Texas Water
Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

AGENDA ITEM MEMO

BOARD MEETING DATE: May 11, 2022

TO: Board Members

THROUGH: Jeff Walker, Executive Administrator
            Ashley Harden, General Counsel

FROM: Richard A. Wade, Deputy Executive Administrator,
            Texas Natural Resources Information System (TNRIS)

SUBJECT: Contract Amendment with the United States Geological Survey

ACTION REQUESTED

Consider authorizing the Executive Administrator to execute a contract amendment with the United States Geological Survey (USGS) that would extend the existing contract to August 31, 2024, and increase Texas Water Development Board (TWDB) funding by $160,000, for a total commitment of $320,000.

BACKGROUND

In a collaborative effort to significantly enhance communities' flood warning and response capabilities, the TWDB joined forces with the USGS in 2020 to develop a real-time flood inundation mapping system for Texas.

This system, the Flood Decision Support Toolbox (FDST), is built on the existing modern framework and successful accomplishments of the federal Interagency Flood Risk Management (InFRM) team, comprised of the Federal Emergency Management Agency (FEMA), United States Army Corps of Engineers (USACE), USGS, and the National Weather Service (NWS). The FDST's publicly available map viewer provides the best available information in each area, which ranges from engineering scale models to National Oceanic and Atmospheric Administration (NOAA) river forecasts. Broadly speaking, the system supports the citizens of Texas by optimizing the use of state and federal resources through continued flood-related collaboration at the highest levels of government.

Our Mission

Leading the state's efforts in ensuring a
secure water future for Texas and its citizens

Board Members

Brooke T. Paup, Chairwoman │ Kathleen Jackson, Board Member

Jeff Walker, Executive Administrator

In April 2020, TNRIS entered into a joint funding agreement with the USGS to enhance the FDST project at a cost of $160,000. In August 2021, TNRIS extended the contract through August 31, 2023, at no additional cost.

KEY ISSUES

The requested amendment would extend the current contract through August 31, 2024, and would increase TWDB's funding support by $160,000, for a total commitment of $320,000. This increase in funding will facilitate the addition of critical functionality to the FDST, including:

- direct external access to data services outside the FDST through a catalog or datahub environment;
- new geospatial data hosting services to allow data to be published and maintained by data owners;
- new reservoir inundation sites; and
- road status map symbology based on real-time road conditions.

RECOMMENDATION

Authorize the Executive Administrator to approve a contract amendment with the USGS to extend the existing contract to August 31, 2024, and to increase TWDB funding by $160,000, for a total commitment of $320,000.

Attachments
    1: USGS Letter Regarding Joint Funding Agreement Modification No. 2
    2: USGS Joint Funding Agreement Modification No. 2

United States Department of the Interior

February 16, 2022

Mr. Richard Wade
Deputy Executive Administrator
Texas Water Development Board
PO BOX 13231
August, TX 78711-3231

Dear Mr. Wade:

Enclosed is one signed scan of Amendment 2 to amend our joint funding agreement for Phase 3 of the Flood Decision Support Tool project. The amendment adds $160,000 funding from your agency. The revised agreement total is $320,000 from your agency. The purpose of the amendment is to add funding to the project for Phase 3 and extend the agreement through August 31, 2024. Please sign and return one fully executed amendment to Kandis Becher at kkbecher@usgs.gov, no later than March 4, 2022.

This is a fixed cost agreement to be billed quarterly via automated Form DI-1040. Please allow 30-days from the end of the billing period for issuance of the bill. If you experience any problems with your invoice, please contact Kandis Becher by email at kkbecher@usgs.gov.

The results of all work performed under this agreement will be available for publication by the U.S. Geological Survey. We look forward to continuing this and future cooperative efforts in these mutually beneficial water resources investigations.

Sincerely,

Timothy H. Raines

Timothy H. Raines
Director

Enclosure
20SJJFATX002020 Amendment 2

20SJJFATX002020
Customer: 6000000481
TIN: 74-60000085
Amendment No. 2

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
AMENDMENT OF JOINT FUNDING AGREEMENT
FOR
WATER RESOURCES INVESTIGATIONS

Fixed Cost Agreement
Yes [X] **No** [   ]

This amendment is for the agreement dated   May 1, 2020   .

1. The parties hereto agree that subject to the availability of appropriations and in accordance
with their respective authorities there shall be maintained in cooperation with the Oklahoma Texas Water
Science Center for Phase 3 of the Flood Decision Support Tool project,

herein called the program.

