



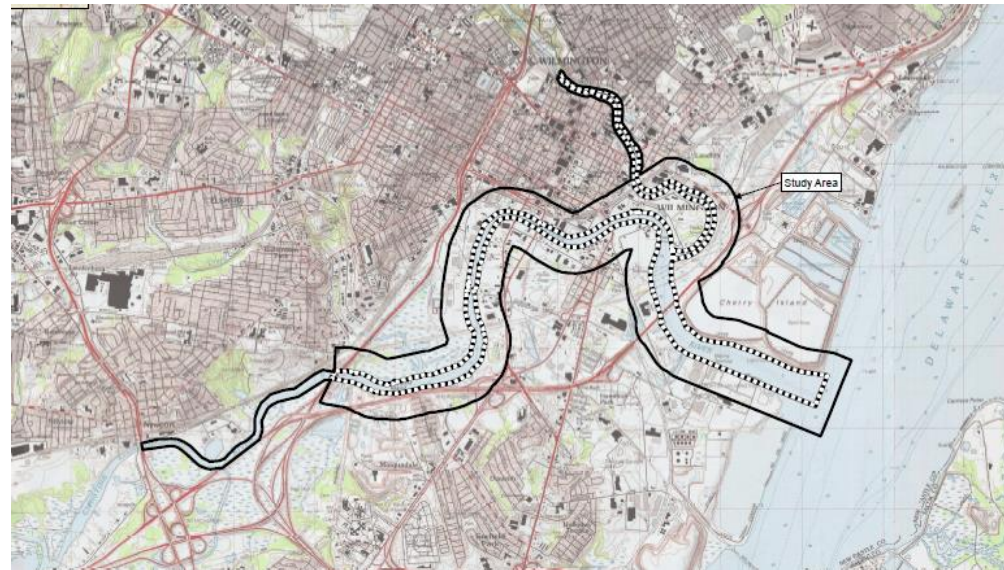
# Addressing Contaminants: Sediment Remediation Feasibility Study For the Christina & Brandywine Rivers



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# Overview

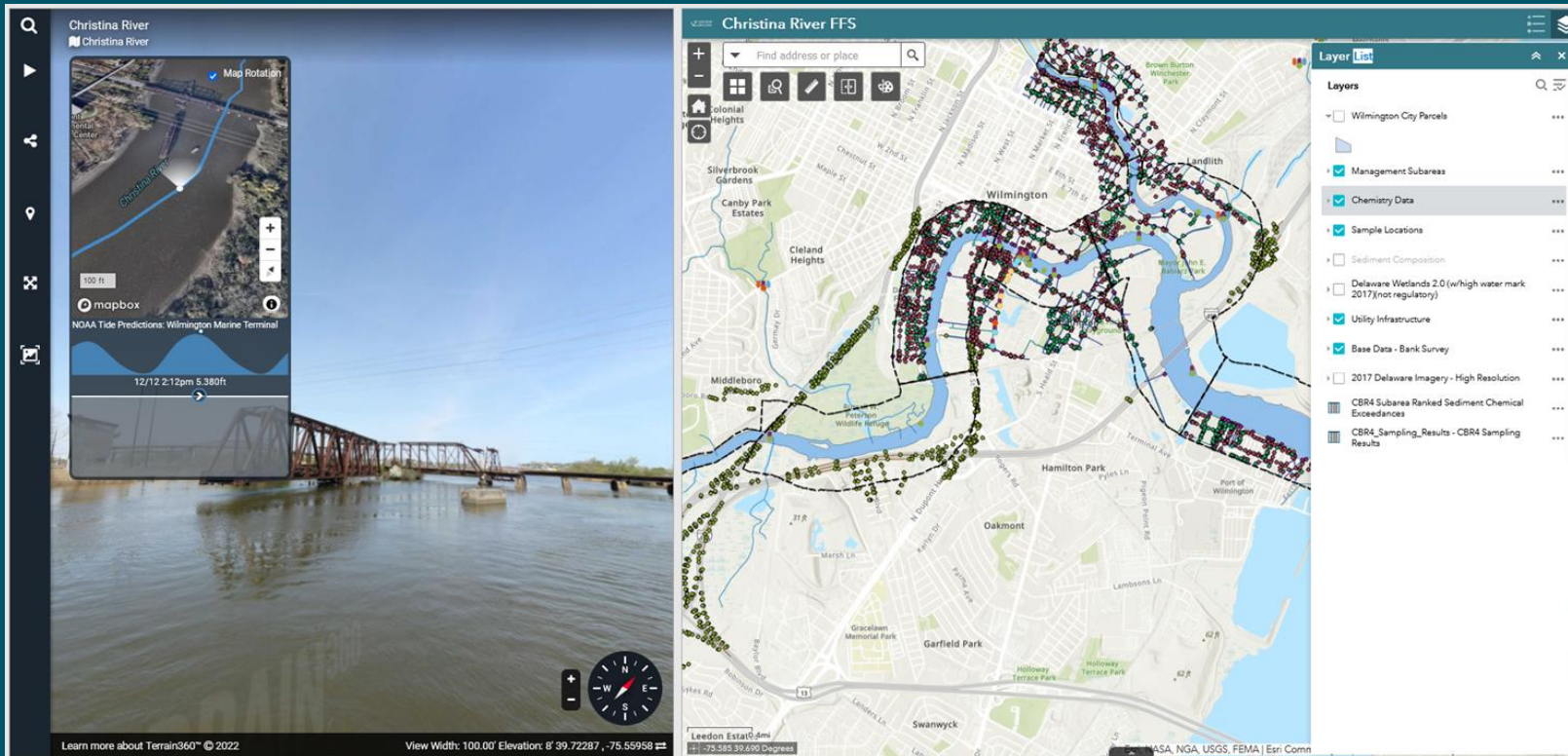
- 1 Data Compilation and Evaluation
- 2 Conceptual Site Model
- 3 Risk Screening
- 4 Data Gap Studies & Next Steps





