS has determined that contractor assistance is needed.

Aside from urgent support requests, the contractor’s availability shall be restricted to normal business hours (i.e., 8:00am to 5:00pm) in the United States Eastern Time zone.

24 hours per day, 7 days per week availability is not required of the contractor.

Support provided to operational sites (i.e., the RFCs) can be provided by the contractor by direct communication with site staff, or advice and instructions provided to another party in the support chain. Communication may include in-person discussions, phone conversations, email, software documentation, or other forms most convenient for the RFC.

When requested by OCP, contractor support activities will include any or all of the following:

- Troubleshooting; e.g., soliciting additional details from OCP and/or RFC about the problem, viewing data and files extracted by OCP from the RFC, NHO-R, or other system, suggesting changes to an RFC's system, attempting to recreate the problem on a different system, etc.
- Suggesting to OCP or RFC potential action(s) to ascertain what might fix the problem, such as changes to RFC configurations, system changes (except for hardware), system restarts, database cleanup.
- Analysis to determine a short term workaround, a fix, and/or the need for a FEWS Patch.
 - Operational Support rarely results in development and deployment of a FEWS Patch.
 - Development and delivery of a FEWS software Patch, when requested by the NWS, is addressed in section 3.2.3 "FEWS Patches".
 - ***The contractor shall provide free of charge any patch determined to be the result of a regression error. OWP defines "regression error" as functionality that worked in previous FEWS systems but is now broken.***
- Interactions with RFC, OCP, or other NWS entities which need to be involved, including use of the ticket tracking system to communicate status, progress, and technical information.
- Subject Matter Expert (SME) advice to OCP and/or RFCs regarding configuration, setup, and use of the system for forecasting operations (e.g., responding to queries where NWS internal knowledge is not available, small amounts of documentation, familiarization for FEWS features which were not funded by the NWS).

3.2 Other Subject Matter Expert Services

3.2.1 Overview

As addressed in the table of deliverables, the NWS will occasionally request services that go beyond the scope of daily operational support. Examples of these services include:

- Detailed analyses of gaps between current CHPS and FEWS capabilities and RFC forecast requirements. An example of such an analysis was one performed in the summer of 2014 on CHPS Calibration Service Deficiencies. Other such gaps or deficiencies or enhancement requests may require detailed analysis culminating in a report that explains how such gaps, deficiencies, or enhancements may be addressed.
- Training to facilitate knowledge transfer from the FEWS source code developers to the NWS. Examples of training requests could include:
 - Training in an area of FEWS functionality or configuration unfamiliar to the NWS users.
 - Training in the form of knowledge transfer from Deltares to the NWS resulting from new/enhanced functionality.

- o Discussion of the software engineering embedded within the FEWS software infrastructure.
- o Discussion of the software engineering of peripheral models or software within the FEWS software suite. (For example, components of the Delft3D software suite.)

3.2.2 Requirements

The contractor shall provide additional labor as needed for training, analyses and related services.

Although the Government prefers these services be delivered remotely, travel, printing and other direct costs are authorized and may be used on a case-by-case basis.

Training material may be in the form of standalone documents delivered to the NWS (e.g., “job sheets”, manuals, memos) or in the form of new/updated entries in the Deltares public wiki FEWSDOC area. (Any public documents must not contain specific NWS directory structures.) Training requirements can vary considerably and will depend on the evolving needs of the NWS and the nature of the FEWS changes.

Additional requirements for remote training include:

- Recording (audio + video) of the training session
- Materials for the audience, distributed at least 24 hours ahead of time

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3.3 FEWS Stable Builds and Enhancements

3.3.1 Overview

Independent of this contract, Deltares develops, tests, and releases FEWS “Stable Builds” twice a year to the broader FEWS user community – nominally in the late spring and the late fall. These builds represent the official FEWS software baseline and include software bug fixes and functionality requested by all clients of Deltares, NWS or otherwise.

