

The AECOM logo is displayed in a bold, white, sans-serif font against a dark blue background.

Imagine it.
Delivered.

The DUPONT logo features the word "DUPONT" in a red, serif font, enclosed within a red oval border.The ANCHOR QEA logo consists of a green anchor icon to the left of the text "ANCHOR QEA" in a green, serif font, with three wavy lines below "QEA" representing water.The Battelle logo is written in a white, serif font.

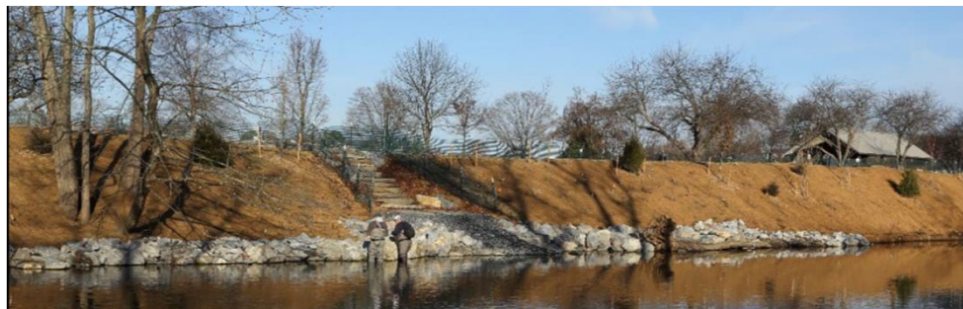
Tenth International Conference on Remediation and
Management of Contaminated Sediments
February 11-14, 2019 | New Orleans, Louisiana

Development of a Custom Carbon Amendment Strategy using Biochar for a Mercury-contaminated River

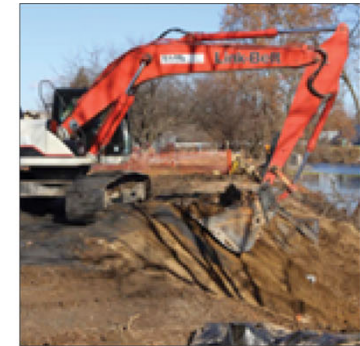
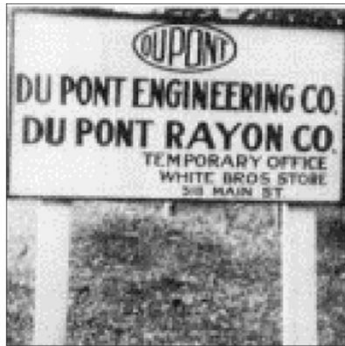
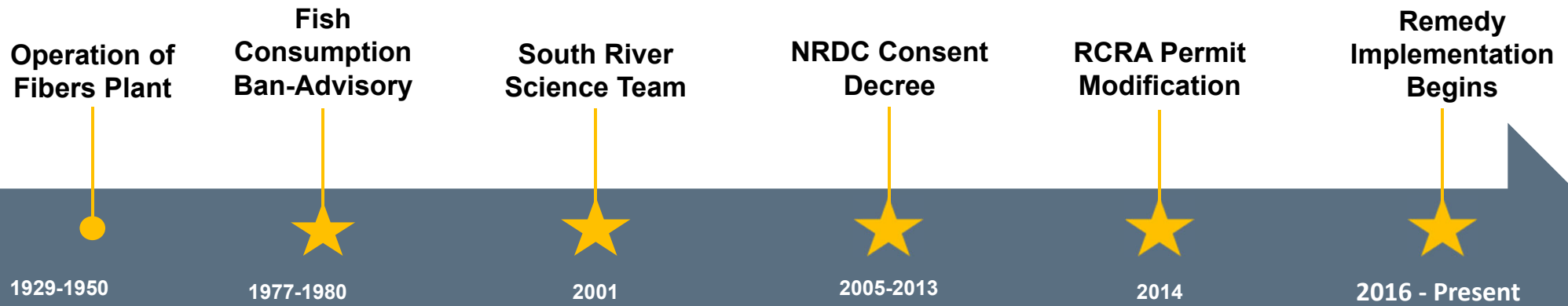
Cameron Dixon, PE

Outline

- Background
- Conceptual Site Model
- What is Biochar
- Why Biochar
- Implementation
- Challenges
- Results

