TETRA TECH

MEMO

To:	Emily Trentacoste (USEPA) Andy Fitch, John Wolf (Chesapeake Bay Trust)
From:	Sam Sarkar (Tetra Tech)
Date:	December 20, 2020
Subject:	Integrating Monitoring, Modeling and Trends Analyses to Inform Management Decisions

1.0 Introduction

Pursuant to tasks 2 and 3 of the Scope of Work (SOW), this memorandum describes the online application architecture developed using ArcGIS Online and associated geospatial data and sources. An instructional video depicting the functionality of the web-based application is also provided.

2.0 Program Architecture and Data Sources

The application is built using off-the-shelf ArcGIS Online products. The user-facing application is an ESRI StoryMap titled “Chesapeake Bay Data Explorer”. The StoryMap incorporates two WebApps - webapp-watersheds and webapp-political that form the two tabs “Explore by Watershed Boundary” and “Explore by Political Boundary”, respectively, in the StoryMap. Each WebApp enables a user to interact with several feature and tile layers including visualization as maps, summarizing data using charts, download of spatial data by watershed (HUC8 and land river segment), county and state boundaries.

he data sources used in the development of the StoryMap and WebApps are summarized in Table 1 below. The data were provided to Tt by the Chesapeake Bay Trust.

Table 1. Data used in the development of the ArcGIS online applications

ArcGIS Online Layer Name	ArcGIS Online Layer Type	Source File Name	Source File Type	Description
Major River Basins	Feature Layer	basins.zip	Shapefile	Map of major river basins
Watershed Boundary • HUC8 Watershed • Land River Segment	Feature Layer	watersheds.zip	File Geodatabase	Map of watersheds and tributaries
Attainment Deficit	Feature Layer	attainment_deficit.zip	File Geodatabase	Water quality standards criteria attainment status

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ArcGIS Online Layer Name	ArcGIS Online Layer Type	Source File Name	Source File Type	Description
Non-Tidal Network Watersheds	Feature Layer	non-tidal_watersheds.zip	Shapefile	Map of non-tidal network watersheds
Non-Tidal Water Quality Monitoring Stations	Feature Layer	NTID.zip	File Geodatabase	Map of non-tidal network water quality trends
Non-Tidal Water Quality Monitoring Total Suspended Solids Trend	Feature Layer	NTID.zip	File Geodatabase	Graph of total suspended solid flux at each monitoring location
Non-Tidal Water Quality Monitoring Nitrite plus Nitrate Trend	Feature Layer	NTID.zip	File Geodatabase	Graph of nitrite plus nitrate flux at each monitoring location
Non-Tidal Water Quality Monitoring Total Nitrogen Trend	Feature Layer	NTID.zip	File Geodatabase	Graph of total nitrogen flux at each monitoring location
Non-Tidal Water Quality Monitoring Orthophosphate Trend	Feature Layer	NTID.zip	File Geodatabase	Graph of orthophosphate flux at each monitoring location
Non-Tidal Water Quality Monitoring Total Phosphorus Trend	Feature Layer	NTID.zip	File Geodatabase	Graph of total phosphorus flux at each monitoring location
CB Watershed Model Loads by Land River Segment	Feature Layer	lrseg_loads.zip	File Geodatabase	Graphs of 2017 edge-of-stream and edge-of-bay total suspended solids, total nitrogen and total phosphorus loads by major and minor landuse categories by land river segments

ArcGIS Online Layer Name	ArcGIS Online Layer Type	Source File Name	Source File Type	Description
CB Watershed Model Loads by HUC8 Watershed	Feature Layer	huc8_loads.zip	File Geodatabase	Graphs of 2017 edge-of-stream and edge-of-bay total suspended solids, total nitrogen and total phosphorus loads by major and minor landuse categories by HUC8 watersheds
CB Watershed Model Loads by County	Feature Layer	county_loads.zip	File Geodatabase	Graphs of 2017 edge-of-stream and edge-of-bay total suspended solids, total nitrogen and total phosphorus loads by major and minor landuse categories by county boundaries
CB Watershed Model Loads by State	Feature Layer	state_loads.zip	File Geodatabase	Graphs of 2017 edge-of-stream and edge-of-bay total suspended solids, total nitrogen and total phosphorus loads by major and minor landuse categories by state boundaries
CB Watershed Model Loads	Feature Layer	CAST.zip	File Geodatabase	Map of 2017 edge-of-stream and edge-of-bay total suspended sediment, total nitrogen and total phosphorus loads
USGS SPARROW Model Nitrogen Loads Delivered to Local Streams	Feature Layer and Tile Layer	SPARROW_TN.zip	File Geodatabase	Map of USGS SPARROW edge-of-stream total nitrogen load
USGS SPARROW Model Phosphorus Loads Delivered to Local Streams	Feature Layer and Tile Layer	SPARROW_TP.zip	File Geodatabase	Map of USGS SPARROW edge-of-stream total phosphorus load
Estimated Groundwater Nitrogen Yield to Streams	Feature Layer and Tile Layer	10_GW_nitrate.zip	File Geodatabase	Map of groundwater nitrogen load yield to streams by HUC12 watersheds and NHD catchments

ArcGIS Online Layer Name	ArcGIS Online Layer Type	Source File Name	Source File Type	Description
Estimated Soil Phosphorus Content on Agricultural Land (ppm)	Feature Layer and Tile Layer	12_Soil_P.zip	File Geodatabase	Map of soil phosphorus content on agricultural land
Wastewater Treatment Plants	Feature Layer	13_WWTP.zip	File Geodatabase	• Map of location of wastewater treatment plants • Graph of edge-of-stream and delivered-to-bay total suspended solid, total nitrogen and total phosphorus loads for each wastewater treatment plant
Animal Production	Feature Layer	animal_production_by_county.zip	Shapefile	• Map of animal numbers by county • Graph of animal numbers by type and county
Nitrogen Application	Feature Layer	nutrient_application.zip	Shapefile	• Map of nitrogen application by county • Graph of nitrogen application by fertilizer type and county
Phosphorus Application	Feature Layer	nutrient_application.zip	Shapefile	• Map of phosphorus application by county • Graph of phosphorus application by fertilizer type and county
Management Practice Implementation • Agriculture • Developed • Natural • Septic	Feature Layer	bmp_summary.zip	File Geodatabase	• Map of management practice implementation by landuse and county • Graph of management practice application by BMP type, landuse and county
CSO	Feature Layer and Tile Layer	CSO.zip	Shapefile	Map of sewer service areas

ArcGIS Online Layer Name	ArcGIS Online Layer Type	Source File Name	Source File Type	Description
MS4 areas	Feature Layer and Tile Layer	MS4.zip	Shapefile	Map of MS4 areas
Vulnerable Geology (Carbonate & Coarse Costal Plain)	Feature Layer and Tile Layer	vulnerable_geology.zip	Shapefile	Map of vulnerable groundwater areas based on geology
Estimated Median Groundwater Age (years)	Feature Layer and Tile Layer	8_GW_age.zip	File Geodatabase	Map of median groundwater age

3.0 Case Studies

Two instructional videos/case studies are provided as mp4 videos.

1. Explore by Watershed Boundary – Explore_by_Watershed_Boundary.mp4
2. Explore by Political Boundary – Explore_by_Political_Boundary.mp4