Typically, NWS only incorporates one of the stable builds annually into the CHPS baseline. As part of the annual stable build, NWS requests “enhancements” to expand the capabilities of the FEWS software. Enhancements serve a variety of purposes:

- Improved approach to a problem fixed via a FEWS Patch (see below) previously delivered for use in RFC operations; in some cases the original patch may be re-engineered with a different and better-designed solution.
- Adaptations to FEWS. They may be requested by the NWS to meet new or previously un-requested requirements, to improve overall CHPS usability, or to extend CHPS functionality beyond its initial baseline deployment.

Deltares supports multiple versions of FEWS; the Government will specify (via Letter of Technical Direction from COR or Task Manager) which FEWS Stable Build(s) will be deployed into RFC Operations. FEWS Stable Build deliveries are subject to existing FEWS License Agreement.

RFC participation in Beta testing of FEWS Stable Builds has proven vital to increasing software stability in RFC operations, gives RFCs an opportunity to test new FEWS functionality, and permits RFCs to re-affirm specific bug fixes.

Delivery of FEWS Stable Builds must be accompanied by knowledge transfer and training from the FEWS developers to NWS users which can include forecasters, scientists, support staff, and software engineers. Delivery of training and associated material can be in a classroom setting or remote (e.g., a webinar); and material may be in the form of standalone documents delivered to the NWS (e.g., “job sheets”, manuals, memos) or in the form of new/updated entries in the Deltares public wiki FEWSDOC area. Training requirements for each FEWS Stable Build will depend on the evolving needs of the NWS and the nature of the FEWS changes. (To be specified via Letter of Technical Direction from COR.)

3.3.2 Requirements

3.3.2.1 Planning

The contractor will deliver FEWS Stable Builds to OWP. Through a collaborative process resulting in a Letter of Technical Direction, the NWS and Contractor shall agree to:

- A clear statement of the requirement(s) interpreted by the contractor and accepted by the NWS.

- The number of “enhancement days” required for each Enhancement prior to beginning work. (An enhancement day is a nominal level of effort of 8 hours of labor per unit.)
- Subsequent analysis to determine the best implementation approach.
- A proposal containing an implementation approach, if implementation requires NWS input
- A delivery schedule including testing start and end dates, plus delivery dates for software, training and documentation.

3.3.2.2 Software Development and Delivery

The contractor will develop and provide:

- Well tested software that implements the requirement
- Software with no regression errors, i.e. maintains functionality of existing features in FEWS that were working before the requirement was implemented
- NWS requested enhancements.
- Corrective fixes to FEWS for both items (a) which resulted in a FEWS Patch, and (b) are logged in the ticket tracking system but did not result in a FEWS Patch request
 - Fixes to the “well-tested software” must not impact the contractor’s ability to meet agreed content, budget, and schedule
 - In cases where a FEWS Patch was previously delivered to OCP/RFCs, the equivalent solution incorporated into a Stable Build might be a different but more desirable long term solution; the contractor must still provide a solution which fixes the problem addressed by the original FEWS Patch, meets the contractor’s implementation goals, and does not break other existing features. If the different solution impacts operational use of the system, the contractor must additionally include the NWS in a review of the approach, impact to operation, and risks associated with the change.
- Fixes to problems identified by RFCs during testing
- Working (sample) configurations to accompany new or changed software features, if needed.
- Delivery of a full set of completed tested software. The current (November 2022) standard delivery involves placement of a zipped tar file on the Deltares USA secure ftp site for NWS to retrieve. The tar file contains documentation as PDF, a Full Clean package of FEWS and its components.
- If requested by the government, FEWS binary files (similar to Section 3.5 “FEWS Evaluation Builds”) to allow the government to “preview” the enhanced capabilities prior to delivery and testing for a FEWS Stable Build.

3.3.2.3 Beta Testing

It is imperative to the NWS mission that FEWS software works properly for RFC operations. Any software change introduces an element of risk. Beta / field testing is an effective mechanism to mitigate that risk and ensure the RFCs and OWP are comfortable introducing the new software into operations.