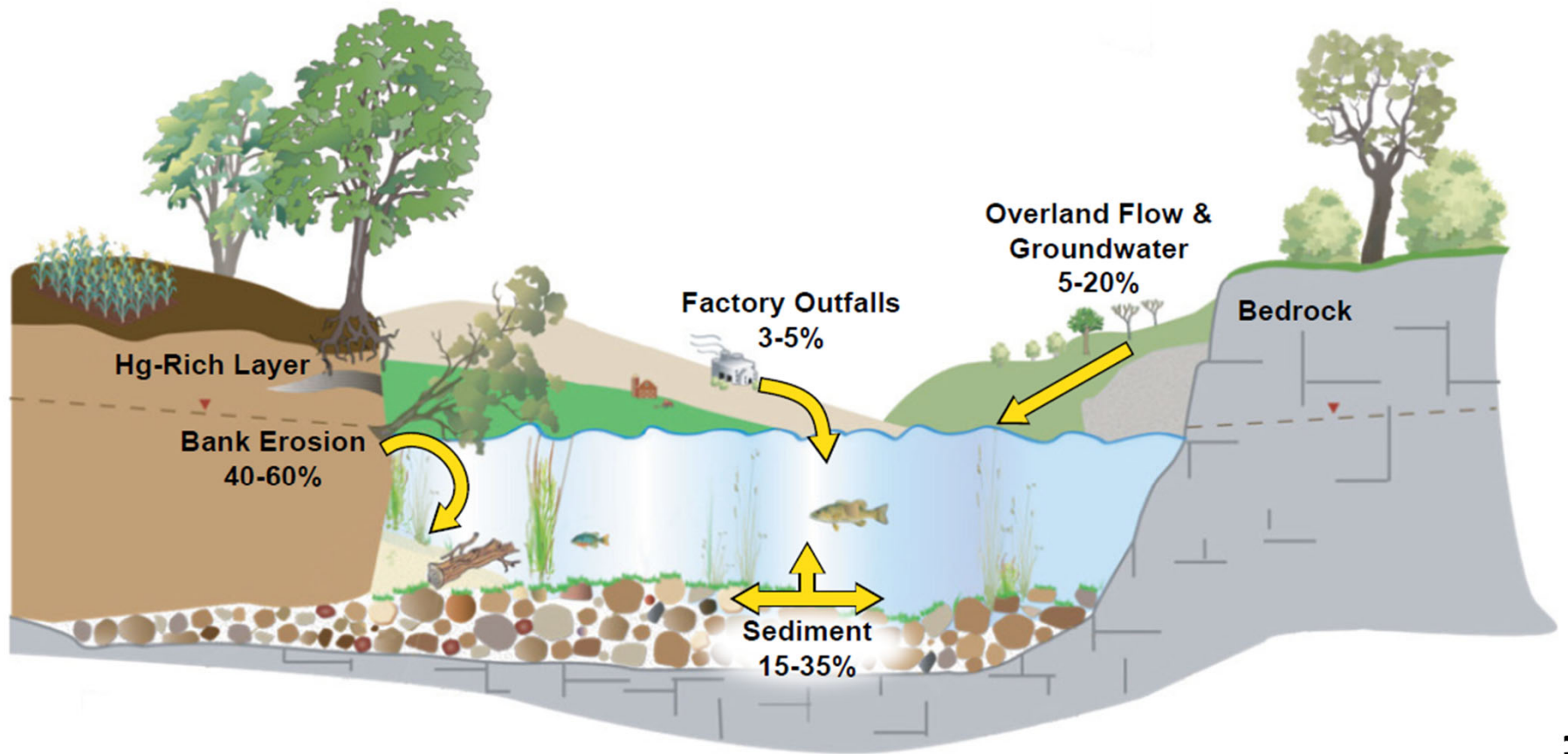


Background - Timeline

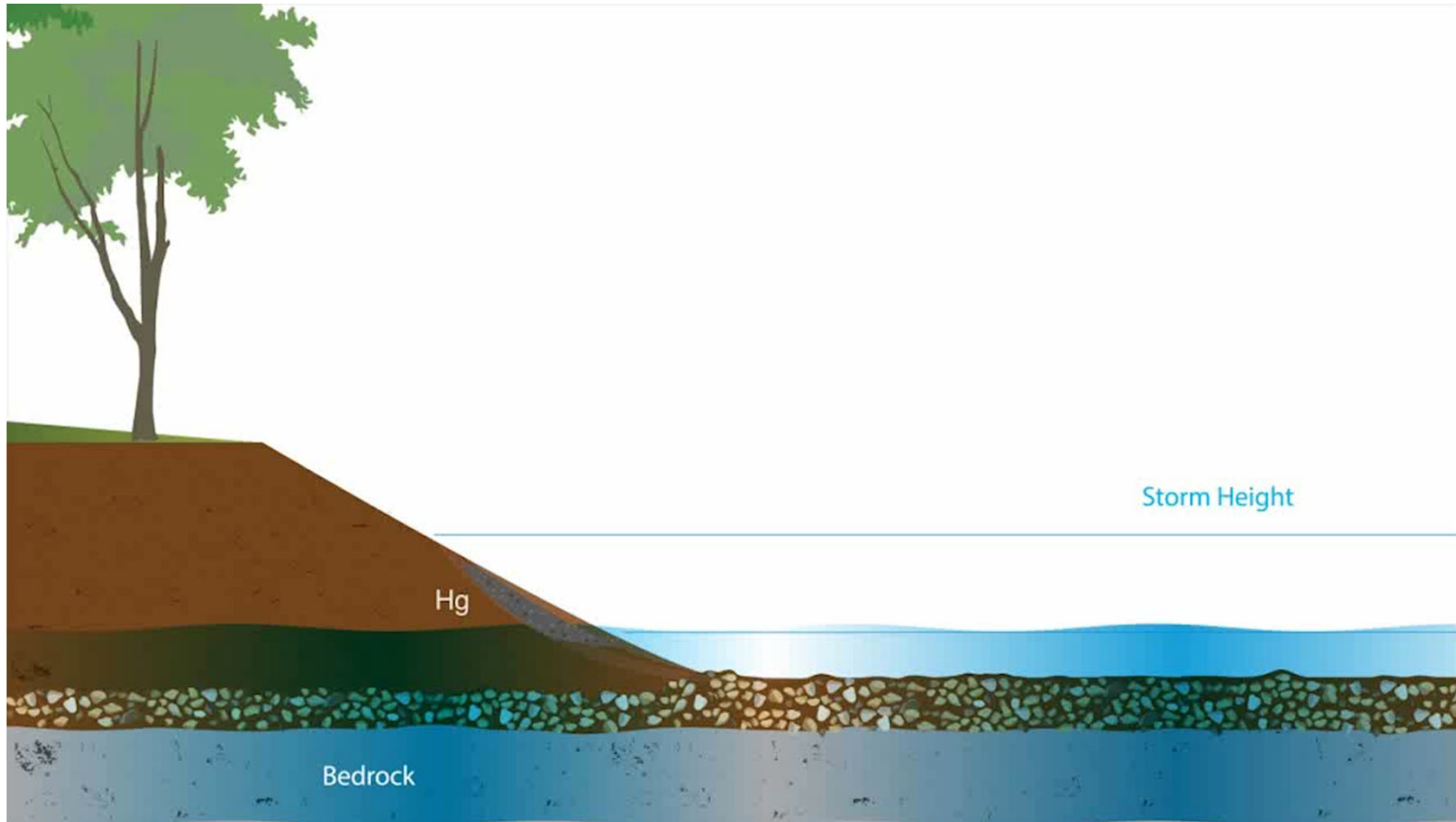