2. Paragraph 2a of the agreement is hereby _____ increased/ _____ decreased by $ *NO CHANGE*
to read as follows:

   (a) $ 0   by the party of the first part during the period
          May 1, 2020   to   August 31, 2024   .

   Paragraph 2b of the agreement is hereby   X   increased/ _____ decreased by $ *160,000*

   (b) $ 320,000   by the party of the second part during the period
          May 1, 2020   to   August 31, 2024   .

Billing for this agreement will be rendered   **quarterly**   . Payments of bills are due
within 60 days after billing date. If not paid by the due date, interest will be charged at the current
Treasury rate for each 30-day period, or portion thereof, that the payment is delayed beyond the
due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983.)

UNITED STATES		**Texas Water Development Board**
DEPARTMENT OF THE INTERIOR		
U.S. GEOLOGICAL SURVEY		

by   TIMOTHY RAINES
Digitally signed by TIMOTHY RAINES
Date: 2022.02.16 14:47:14 -06'00'
_____
(Signature)

by _____
(Signature)

Timothy H. Raines
(Name)

_____
(Name)

Director
(Title)

_____
(Title)

Date _____

Date _____

Flood Decision Support Toolbox

Phase 3 Scope of Work

Submitted To: Texas Water Development Board

Prepared By: Oklahoma-Texas Water Science Center
   U.S. Geological Survey

Version Date: January 3, 2022

Background

Digital geospatial flood inundation mapping can be a powerful tool for flood risk management. Flood preparedness, communication, warning, response and mitigation can be enhanced by flood inundation mapping that shows floodwater extent and depth over the land surface. Flood inundation maps that accurately reflect observed and forecasted hydrodynamic conditions enable officials to make timely operational and public safety decisions before and during flood events. Real-time inundation maps, based on US Geologic Survey (USGS) real-time streamgage observations, National Weather Service (NWS) forecasts and US Army Corp of Engineers (USACE) flood operations, can significantly enhance a community's flood warning and response operations and systems. These maps enable local officials to make more informed flood risk management decisions and enhance the communication of these decisions to the public – reducing loss of life and property. In addition, flood inundation maps and scenario analysis can inform all parties of the potential risk associated with various flood management options, prior to an actual flood event.