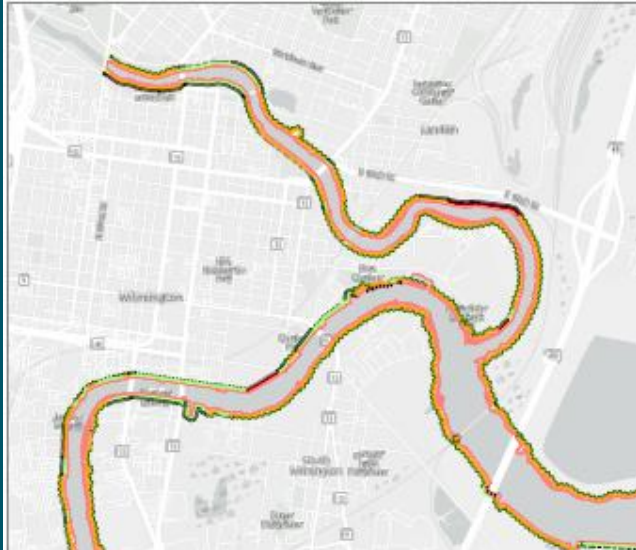
# 1

# Data Compilation & Preliminary Evaluation

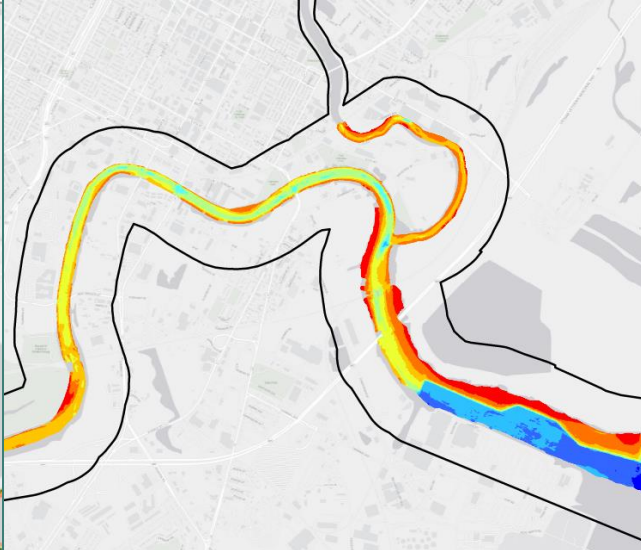


- Physical and chemical data compiled in enterprise-class EarthSoft EQiS data management system.
- Geodatabase of spatial information developed in Esri ArcGIS





