



COMMONWEALTH OF VIRGINIA

Department of Emergency Management

9711 Farrar Court, Suite 200, North Chesterfield, Virginia 23236
TEL 804.267.7600 TDD 804.674.2417 FAX 804.272.2046

CURTIS C. BROWN
State Coordinator of
Emergency Management

ERIN SUTTON
Chief Deputy State Coordinator
of Emergency Management

November 23, 2021

Dear Reader,

On behalf of the Virginia Department of Emergency Management, thank you for your patience with the additional time needed for the submission of our annual reports. Since January 2020, our small team of around 150 teammates has been working 24/7/365 serving our citizens and visitors across the Commonwealth through dozens of natural and humanmade disasters and large-scale events. This includes several significant rallies, flooding events, civil unrest, COVID-19 testing and vaccinations, inauguration, the Capitol riot, a cyber attack on critical infrastructure, hundreds of protests, repatriation, winter weather, hurricane season, and numerous other high-profile and impactful incidents. My agency is ready to help, and here to serve. Thank you.

Respectfully,

A handwritten signature in black ink, appearing to read "Curtis C. Brown".

Curtis Brown, State Coordinator



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MEMORANDUM

TO: The Honorable Ralph S. Northam, Governor
The Honorable Janet D. Howell, Chairperson of the Senate Finance and Appropriations Committee
The Honorable Luke E. Torian, Chairperson of the House Appropriations Committee
Daniel Timberlake, Director of the Department of Planning and Budget

VIA: Brian J. Moran, Secretary of Public Safety and Homeland Security
Shawn Talmadge, Deputy Secretary of Public Safety and Homeland Security

FROM: Curtis Brown, State Coordinator

SUBJECT: FY2022 Annual Report on IFLOWS Enhancement Program

Attached is the FY2022 Annual Report on the IFLOWS Enhancement Program as mandated by the 2020-2022 budget bill in the General Assembly.

A handwritten signature in black ink, appearing to read "Curtis Brown", enclosed in a rectangular box.

Curtis Brown
State Coordinator

The Integrated Flood Observation and Warning System (IFLOWS) Enhancement Program Year ONE



Virginia Department of
Emergency Management

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Executive Summary

This document presents a detailed explanation of the first steps of the IFLOWS Enhancement Program, the Virginia Department of Emergency Management's (VDEM's) strategy to evaluate, replace, and/or upgrade the system. It was developed to satisfy the requirements set forth in the 2020-2022 Budget Bill:

The State Coordinator of the Department of Emergency Management shall develop a plan that prioritizes a list of repairs, replacements, upgrades, and maintenance needs of IFLOWS systems. The Department is directed to provide a report that consists of, but is not limited to, detailed costs to address each project; a phased plan to fund the cost of upgrading, enhancing, and maintaining the systems, if feasible, giving priority to systems that require immediate replacement, repairs, and upgrades; and recommendations for offsetting the costs with federal grants and cost-sharing opportunities with localities that rely on IFLOWS. The report shall be submitted to the Secretary of Finance, the Director of the Department of Planning and Budget, and the Chairs of the House Appropriations and Senate Finance Committees no later than October 15, 2020.

The total rough order magnitude (ROM) cost estimate for the Program is \$4.6M, although this estimate will be refined as planning progresses. The Program schedule is five years, dictated by the anticipated disbursement rate (one allotment per year for five years). In addition to GA funds, VDEM will seek federal funding streams. Additionally, VDEM will closely collaborate with a diverse range of stakeholders to ensure the system provides the highest value features.

The ultimate goals of this project will be the following:

- Restore operational readiness to a consistent rate of at least 95% of intended functionality.
- Support maintenance and training through organic maintenance personnel and support to locality preventive maintenance efforts.
- Provide an accessible long-term hydrologic database.
- Maximize value to stakeholders through prioritized system capabilities.
- Develop a better capability for collecting and understanding the data from existing IFLOWS infrastructure which can be ingested into existing predictive analysis.
- Modernize the current architecture to support increased data fields from a variety of sources.
- Improve, modernize and replace hardware as needed while retaining and maintaining the infrastructure elements that are still useful.
- Support future operations for data transfer, up to and including a Commonwealth-wide Common Operating Picture that can be used by localities and decision makers as both a situational awareness tool and a method to formulate evacuation decisions and flood mitigation strategies.