Conceptual Site Model

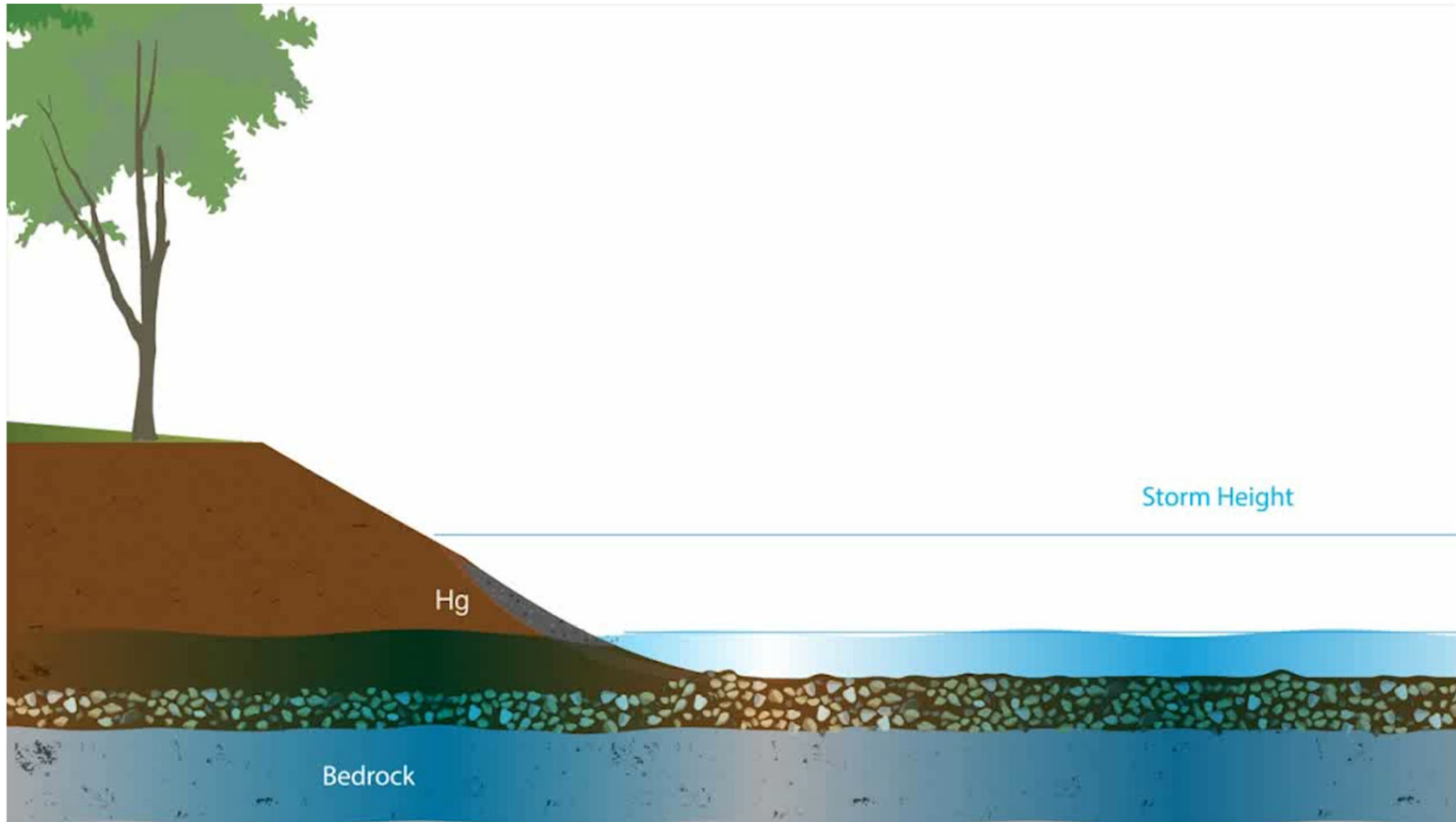
South River: CONCEPTUAL SITE MODEL SCHEMATIC