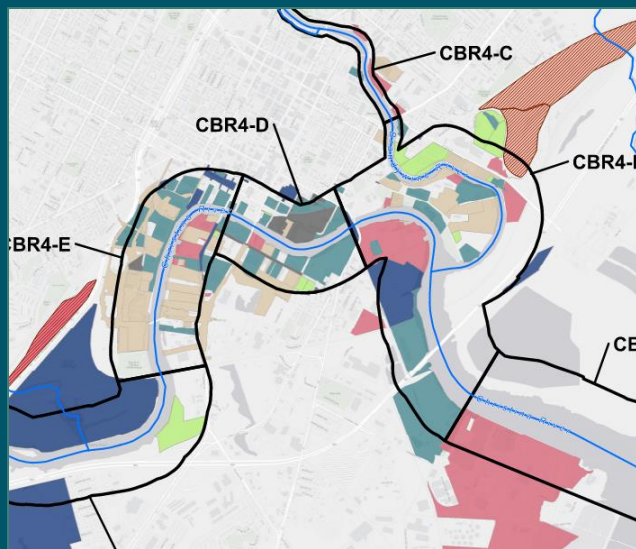
**Bank Conditions**



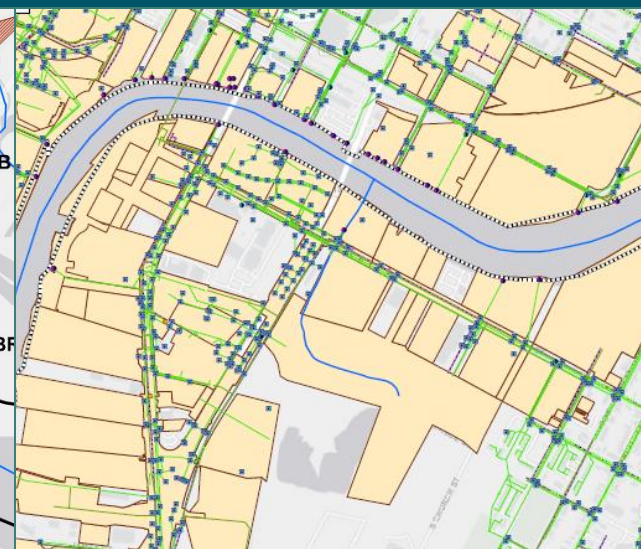
**Bathymetry**



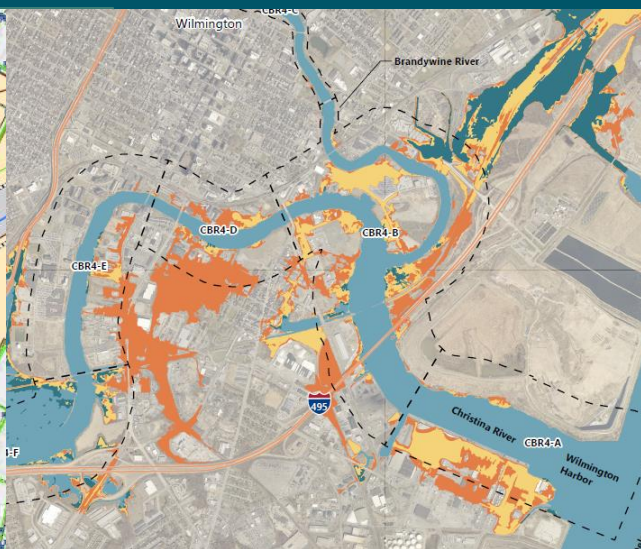
**Land Use/Cover**



**HSCA Site Status**



**Utilities & Outfalls**

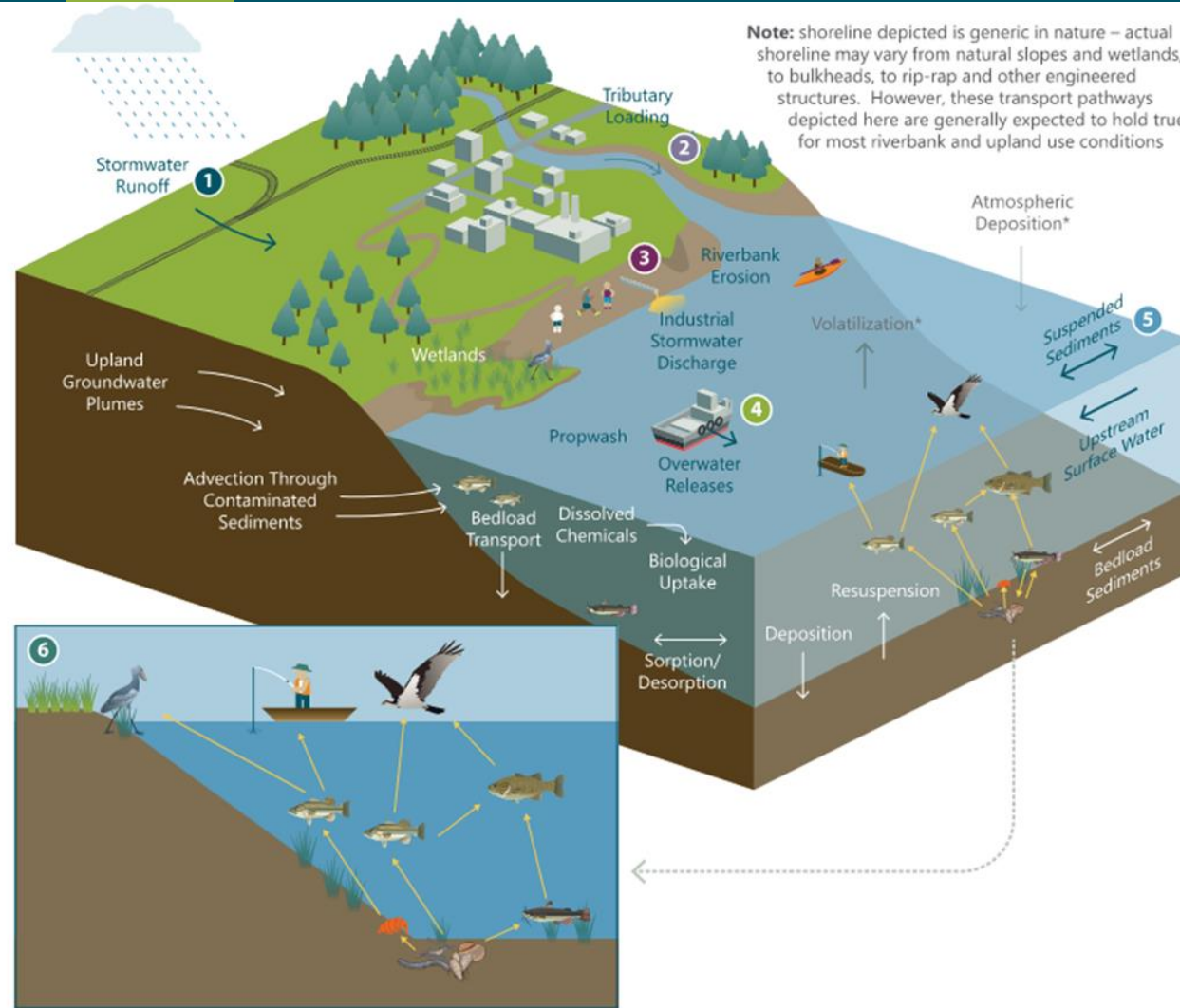


**Coastal Inundation**



# 2

# Conceptual Site Model

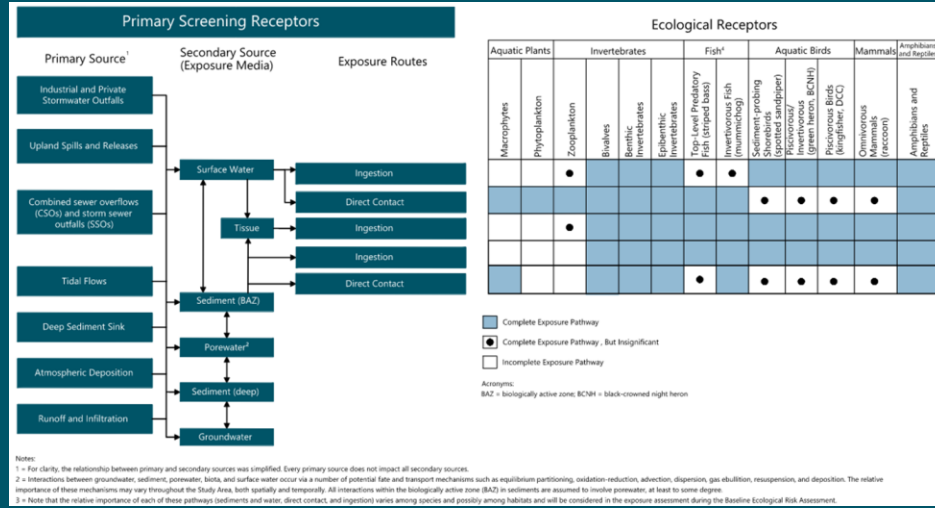


- 1 Stormwater Runoff:** During storm events, stormwater may transport upland contaminants to River through stormwater runoff. Contaminants may originate from agricultural areas, industrial sites, or roadways.