The contractor will develop and provide:

- Documented test procedures (testing instructions for changed or new functionality)
- Technical assistance so test RFCs can download the release and conduct testing
- A list of known issues not fixed for the FEWS Stable Build; these will be documented by the contractor in the ticket tracking system

The contractor will participate in NWS-led conference calls with test RFCs and OCP using conferencing tools readily available to the NWS. The NWS will have final say on whether or not they will participate in FEWS Beta testing.

During the Beta testing period the contractor will respond to issues with the new software in a manner consistent with “Daily Operational Support and Maintenance” (see Section 3.1.1). It is expected that all issues identified during the Beta test period will be resolved prior to final delivery of completed software. Support for Immediate and Urgent issues identified during Beta Testing will continue until resolved, even if resolution goes beyond the Beta test period.

3.3.2.4 Training

Training in the use and application of changed or new functionality is required for the purposes of knowledge transfer from the contractor to the NWS.

Training will be conducted remotely (e.g., via webinar) and led by the contractor. A webinar lasting 1-2 hours is usually sufficient for these purposes, and the material is not assumed to already exist; therefore the contractor is expected to create the necessary material and distribute to NWS at least 24 hours in advance of training.

Accompanying material may be in the form of standalone documents delivered to the NWS (e.g., “job sheets”, presentations, manuals, memos) and/or in the form of new or updated entries in the Deltares public wiki FEWSDOC area (e.g., User Guide, Configuration Guide, etc. but nothing with NWS-specific directory structures).

Delivery type (e.g., hard copy, FTP) and format (e.g., MS Word, PDF) of materials will be pre-agreed between the contractor and the NWS.

Additional requirements for remote training include:

- Recording (audio + video) of the training session
- Materials for the audience, distributed at least 24 hours ahead of time

Further, the NWS may choose to develop its own web-based training module for new functionality. In such cases the contractor may be asked to review material developed by the NWS for completeness and accuracy. A total of 4 hours of contractor labor is assumed to be adequate to review one module.

3.3.2.5 Documentation

The contractor will develop and provide documentation, which may be in the form of standalone documents delivered to the NWS (e.g., “job sheets”, presentations, manuals, memos) and/or in the form of new or updated entries in the Deltares public wiki FEWSDOC area such as:

- User’s Guide
- Developer’s Guide
- System Administrator’s Guide

- Configuration Guide
- Release Notes
- List of deferred issues

3.4 FEWS Patches

3.4.1 Overview

The purpose of a FEWS Patch is to provide a swift software update to the FEWS software baseline to resolve an operational problem which is preventing one or more RFCs from meeting its forecasting obligations. In these cases, an RFC needs a software resolution but cannot wait for the fix to be delivered in the next Stable Build.

The development organization is expected to define, develop, test, and deliver a solution which will sustain the RFC's operations until the next FEWS Stable Build is delivered. If a well-engineered software solution is impractical due to time constraints, a temporary workaround may be a necessary response, possibly in addition to an interim software solution in the form of a FEWS Patch.

FEWS Patches undergo limited field testing to verify that the fixes work as expected and have not broken something else at the RFC(s) experiencing the problem. The contractor is expected to thoroughly test FEWS software fixes in an environment closely representing RFC operations. Comprehensive field testing of the FEWS Patch at one or more RFCs is required as an essential part of the testing process. RFC testing is done in collaboration with OCP.

FEWS software patches deployed into RFC operations are incorporated into subsequent FEWS Stable Builds (see above), where they are subject to full regression testing.

The NWS request for a FEWS Patch is always an outcome of activities described under Daily Operational Support and Maintenance (See Section 3.1). When tasked by OCP, the contractor will analyze the highest impact cases identified as a potential FEWS software bug, and may deliver software bug fixes in the form of Patches on the FEWS software baseline.

Some software tasks may require contractor developers (FEWS software) and NWS developers (OWP software) to collaborate on complementary components which together form part of a complete solution.

3.4.2 Requirements

The contractor will deliver FEWS Patches to OCP. Due to the uncertainty of what operational problems will arise and when, delivery of FEWS Patches will be specified via Letter of Technical Direction from COR or Task Manager.)

No travel is required to prepare or deliver FEWS Patches.