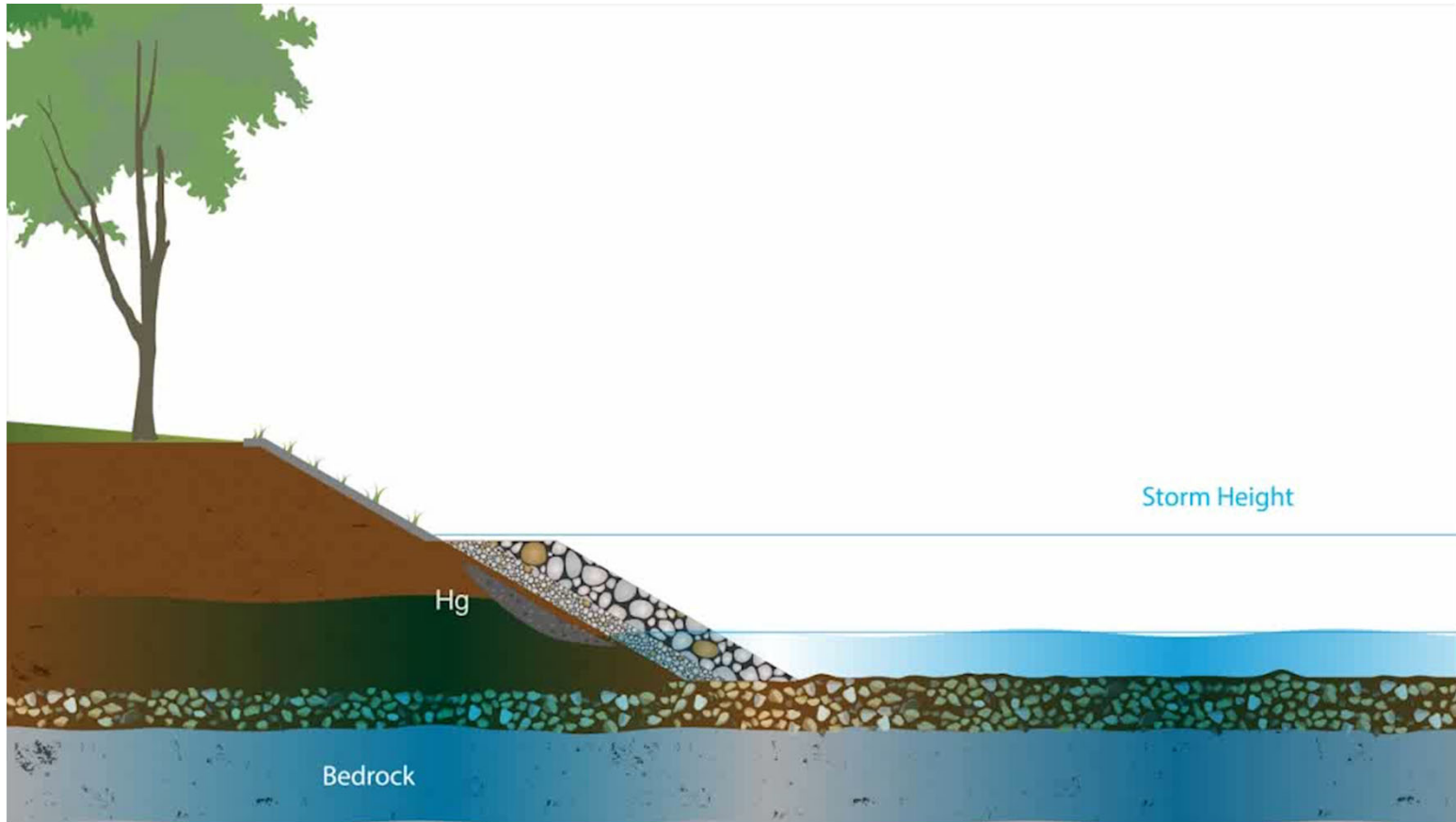
Conceptual Site Model – Storm Event



Conceptual Site Model – Storm Event with Cap



Conceptual Site Model – Storm Event with Amended Cap



Evaluation of BioChar as Remedial Option

Technology Evaluation

- BioChar
- Activated Carbon
- Thiol SAMMS
- Polymeric Adsorption Resins

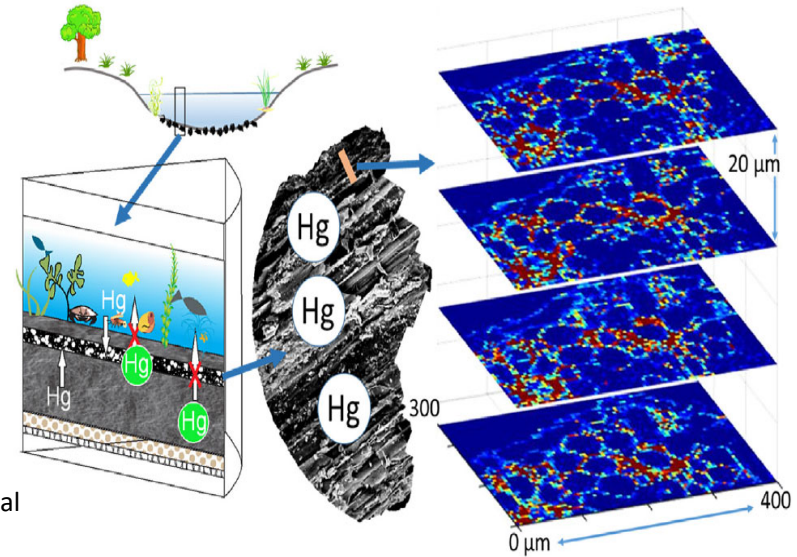
Laboratory Evaluation

- Column Studies
- Leachability Testing
- Ecological Impact

Field Pilots

- Ecological
- Pond
- Floodplain
- Surface Water

Remedy Implementation



P. Liu, C. J. Ptacek, D. W. Blowes, Y. Z. Finrock, R. A. Gordon (2017) Stabilization of mercury in sediment by using biochars under reducing conditions. *Journal of Hazardous Materials* 325:120-128

Laboratory Testing

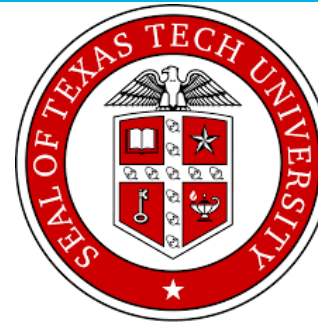


Dr. Robert Brent
Biochar
Treatment and
Bioaccumulation



**COLORADO STATE
UNIVERSITY**

Dr. William Clements
Biochar impacts on
Benthic
Macroinvertebrates



Dr. Danny Reible
Mercury Leaching from
Banks



Dr. Carol Ptacek
Biochar Treatment
Efficacy



Smithsonian Environmental
Research Center

Dr. Cynthia Gilmour
Partitioning to pore water and
bioaccumulation in aquatic
oligochaete

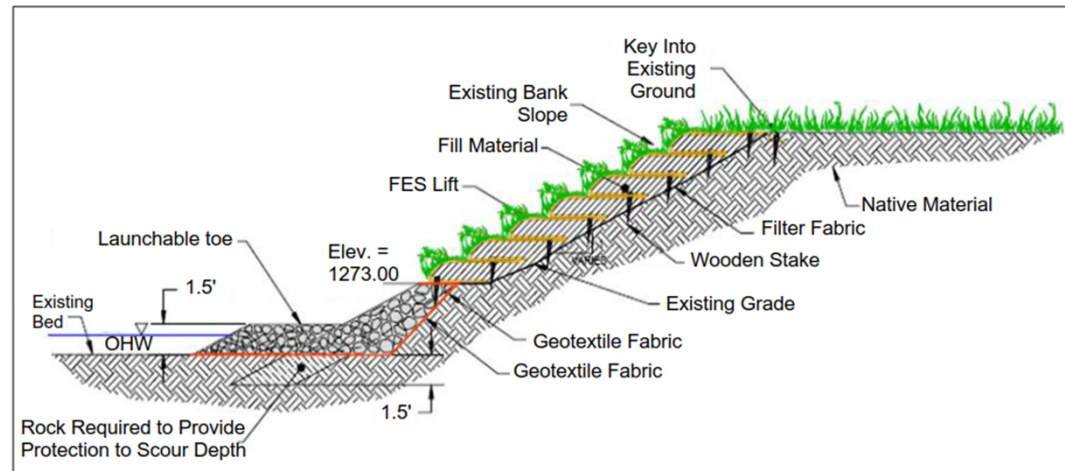
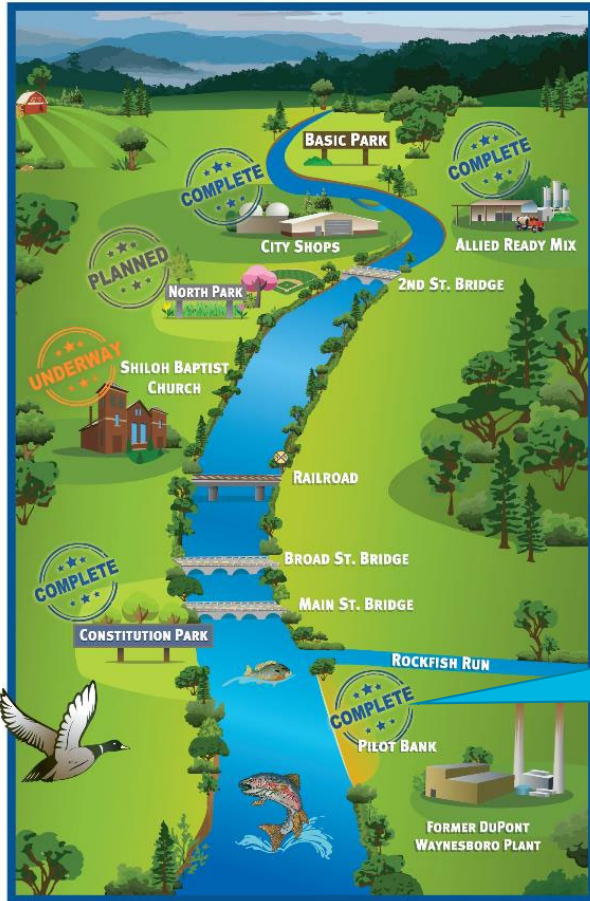
**WILLIAM
& MARY**