- 2 Tributary Loading:** Contaminants potentially present in tributaries may be deposited in River via typical flow conditions. Contaminants may originate from sources such as stormwater runoff (See Note 1) and/or industrial stormwater discharges to the tributaries (See Note 3). Loading may be increased during storm events.
- 3 Industrial Stormwater Discharge:** Discharge of contaminants from industrial facilities includes both active and historic discharges. This loading may include currently permitted discharges.
- 4 Overwater Release:** Includes both intentional and accidental release of contaminants from marine vessels on the River. Typical releases may include petroleum products, refuse, or sewage.
- 5 Suspended Sediments:** Contaminated sediment in the River become suspended in the water column as a result of typical tidal conditions, propeller agitation from vessels, or storm events. Suspended sediment particles are then redeposited at different locations in the River system.
- 6 Biologic Processes:** Contaminated sediment is ingested by benthic organisms, which in turn are ingested by fish or bird species. The fish or birds are then ingested by larger fish, birds, or humans which transports the contaminants throughout the food chain.

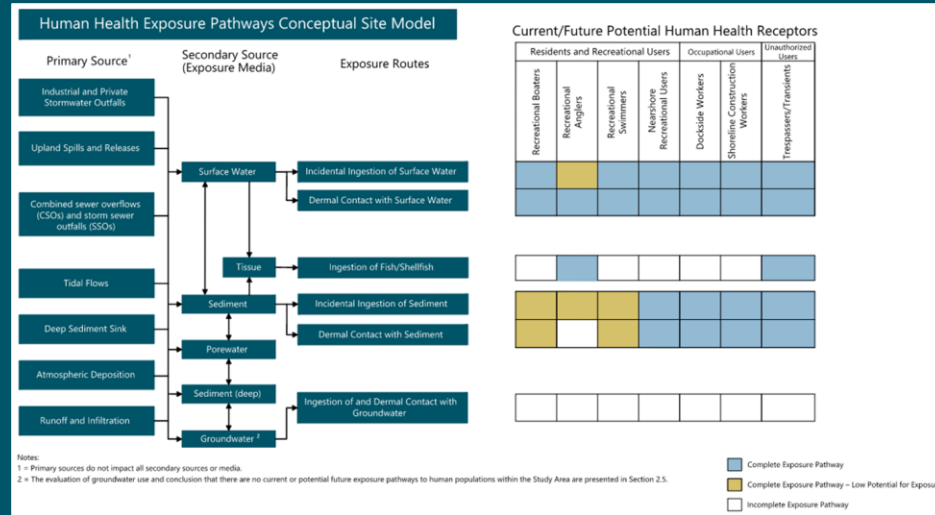
\*De minimis contribution to Christina River system