Prioritization of repairs, replacements, upgrades and maintenance needs of the IFLOWS system

To be accomplished in six phases (sequential and non-sequential)

1. Establish a pilot project with the Center for Innovative Technology (CIT) to test gauge functionality, maintenance and responsiveness (8 months): **\$630,973 (FY22)**
VDEM will conduct a functionality study that integrates current IFLOWS technology with new detection and transmission capabilities, ascertain critical transmission pathway failures, and develop updated websites that will be owned by the Commonwealth Data Trust and operate on open-source software. This pilot will test and validate data streams from sensors of different ages, capabilities and data protocols. The products produced and the conclusions of this study will inform the broader IFLOWS project going forward, to include:
 - a. Critical transmission pathway failure identification, and a determination on gauge removal, upgrade or replacement.
 - b. Best practices for future data transmission capabilities.
 - c. Recommendations for upgrading transmission from radio pathways to cell and/or satellite connections (if appropriate).
 - d. Best placement of sensors for locality and National Weather Service (NWS) utility.
 - e. Integration into a single source (Commonwealth Data Trust) of all flood sensors currently installed (IFLOWS, locality installed, possibly USGS, etc).
 - f. Recommendations for future utilization and cross-integration with other states.
2. Right-size current system components determined by NWS and locality requirements (12-18 months): **Cost: Assessment Dependent**
As a large majority of sensors remain viable, are well established and relied upon by all customers, VDEM intends to retain and upgrade as many current sensors as possible while working with localities and the NWS to cull sensors that are no longer sustainable and do not add quantifiable value to the system. Concurrently, VDEM will coordinate with localities and NWS on the most propitious location for new sensor technology based on historical data, forecasting need and locality preference.
3. Develop a method for data collection of existing sensors that is also compatible with new technology (24 months):
VDEM will adopt a data collection and display method that will demonstrate a more dynamic, transparent, timely and flexible ability to collect data and support analysis. VDEM will produce the following:
 - a. Ability to collect and deliver data to end users in near real time.
 - b. Ability to provide “end-to-end” traceability of data from the data closest to the end-user.
 - c. Provide explicit, near real-time system health status that supports targeted maintenance and modernization.
 - d. Demonstrate the integration of all available flood sensors and available data (i.e. weather reporting) into a common data set and data stream.

- e. Demonstrate the ability to perform analysis on the integrated data.
4. Develop and institute a maintenance schema that incorporates VDEM personnel effecting direct maintenance while supporting localities in addressing basic upkeep, as well as “depot-level” maintenance for larger equipment issues (60 months): **Cost: Assessment Dependent**
Historically, most IFLOWS maintenance was executed by contractors who conducted system maintenance from a central location irrespective of the severity of the issue. This maintenance was also “on demand” and did not incorporate preventive maintenance, periodic sensor repositioning and sensor value to the system. VDEM will coordinate with all data consumers and establish Memorandums of Agreement (MOAs) with those entities that accept or currently retain IFLOWS equipment for basic maintenance, while the Agency will agree to ensure large scale (depot level) maintenance and repair be carried out through organic personnel and contracting.
5. Identify and contract a new depot-level maintenance contractor (12 months): **Cost: Assessment Dependent**
Through the RFP process, identify and contract a high-quality/best value maintenance contract to effect depot-level equipment maintenance and data integration in conjunction with the Commonwealth Chief Data Officer and the Commonwealth Chief Innovation Officer.
6. Work with Federal, State and local agencies to develop a Commonwealth-level Common Operating Picture (COP) to ingest and display data that will be critical to emergency management and State-level decision makers (60 months): **Cost: Assessment Dependent**
Through focused working groups and stake-holder input, as well as potentially funding and assistance from other state and federal agencies, VDEM hopes to develop an “all hazards” operational tool that can be utilized for situational awareness to senior leadership, disaster planning, mitigation strategies, population access and operational equity, and limited public information. This tool will be developed in close coordination with the Chief Innovation Officer and will potentially encompass data streams that expand far beyond flooding.

Cost

The following costs are based on estimates currently available. Study results, technology costs and funding opportunities not yet known have the potential to alter these figures and will be addressed and updated in subsequent reports.