Dr. Michael Newman
Efficiency of Sediment
Amendments



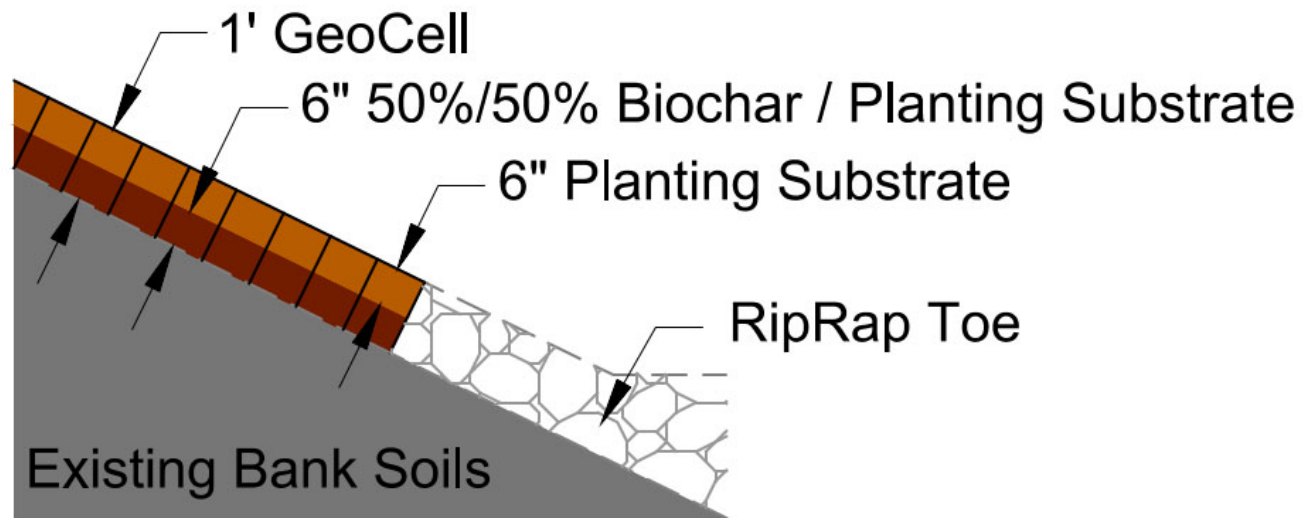
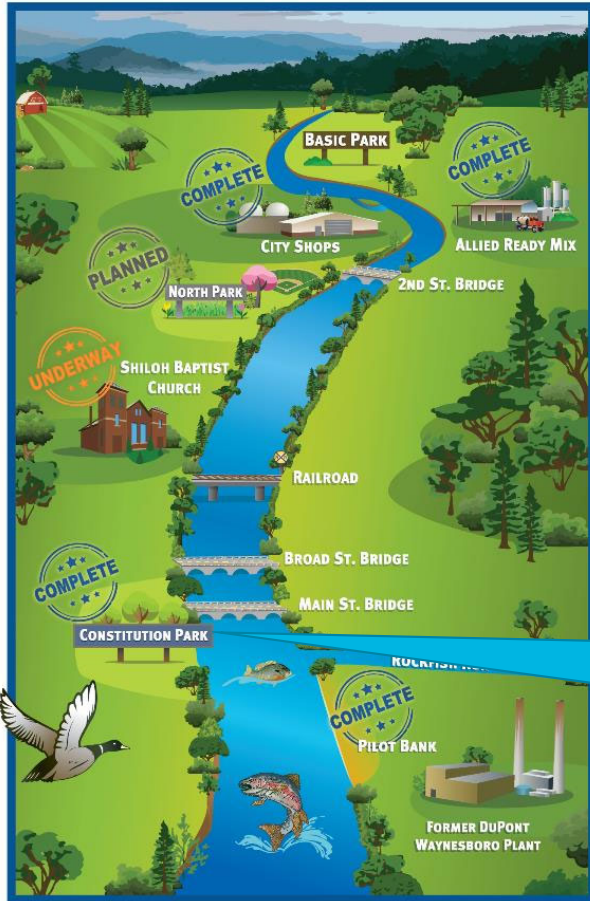
Biochar affect on Bio-
accumulation in aquatic
invertebrate and in
earthworms **AECOM**