# 3

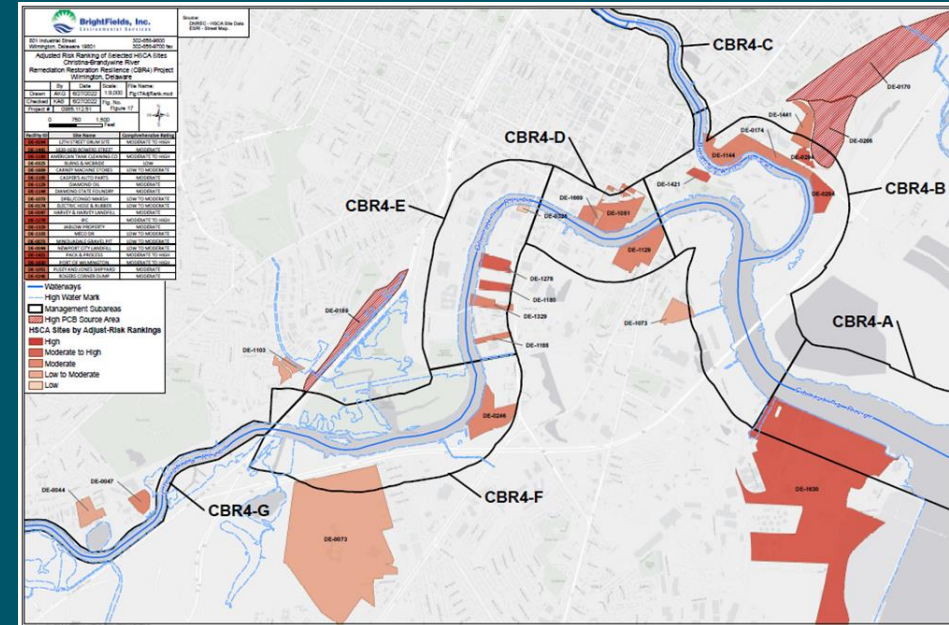
# Risk Screening



Notes:  
 1 = For clarity, the relationship between primary and secondary sources was simplified. Every primary source does not impact all secondary sources.  
 2 = Interactions between groundwater, sediment, porewater, tissue, and surface water occur via a number of potential fate and transport mechanisms, such as equilibrium partitioning, oxidation-reduction, adsorption, dispersion, gas ebullition, resuspension, and deposition. The relative importance of these mechanisms may vary throughout the Study Area, both spatially and temporally. All interactions within the biologically active zone (BAZ) in sediments are assumed to involve porewater, at least to some degree.  
 3 = Note that the relative importance of each of these pathways (landfills and water, direct contact, and ingestion) varies among species and possibly among habitats and will be considered in the exposure assessment during the Baseline Ecological Risk Assessment.



Notes:  
 1 = Primary sources do not impact all secondary sources or media.  
 2 = The evaluation of groundwater use and conclusion that there are no current or potential future exposure pathways to human populations within the Study Area are presented in Section 2.5.



# 4

## Data Gap Studies & Next Steps

- Data Gaps Studies
  - Continued Upland Source Evaluation
  - Sediment Sampling
  - Porewater, Surface Water, and Groundwater Evaluation
  - Fish Tissue Study
  - Drone Survey and Field Assessment of Bank Conditions
  - Bathymetric and Debris Survey
  - Development of Hydrodynamic Model
- Coordination for Overall CBR4
  - Sediment at CBR4 Proposed Project Sites
    - Existing data – date/source
    - Known contamination profile (if applicable)
    - Planned data collection
    - Potential impacts on conceptual restoration approach
  - Changes in Policy/Regulation
    - Emerging Contaminants
    - Policy changes/initiatives
    - Modifications/updates to relevant regulations



Thank You