IFlows Enhancement Budget Request
FY22

Budget Line Description	Current Base	FY2022	FY2023	FY2024	FY2025	FY2026	
Personnel & Overhead (Program Manager & 2 Technical specialists)	\$ 127,634	\$ 424,008	\$ 255,268	\$ 262,926	\$ 270,814	\$ 278,938	
Maintenance & Monitoring	\$ 297,240	\$ 304,968	\$ 312,897	\$ 321,033	\$ 329,380	\$ 337,943	
VITA Enterprise Cloud Oversight Services (ECOS)		\$ 4,925	\$ 5,053	\$ 5,184	\$ 5,319	\$ 5,457	
Staff Training		\$ 60,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	
Technical Network Assessment		\$ 630,973					
Upgrade, expand, improvement of gauges to ALERT 2/iridium (assessment dependent)			\$ 806,006	\$ 789,414	\$ 772,361	\$ 754,833	
Continuous improvement/Product lifecycle management (assessment dependent)			\$ 25,650	\$ 26,317	\$ 27,000	\$ 27,703	
Total Project	\$ 424,874	\$ 1,424,874	\$ 1,424,874	\$ 1,424,874	\$ 1,424,874	\$ 1,424,874	\$ 7,549,244
Current Funding	\$ 424,874	\$ 424,874	\$ 424,874	\$ 424,874	\$ 424,874	\$ 424,874	\$ 2,549,244
Additional Base Funding	\$ -	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 5,000,000

Phased approach for upgrade, enhancement and maintenance

Phase One: The pilot program developed by VDEM in conjunction with the Center for Innovative Technology and in coordination with independent locality and Planning District Commissions, will provide a standardized platform for data ingestion that will be owned and hosted by the Commonwealth. Concurrently, VDEM intends to hire two IFLOWS maintenance personnel who will affect higher level maintenance, work and train localities on basic preventative maintenance (PMS), and schedule/manage complex maintenance issues.

Phase Two: once the pilot program is complete and findings published, VDEM will assemble a series of meetings with localities, relevant state agencies and federal entities (NWS, USGS) as a steering committee to address next steps. These will include:

- Current and future gauge placement for best predictive analysis
- Decommissioning of certain current gauges that no longer produce desired data based on location
- Maintenance protocols
- Data delivery, control and usage
- Transmission methods (radio pathway, cell, satellite)
- MOU language with individual localities for PMS and upkeep
- Possible cross-usage with other states
- Common Operating Picture development

This group will meet on a scheduled basis to refine future direction and vision.

Phase Three: During the year two-three mark of the project (FYs 2023-2024), sensors and ancillary equipment will be upgraded as per the recommendations of the steering committee and based on the best use of Commonwealth funds, technology and manpower. Concurrently, sensors that have been identified for decommissioning and/or upgrade will be addressed, and new sensors will be installed based on the steering committee's recommendations. Maintenance of existing and relevant equipment will continue as coordinated by VDEM IFLOWS maintenance personnel, and relationships with localities (backed by MOUs) will be cemented for preventive maintenance of IFLOWS equipment.

Phase Four: During the last two years of the project (FYs 2025-2026) VDEM will develop the future direction of the program, with possible integration into an all-hazards Common Operating Picture which will marry multiple data sources into one

Federal Grants

VDEM will apply for FEMA's Building Resilient Infrastructure and Communities (BRIC) grant to offset the cost of the Enhancement Program once enough background data has been collected and analyzed. Additionally, VDEM will continually seek and capitalize on other federal grant opportunities to offset the cost. The pilot project will collect data essential to produce project plans, which will make our grant applications more competitive.

Cost Sharing

VDEM is exploring cost-sharing arrangements with localities, both monetary and work-based. These cost-sharing arrangements are dependent on the characteristics of the final system design, which is in early stages of development. VDEM is currently developing a state-local operations and maintenance arrangement with communities in the Rappahannock River Basin, where localities perform basic routine cleaning and maintenance to evaluate a new cost-sharing model, as well as entertaining cost-sharing possibilities with localities that have placed sensors within their localities at their own expense (such as Roanoke's SHARK system and independent gauge installation in Stanton and Fredericksburg). As many localities which IFLOWS serves do not have the fiscal capacity to provide funds to a flood-warning system, VDEM is also exploring support mechanisms that are non-monetary (work in-kind, preventative maintenance by locality personnel, adopt-a-gauge program).