Implementation Timeline



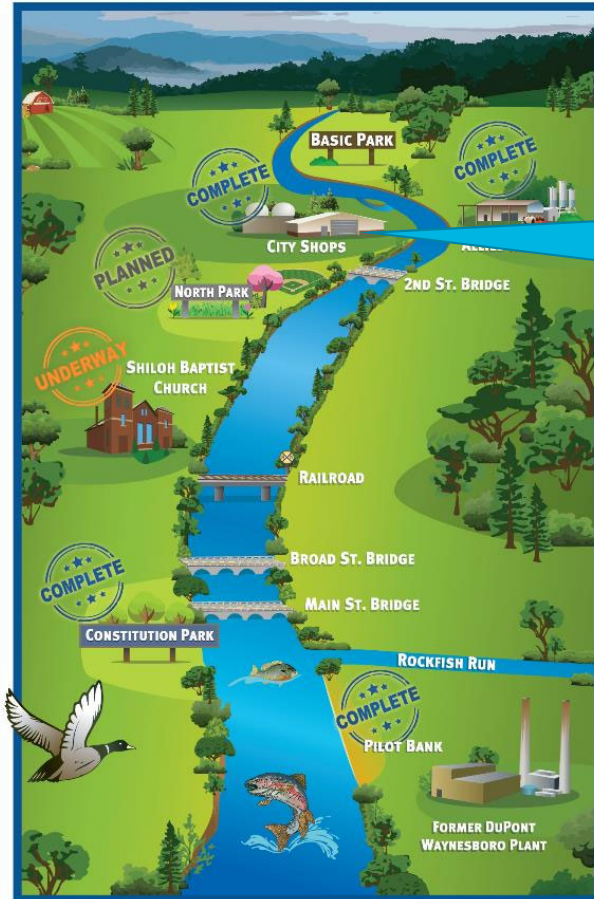
2009: Pilot Bank
No Biochar

Implementation Timeline

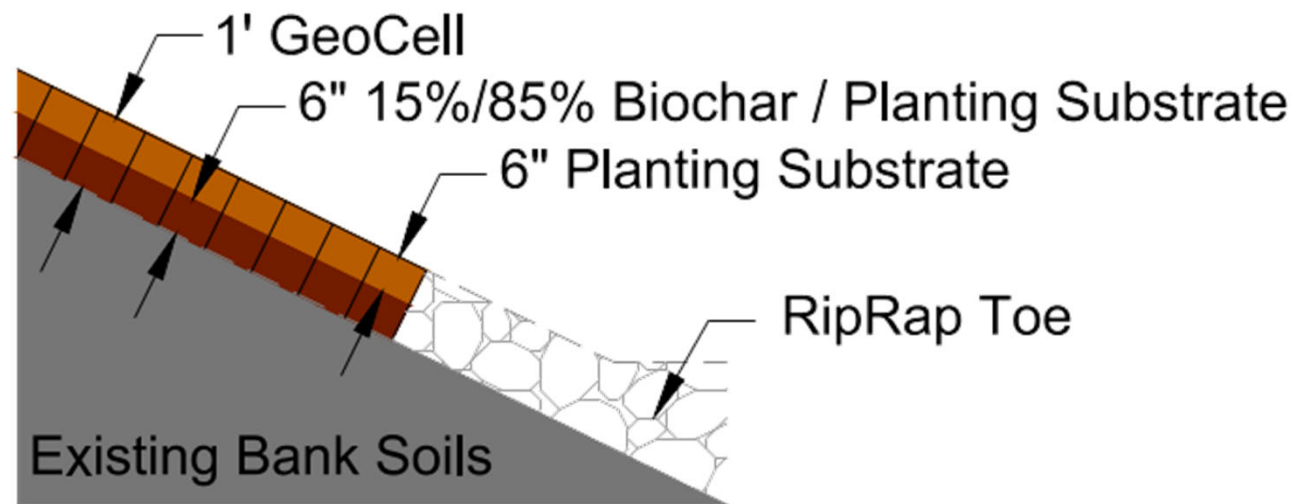


2016: Constitution Park
6" 50% Biochar Layer

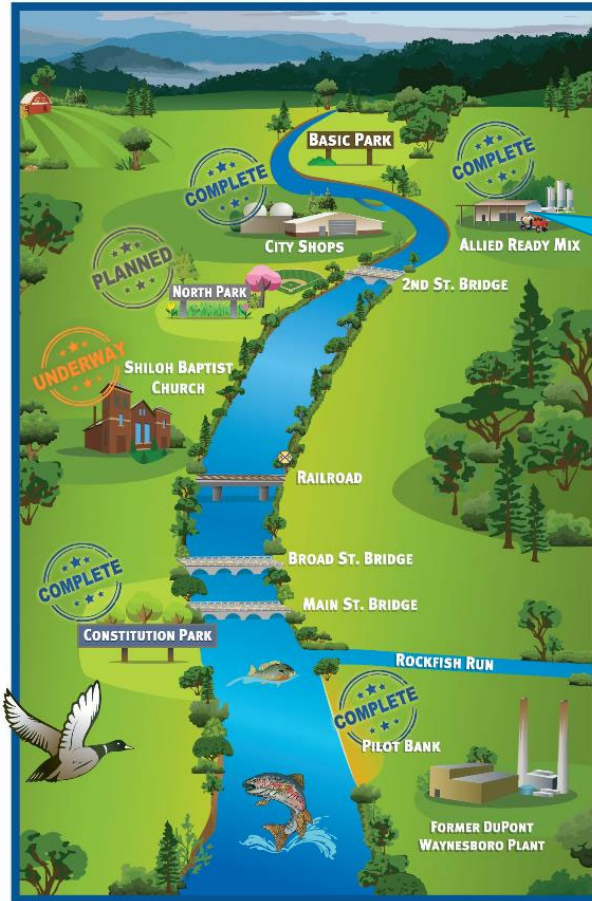
Implementation Timeline



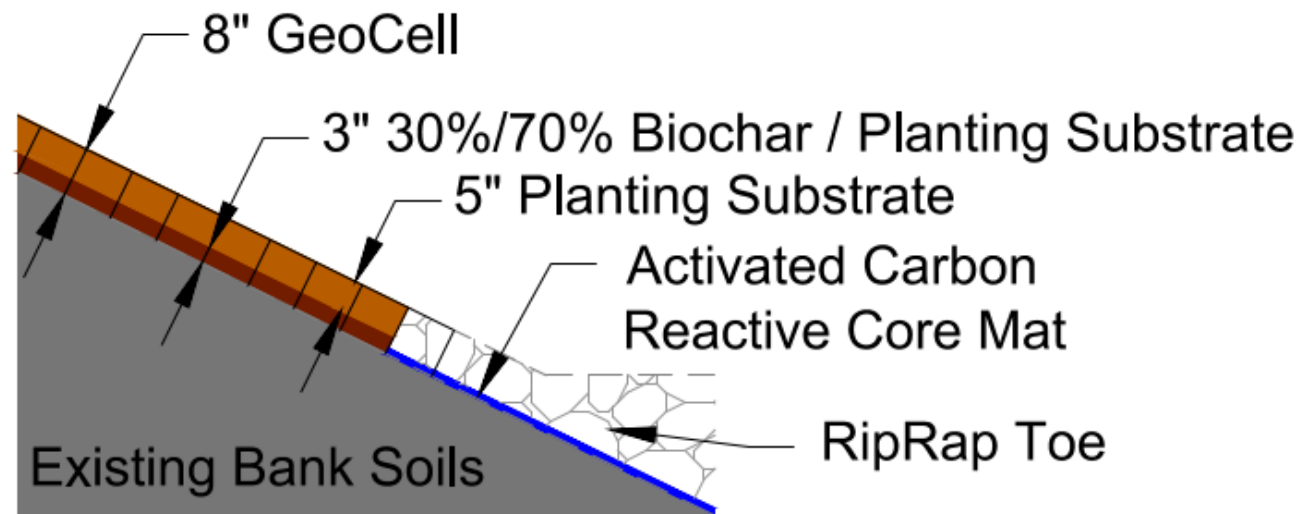
2017: City Shops
6" 15% Biochar Layer



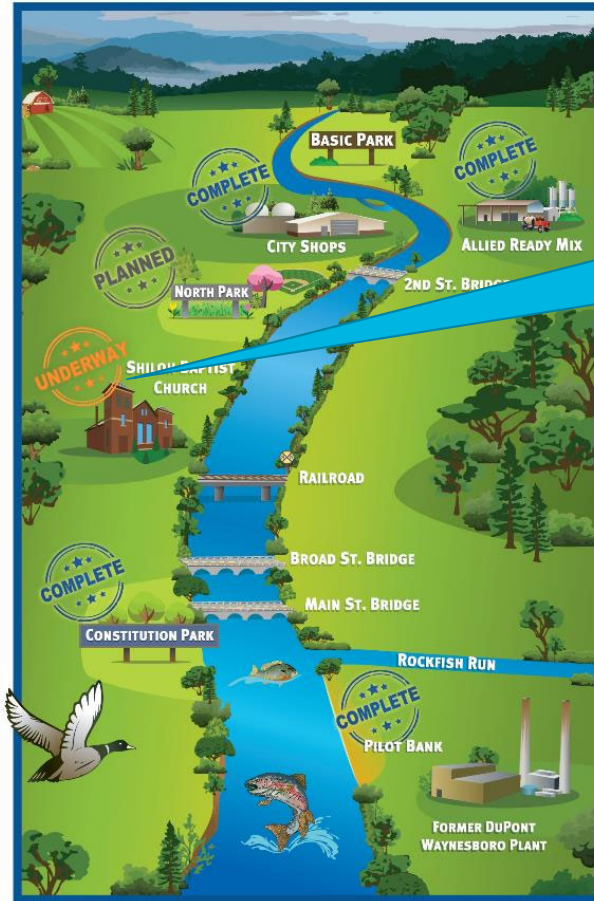
Implementation Timeline



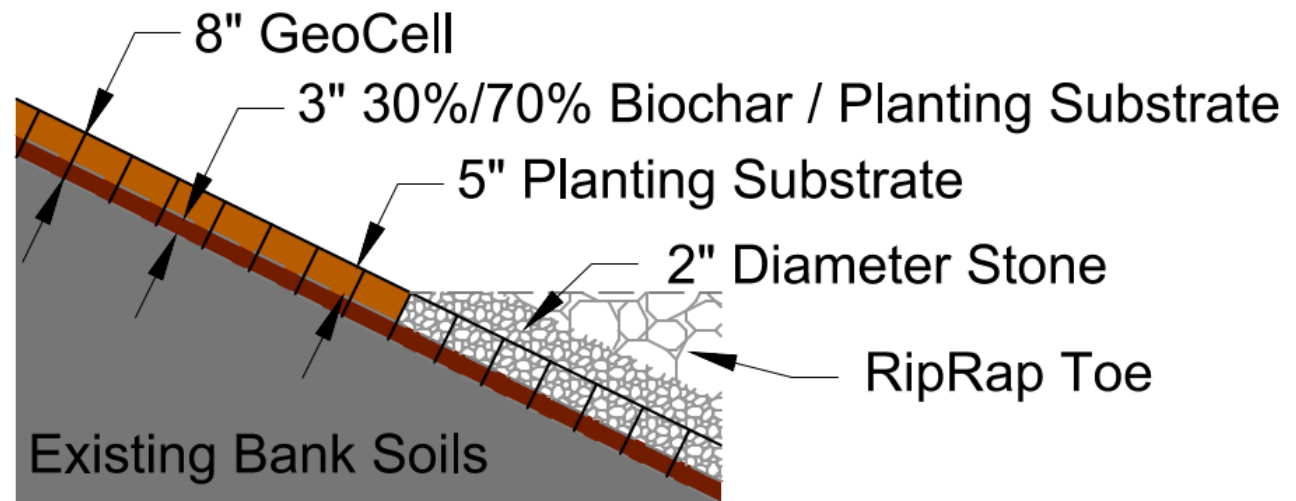