In collaboration, the Interagency Flood Risk Management (InFRM) team has developed the framework for an interactive on-line flood inundation tool to support peace-time planning and real-time response efforts through the centralization of forecast/predictive flood inundation maps built from pre-positioned flood libraries.
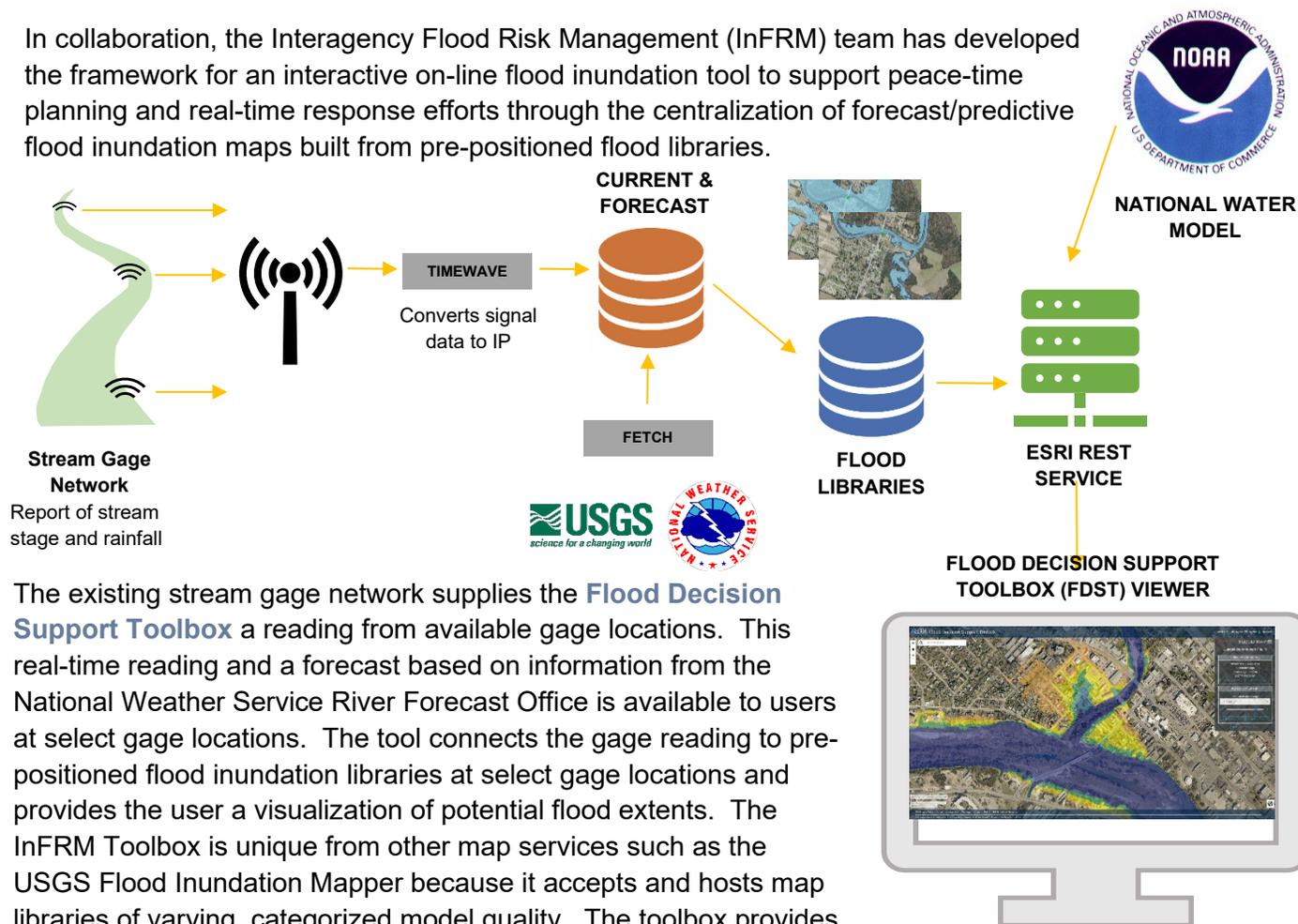
The existing stream gage network supplies the **Flood Decision Support Toolbox** a reading from available gage locations. This real-time reading and a forecast based on information from the National Weather Service River Forecast Office is available to users at select gage locations. The tool connects the gage reading to pre-positioned flood inundation libraries at select gage locations and provides the user a visualization of potential flood extents. The InFRM Toolbox is unique from other map services such as the USGS Flood Inundation Mapper because it accepts and hosts map libraries of varying, categorized model quality. The toolbox provides the best available information in a given area, which ranges from engineering scale models to base-level engineering scale models to NOAA river forecasts.

More importantly, the Toolbox provides Emergency Management and Response teams and staff to review gage readings of various severity within the vicinity of available stream gages. Users will be able to visualize flood events between minor and major flood heights, a slider bar at the right-hand side of the screen allows users to review estimated flood extents and estimated flood depths at various locations, providing data for community technical staff, emergency management, and first responders with this scenario data ahead of flood events. Allowing communities to review the available resources and the possible flooding extents that could be seen along streams throughout the Region.

Currently, the national streamgage network is made up of approximately 3,600 locations, these streamgage locations act as data points for the River Forecast Centers to provide weather warnings and watches for flood and flash flood events. The National Water Model (NWM), produced by the National Water Center provides streamflow information for 2.7 million river reaches and 1km and 250m grids. The NWM provides complementary hydrologic guidance at current National Weather Service (NWS) river forecast locations and significantly expands guidance coverage and type in underserved locations.

The NWS uses forecast models to estimate the quantity and timing of water flowing through selected stream reaches in the United States. These forecast models:
- Estimate the amount of runoff generated by precipitation and snowmelt,
- Simulate the movement of floodwater as it proceeds downstream, and
- Predict the flow and stage (water-surface elevation) for the stream at a given location (AHPS forecast point) throughout the forecast period (every 6 hours and 3 to 5 days out in many locations).

For more information on AHPS forecasts, please see: [https://water.weather.gov/ahps/pcpn and river forecasting.pdf](https://water.weather.gov/ahps/pcpn)

The InFRM Flood Decision Support Toolbox currently provides micro level and macro level information for limited gage locations throughout FEMA Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). Micro level flood information, built from engineering hydraulic models, will allow users to review estimated flood locations and flood depths near streamgage locations supported by pre-positioned flood libraries. Users are able to download the micro level flood libraries for local analysis and planning efforts.

