

EXHIBIT A

SCOPE OF WORK

Grantee: Chesapeake Environmental Communications

Grant #: 440-S-14-01

General Description:

CEC Tasks:

Over a 27-month period, CEC shall execute the following tasks:

Task 1 - Data Inventory and Analysis – Data inventory and analyses will build upon that collected and analyzed for Task 2 of the project (Modeling Support for the James River Chlorophyll Study) with the exception of the high frequency data flow data.

- Incorporate and reprocesses 2011-2013 weather and climate data - Incorporate updated study time period rainfall and climate data into existing weather file times series. Reprocess updated rainfall time series data with PRISM gridded data to represent increased spatial resolution throughout the watershed.
- Incorporate additional Management, BMP, and farming information as needed.
- Process 2011-2013 point source, water quality and flow data.
- Tidal/Non-tidal 2011-2013 Water Quality and Plankton data analysis.
- Analysis of 2011-2013 high frequency Data-flow data - The James River Chlorophyll Project monitoring component collected a large amount of DATA flow data and fixed station high frequency data. Before these data can be used, a suitable method needs to be developed to convert the relatively patchy DATA flow data to a format that is compatible with the temporal and spatial resolution of the model.

Task 2 - Model Boundary Conditions and Calibration

- Refine hydrologic and water quality calibration as needed - Conduct model verification for the VIMS water quality model using the data set collected from 2011-2013. Analyze high frequency model results and identify any problems. As the DATA flow data is different from traditional data sets, different statistical methods will be investigated to find a suitable approach to conduct the model calibration.
- Update Hydrodynamic model simulation and provide transport fields to the water quality model.
- Update boundary conditions (2011-13).

Task 3 - Task 2 Report Addendum and Communication with the Science Advisory Panel (SAP)

- Based on the findings of the 2011-2013 data analyses, an addendum will be added to the “Task 2 – Empirical Data Analysis Report”.
- Communicate findings to the SAP.

Task 4 - Additional Scenario Runs

- One additional Spring criterion.
- One additional Summer criterion.
- A different reference Cumulative Frequency Distribution (CFD) curve for each of the 2 Spring and 2 Summer criteria (existing and alternative).

Cost Estimate:

- Task 1 – 30% of total effort; \$75,000
- Task 2 – 30% of total effort; \$75,000
- Task 3 – 15% of total effort; \$37,500
- Task 4 - 25% of total effort; \$62,500

Benefits:

This additional work is being requested by the Virginia Department of Environmental Quality, with support from the Virginia Association of Municipal Wastewater Agencies. The models presently under development for re-evaluation of chlorophyll-*a* criteria in the James River estuary are planned to be calibrated to temporal spans within the 1991-2000 and 2007-2009 periods. However, some of the most valuable, highest-resolution data collected for the James River study are being collected in the 2011-2013 period. The 2011-2013 monitoring efforts have been a core component of the James River Study and were conducted at a significant expense. Omission of these data from the model represents a disconnect between the monitoring and modeling components of the study. Conversely, inclusion of the 2011-2013 data could significantly enhance confidence in the new modeling framework, especially the new model being developed to simulate harmful algal blooms (HABs).

Deliverables and Schedule:

CEC will deliver, over a 27-month period:

1. Addendum to the “Task 2 – **September 2014** - Empirical Data Analysis Report” detailing the findings of incorporating 2011-2013 data into the analyses.
2. Additional Scenarios and CFD Curves – **December 2015**
 - One additional Spring criterion.
 - One additional Summer criterion.
 - A different reference CFD curve for each of the 2 Spring and 2 Summer criteria (existing and alternative).

Quarterly Reports – **December 2013, March 2014, June 2014, September 2014, December 2014, March 2015, June 2015, September 2015, December 2015.**