2018: Allied Ready Mix
3" 30% Biochar layer w/ AC RCM



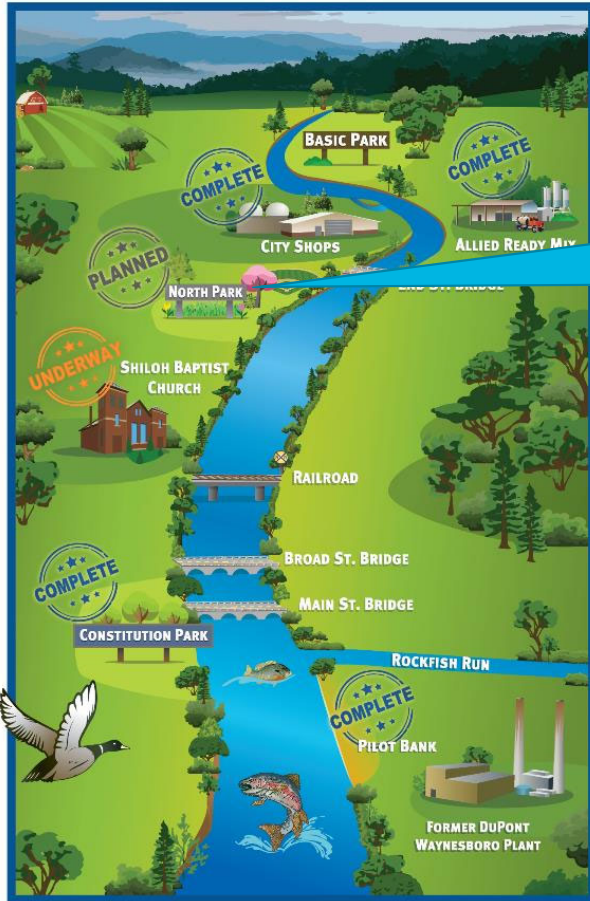
Implementation Timeline



2019: Shiloh Baptist Church
3" 30% Biochar layer to base of slope



Implementation Timeline



2020: North Park
 3" 30% Biochar layer to base of slope
 Or Biochar Bonded to Aggregate

AquaGATE+
~~BioChar~~

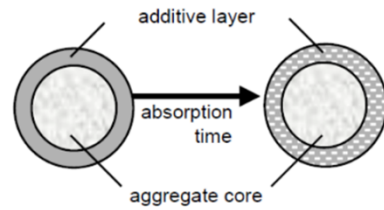


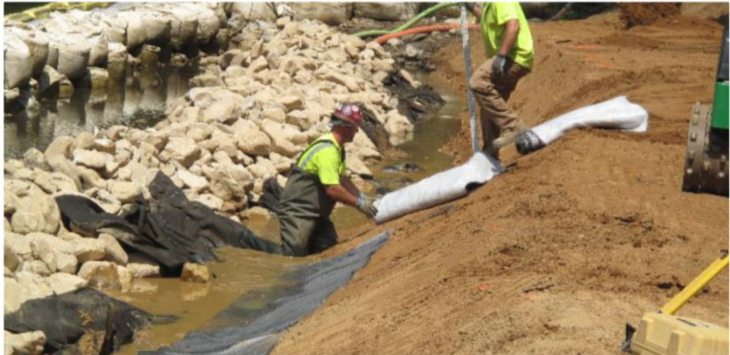
Figure 1. Configuration of PAC-coated particle.