Flood-inundation maps (FIMs) show inundation extent, and inundation depth, for a wide range of stream flows and are distinguished from Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps in that they show inundation extent for specified water stages at an existing streamgage rather than annual exceedance probability flood flows. The Base Level Engineering models, however, can be leveraged to build out flood inundation libraries at streamgages where available.

The InFRM team will work with local, regional, State and Federal partners to increase the coverage and availability of these tools and resources. Partners may identify and prioritize additional interest areas for inclusion in the Flood Decision Support Toolbox. In order to produce micro level flood inundation library, the location of interest should:

- Have a USGS streamgage on the stream of interest
- Have a River Forecast Center forecast point
- Have an available engineering model meeting either Base Level Engineering or IWRSS model standards

The Flood Decision Support Toolbox allows users to interact with the various weather forecast and datasets prepared and released by NOAA and the NWS, to include:

Warnings and Watch Locations

Radar (Static or 1 hour loop)
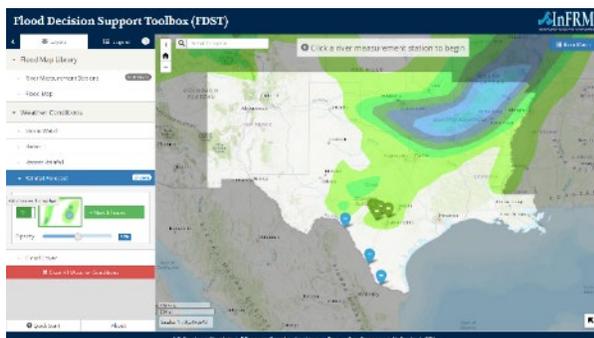
Forecasted Rainfall
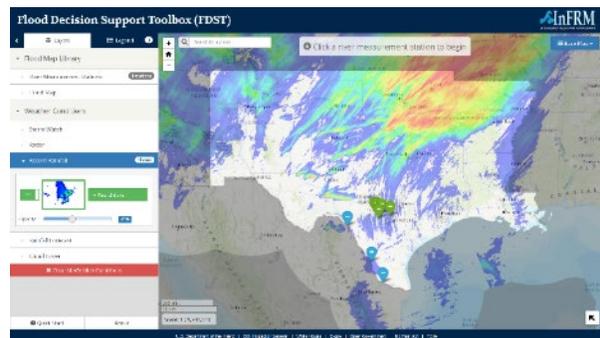
Rainfall Totals (1 hour, 1, 2, 3 days)

Scope and Objective

Phase 1 – complete

1. Develop ability for user to select view upon entering the FDST using a dropdown where the user can choose to view by region or state. Once Texas is selected the InFRM and TWDB collaboration will be introduced and TWDB logo will be displayed in the banner next to the InFRM logo.
2. Ability for user to save map status.
3. USGS will pull data from TNRIS to display building footprint. The data will continue to be maintained by TNRIS. Buildings symbology will be displayed by percent of damage.
4. A joint press release between InFRM and TWDB.

Phase 2 – complete

1. Create dashboard to display damage data depending on flood depth scenario. Initially this will be displayed for each library area, with potential to change selected area in Phase 3. The dashboard will include damage curve which will calculate the damage of the buildings at different flood scenarios. This data will be pulled from TNRIS database.
2. A PDF Report of flood and damage scenario will be able to be pulled from the dashboard.
3. Drive Texas layers were added to show status of roads based on current conditions.
4. Develop a layer to show reservoir status (similar to 'lake conditions' in TNRIS viewer: https://map.texasflood.org/#/)

Phase 3 – 2022 to 2023

1. Add a tool that would provide a catalog of optional data layers to be added from map services to allow additional geospatial data to be displayed on the FDST viewer.
2. Work with TWDB to develop geospatial data sets and hosting services. Datasets will be hosted and updated first by the owner of the dataset and then by TWDB for consistency.
3. Work with the InFRM group to potentially add reservoir inundation sites.
4. Work with the InFRM group to potentially add road status based on scenario and current conditions.

Although not included in this budget, the plan is to include additional webservices, build out of libraries across the state, and adding additional gage networks. These phases will evolve as additional needs are determined and new datasets come online.

Budget

Phase 3 – 2022-23

	Total
FDST Additional Features	$140,000
Operation and Maintenance ($10k/year)	$20,000
	$160,000

*There will be continued O&M cost

*Annual O&M will vary depending on the amount of data added and requested upgrades