The contractor and OCP will collaborate to determine whether an identified software change is a corrective fix (to make the software meet a pre-existing requirement) or an enhancement (change to a pre-existing requirement). Due to their nature, FEWS Patches are not a desirable mechanism to implement new or enhanced operational requirements (i.e., software enhancements). However, the NWS advises that some requirements for CHPS may not have been clearly or fully defined at the time of original implementation, which might result in a service failure at an RFC and thus the need for a FEWS Patch.

Some software fixes may be identified as candidates for a FEWS Stable Build (see below) rather than a FEWS Patch. In such cases the work is carried out via the FEWS Stable Build or FEWS Enhancement task.

A FEWS Patch will include all of the following products and services:

- Part of Operational Support and Maintenance:
 - Clear statement of the requirement(s) interpreted by the contractor and accepted by the NWS, usually documented in the ticket tracking system (currently Redmine)
 - Development of NWS-requested corrective fixes to the FEWS software
 - Testing instructions to confirm and verify changed functionality
 - Support to one or more RFCs during field testing and evaluation of the FEWS Patch
- Part of the Fixed-Price FEWS Patch
 - Based on the specific software engineering solution, the contractor shall identify level of effort (Low, Medium, High) for delivery of a FEWS Patch.
 - Packaging and Delivery of well tested software which resolves the problem originally reported and does not break something else (FEWS or otherwise) which was working before the FEWS Patch was installed
 - Working configurations to accompany the software changes, where needed
 - Documentation if requested by OCP and/or RFCs

Software updates delivered through FEWS Patches shall be incorporated into the next available FEWS Stable Build. (refer to Section 3.3)

3.5 FEWS Evaluation Builds

3.5.1 Overview

Occasionally the NWS requires early access to the FEWS software ahead of the next Stable Build in order to evaluate the upcoming FEWS release and develop CHPS software components upon features in that advanced FEWS software. These packages of advanced FEWS software are referred to as FEWS Evaluation Builds (formerly “Development Builds”).

FEWS Evaluation Builds are never intended to be used Operationally. FEWS Evaluation Builds must include knowledge transfer from the FEWS developers to NWS users who may include forecasters, scientists, support staff, and software engineers. Delivery of training and associated material will be remote (e.g., a webinar); accompanying material will be in the form of standalone documents delivered to the NWS (e.g., “job sheets”, manuals, memos). Training requirements will depend on the nature of the FEWS changes.

3.5.2 Requirements

The contractor will deliver FEWS Evaluation Builds to OWP. Due to the uncertainty of when FEWS Evaluation Builds will be needed, delivery will be specified via Letter of Technical Direction from COR or Task Manager.

No travel is anticipated for the delivery of FEWS Evaluation Builds.

In cases where NWS-developed enhancements for CHPS rely on FEWS features added by the contractor, the NWS will be responsible for demonstrating its own CHPS enhancements to the RFCs. It may be desirable or necessary for the contractor to demonstrate the FEWS features without the NWS enhancements.

The contractor will deliver FEWS Evaluation Builds to the appropriate NWS project manager for use by the RFCs identified by the NWS as test sites. The NWS will select RFC representatives who will test the features contained in a given Evaluation Build.

A FEWS Evaluation Build will include all of the following products and services:

Planning

- A proposed plan for delivery of FEWS Evaluation Build(s) to the NWS
- Clear statement of the requirements interpreted by the contractor and acceptable to the NWS
- Proposal containing design or implementation approach, if implementation requires NWS input

Software Development and Delivery

- Development and delivery of well-tested software which implements the requirement(s) and does not break something else in FEWS that was working before the requirement was implemented

- Fixes to the “well-tested software” must not impact the contractor’s ability to meet agreed content, budget, and schedule
- Working (sample) configurations to accompany new or changed software features, if needed

Training, Documentation and Support

- Instructions for downloading and testing FEWS Evaluation Builds
- Demonstrations of Evaluation Build capabilities
- Technical assistance so RFCs and OWP can effectively evaluate the FEWS Evaluation Build
- Documentation in the form of Memos or How-To worksheets to aid the knowledge transfer from the contractor to the NWS; but only when the NWS considers such documentation to be essential
- Tracking of software bugs and configurations identified during the evaluation process.
- If software bugs are discovered in the FEWS Evaluation Build which prevent the government from evaluating the specified features, then the Contractor will fix and update the software.
- A list of enhancements, fixes, and/or features included in/excluded from any given FEWS Evaluation Build; the contractor may document these via email.