AquaGate+PAC serves as a delivery mechanism to reliably place reactive capping materials into aquatic environments.

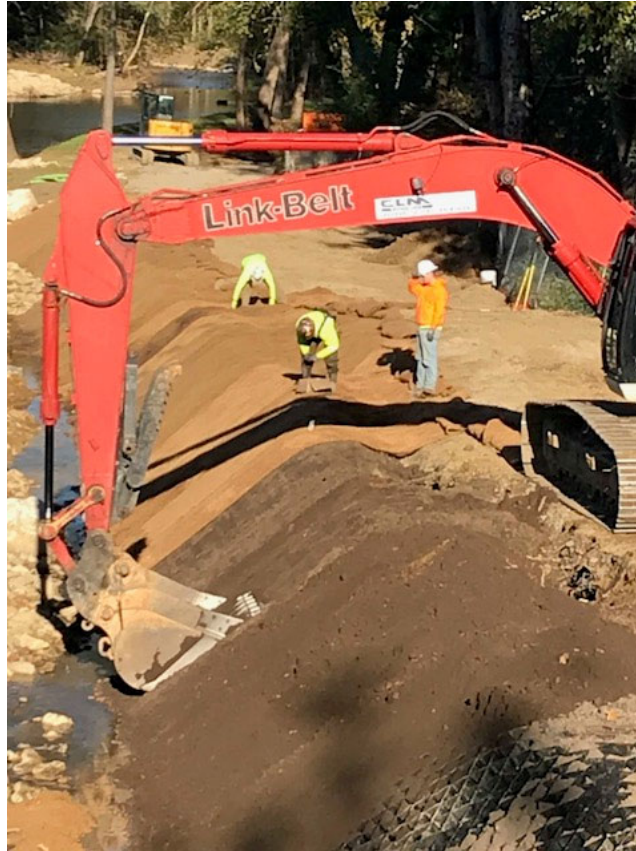
Mixing



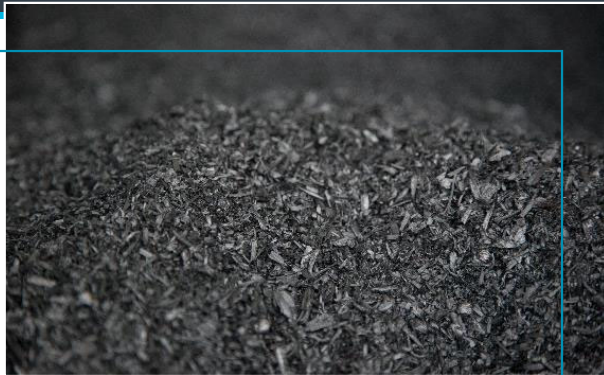
Placement



Cover and Restoration



Challenges



Supply



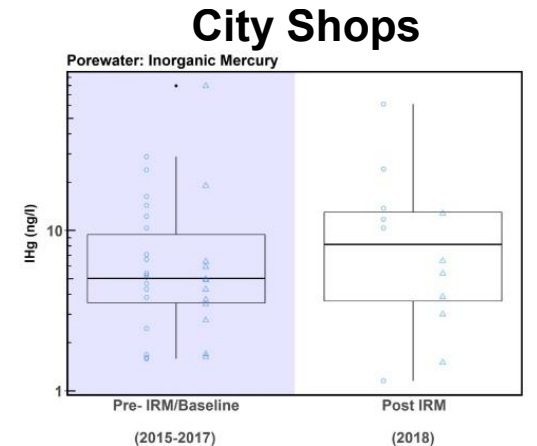
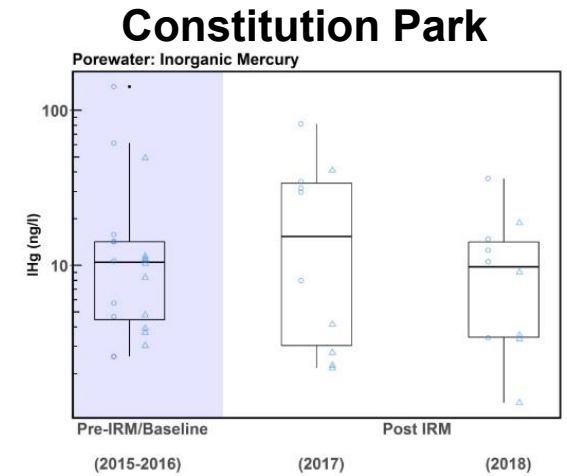
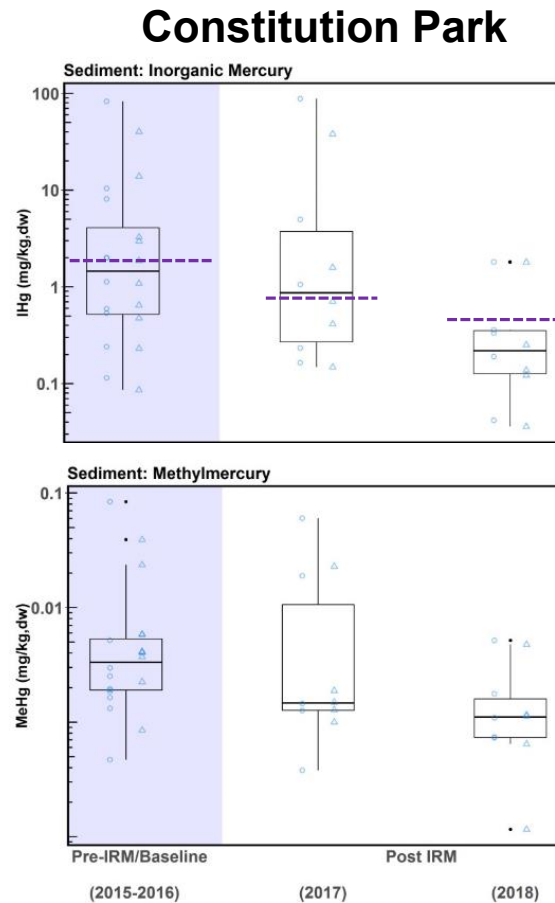
Mixing



Placement

Post Remediation Results

- Decreasing IHg and MeHg concentrations in near bank sediment
- Bulk sediment IHg concentrations similar to water column particulates
- No reduction in concentrations at non-remediated banks
- Pore water IHg concentrations decreasing after initial post remediation 'bump' at Constitution Park





AECOM Imagine it.
Delivered.



Thank You!

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