4 Contract Requirements:

4.1 Contractor Communications:

General responsiveness is important to the Government. Internal responses to emails shall be provided within 4 business hours of receipt.

4.2 Monthly Contract Status Report:

The contractor shall submit to the Government a progress report every month after the effective date of the contract and every month thereafter during the period of performance. This document shall be submitted with the contractor’s invoice by the 10th of the month. Each report shall cover the contract activities relevant to the performance for that reporting period. The report shall include:

- A description of work performed during the period and the progress achieved. The description shall include pertinent data or graphs in sufficient detail to explain any significant results achieved.
- A comparison of planned progress and actual progress achieved, including problems or delays encountered and recommended solutions.
- Anticipated problems in the next or foreseeable future period and recommended solutions.
- An outline of activities proposed for the next period.
- Planned contractor leave for the next 90 days
- The report shall also include any additional information – including findings and recommendations – that may assist the Government in evaluating progress under this contract.

4.3 Level of Effort (LOE) Spend Plan:

The contractor shall submit to the Government an LOE spend plan after the effective date of the contract and every month thereafter during the period of performance. This document shall be submitted with the contractor's invoice by the 10th of the month and shall include:

- Current and cumulative labor hours, travel, and Other Direct Costs (ODCs) incurred.
- Burn rates including names, titles, and number of hours expended for each of the contractor's professional personnel assigned to the contract, including officials of the contractor.
- Forecast of labor hours, travel, and ODCs required to complete all activities.
- Estimated date at which current funding will be fully expended.

4.4 Monthly Contracting Officer's Representative (COR)-Program Manager (PM) Meetings:

The contractor shall establish and maintain monthly meetings with the COR, applicable Technical Points of Contact (TPOC), and other Government personnel as needed. The meeting agenda will cover:

- Review of the most recent monthly spend plan.
- Status for any open staffing positions.
- General discussion of contract health.
- Potential risks and opportunities.

5. GENERAL CONTRACT INFORMATION

5.1 Key Personnel

The contractor shall identify a Program Manager (PM) for oversight of contract performance. The individual functioning in the PM role shall understand the planning and direction of all ongoing, highly technical programs/tasks, which involve hydrologic/hydrometeorologic forecasting. The PM will understand how to direct the completion of tasks within estimated time frames and budget constraints, scheduling and assigning duties to subordinates, interfacing with Government management personnel, including contracting office, the Contracting Officer's Representative (COR), and the individual task monitors, reporting both orally and in writing to contractor management and Government representatives. The individual functioning in the program management role is capable of negotiating and making decisions for the company. The PM is a Key Person under this contract; the Contractor shall coordinate with the Government should they become unavailable and a replacement PM is needed.

5.2 Contractor Furnished Property, Equipment, and Services:

Except for those items specifically stated to be Government furnished as stated above, the contractor shall furnish everything required to perform this PWS.

5.3 Technical Point(s) of Contact (TPOC):

One or more TPOCs will assist the COR as needed. All parties are reminded that this in no way detracts or changes the responsibilities and limitations described in the contract including, but not limited to, CAR 1352.201-70, Contracting Officer's Authority, and CAR 1352.201-72, Contracting Officer's Representative. Only the contracting officer has the authority to direct, revise, or otherwise change the requirements of the subject contract.

The TPOC(s) will be identified via a separate letter and may be changed at any time by the Government via letter without prior notice to the contractor.

5.4 Travel and Other Direct Costs (ODCs):

Contractor travel may be required to support this requirement.

a. If travel and/or ODCs are required under this contract, they shall be requested and approved in advance and (except as otherwise authorized herein) in writing by the COR (email is acceptable).

Travel

All travel hereunder shall be accomplished in accordance with the requirements of the Federal Travel Regulation (FTR) and the Department of Commerce Travel Handbook (DOCTH), available online respectively at:

FTR – <http://www.gsa.gov/portal/content/104790>

DOCTH – <http://www.commerce.gov/fmpublications/handbooks-and-manuals/travel-management>

All travel requests shall be pre-authorized, submitted to the COR at least five business days prior to the departure date and shall include:

1. The purpose of the trip;
2. The destination;
3. The duration (and times of initial departure and return);
4. The number of personnel traveling, and their respective names and titles; and
5. The estimated cost per person, including a breakdown of the costs for transportation (airfare, car rental, parking) and Meals and Incidental Expenses (M&IE).

b. Travel invoices shall include an affirmation signed by an authorized corporate representative stating that the costs being submitted are in compliance with the FTR and Federal Acquisition Regulation (FAR) Part 31—Contract Cost Principles and Procedures.

c. Reimbursement shall not exceed the rates and expenses allowed by the FTR to a Government employee traveling under identical circumstances and shall not exceed FTR limits without prior approval from the COR. The contractor shall make a good faith effort to obtain the lowest standard coach or equivalent airfare.

d. The contractor shall take advantage of travel discounts whenever possible. Except as otherwise provided herein, payment will be made for actual common carrier fares plus cost of

travel between the contractor employee's home (or regular duty station) and the carrier terminal and temporary duty points for travel by the most reasonable and economical means.

5.5 Quality:

5.5.1 Quality Control:

Quality control is the responsibility of the contractor. The contractor is responsible for the delivery of quality services/supplies to the Government.

The contractor shall develop, implement, and maintain an effective quality control system to identify, prevent, and ensure non-recurrence of defective services which includes a written Quality Control Plan (QCP). The QCP shall implement standardized procedure/methodology for monitoring and documenting contract performance to ensure all contract requirements are met. The contractor's QCP shall contain a systematic approach to monitor operations to ensure acceptable services/products are provided to the Government. The QCP may address the following: continuous process improvement; procedures for scheduling, conducting and documentation of inspection; discrepancy identification and correction; corrective action procedures to include procedures for addressing Government discovered non-conformances; procedures for root cause analysis to identify the root cause and root cause corrective action to prevent re-occurrence of discrepancies; procedures for trend analysis; and procedures for collecting and addressing customer feedback/complaints. The contractor shall submit a QCP for COR approval within 14 calendar days of contract award. Any subsequent changes to the QCP after initial COR approval are subject to COR approval. The contractor shall, upon request, provide additional quality control documentation to the Government.

5.5.2 Quality Assurance:

Quality assurance is a program for the systematic monitoring and evaluation of contract performance to ensure that standards of quality are being met. Quality assurance is the responsibility of the Government. The Government will evaluate the contractor's performance in accordance with the Quality Assurance Surveillance Plan (QASP). This plan is a Government only document primarily focused on what the Government will do to assure that the contractor has performed in accordance with the requirements of the contract.

5.5.2.1 Contract Discrepancy Meetings:

The Government will issue a written Contract Discrepancy Report when the contractor's performance is found to be unacceptable for any contract service. The COR will, within two work days of discovery of a discrepancy, call a meeting between the Program Manager, and any others, as appropriate, to address the unacceptable performance. The Government will, within two work days of the meeting, prepare a Discrepancy Report that explains the problem and documents the meeting discussion. This report will be sent to the Program Manager and to the contracting officer.

Within three work days of receipt of the Discrepancy Report, the contractor shall provide, to the COR and the contracting officer, a written statement of the planned corrective action. The

contractor shall take corrective action within two work days after providing the written statement of corrective action.

If the contractor disagrees with the Discrepancy Report, the contractor shall explain, in writing, areas of disagreement to the COR and contracting officer within three work days of Discrepancy Report receipt. Upon receipt of the contractor's written disagreement, the contracting officer will recommend action.

Contract Cost Principles and Procedures.

c. Reimbursement shall not exceed the rates and expenses allowed by the FTR to a Government employee traveling under identical circumstances and shall not exceed FTR limits without prior approval from the COR. The contractor shall make a good faith effort to obtain the lowest standard coach or equivalent airfare.

d. The contractor shall take advantage of travel discounts whenever possible. Except as otherwise provided herein, payment will be made for actual common carrier fares plus cost of travel between the contractor employee's home (or regular duty station) and the carrier terminal and temporary duty points for travel by the most reasonable and economical means.

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6 Performance Requirements Summary:

The contractor shall be responsible to ensure all tasks are completed in accordance with the performance requirements. Failure to meet the performance requirements will be reported verbally to the contractor by the COR and reported on a Contract Discrepancy Report by the COR. The contractor shall correct substandard performance within the timeframe specified in the Contract Discrepancy Report.

The following incentives/remedies apply to all performance objectives listed below.

Incentive: Timely payment and potential for exercising option periods

Remedy: Withholding of invoice until rectified and/or negative past performance rating

Performance Objective	PWS Paragraph	Standard	Maximum Allowable Deviation from Requirement
General Responsiveness	3.1.1	Initial response to emails within 4 business hours of receipt	2%
Deliverables	1.3 and 6.0 and throughout contract	Provide deliverable items as described in the contract and PWS	2%

7. Deliverables

PWS Ref	Title	Format	Required Dates	Frequency	Distribution
3.1 3.1.1 3.1.2	Daily Operational Support	Microsoft Office or Adobe compatible and submitted via email or published on an open-source repository.	According to project schedules	According to project schedules	COR/TPOC and/or open-source repository
3.3 3.3.2.1 3.3.2.2 3.3.2.3 3.3.2.4 3.3.2.5	FEWS Stable Builds and Enhancements Software Development and Delivery, Beta Testing and Training and Documentation	Microsoft Office or Adobe compatible and submitted via email or published on an open-source repository.	According to project schedules	According to project schedules	COR
3.4 3.4.1 3.4.2	FEWS Patches	Microsoft Office or Adobe compatible and submitted via email or published on an open-source repository.	According to project schedules	According to project schedules	COR/TPOC and/or open-source repository
3.5 3.5.1 3.5.2	FEWS Evaluation Build	Microsoft Office or Adobe compatible and submitted via	According to project schedules	According to project schedules	COR/TPOC and/or open-

		email or published on an open-source repository.			source repository
4.2 4.3 4.4	Monthly Contract Status Report and LOE Spend Plan	Microsoft Office or Adobe or Google Docs compatible and submitted via email. Report may be in contractor format but will first be approved by COR.	Initial: With each invoice Subsequent: Updated on a monthly basis by the 10th of each month.	Initial and monthly thereafter	Contracting Officer (CO)/COR
5.5.1	Quality Control Plan	Microsoft Office or Adobe compatible and submitted via email			

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NON-PWS ITEMS:

Type of Order:

The government anticipates a hybrid contract.

- Direct Labor shall be awarded on a Time and Materials basis using contracted labor rates.
- FEWS Stable Builds, Patches, and Enhancement Builds shall be awarded on a Firm Fixed Price basis.

Period of Performance:

The period of performance for FEWS Stable Builds and Enhancement matches the established, 17-month development, testing and delivery schedule:

Base Year:	07/01/2023 - 11/30/2024
Option Year 1:	07/01/2024 - 11/30/2025
Option Year 2:	07/01/2025 - 11/30/2026
Option Year 3:	07/01/2026 - 11/30/2027
Option Year 4:	07/01/2027 - 11/30/2028

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The period of performance for Direct Labor shall be for one (1) Base Year of 12 months and four (4) option years:

Base Year:	09/21/2023 - 09/20/2024
Option Year 1:	09/21/2024 - 09/20/2025
Option Year 2:	09/21/2025 - 09/20/2026
Option Year 3:	09/21/2026 - 09/20/2027
Option Year 4:	09/21/2027 - 09/20/2028

The Government reserves the right to extend the term of this contract at the prices set forth in Section B in accordance with the terms and conditions contained in clause 52.217-9 entitled, “Option to Extend the Term of the Contact”.